



Board of County Commissioners

Eva J. Henry - District #1
Charles "Chaz" Tedesco - District #2
Emma Pinter - District #3
Steve O'Dorisio - District #4
Lynn Baca - District #5

PUBLIC HEARING AGENDA

NOTICE TO READERS: The Board of County Commissioners' meeting packets are prepared several days prior to the meeting. This information is reviewed and studied by the Board members to gain a basic understanding, thus eliminating lengthy discussions. Timely action and short discussion on agenda items does not reflect a lack of thought or analysis on the Board's part. An informational packet is available for public inspection in the Board's Office one day prior to the meeting.

THIS AGENDA IS SUBJECT TO CHANGE

Tuesday
July 27, 2021
9:30 AM

1. ROLL CALL

2. PLEDGE OF ALLEGIANCE

3. MOTION TO APPROVE AGENDA

4. AWARDS AND PRESENTATIONS

- A.** Resolution Approving the Award of Open Space Grant Awards and Grant Agreements on July 27, 2021
(File approved by ELT)
- B.** Spring 2021 Open Space Sales Tax Awards Presentation

5. PUBLIC COMMENT

A. Citizen Communication

A total of 30 minutes is allocated at this time for public comment and each speaker will be limited to 3 minutes. If there are additional requests from the public to address the Board, time will be allocated at the end of the meeting to complete public comment. The chair requests that there be no public comment on issues for which a prior public hearing has been held before this Board.

B. Elected Officials' Communication

6. CONSENT CALENDAR

- A.** List of Expenditures Under the Dates of July 05-09, 2021
- B.** List of Expenditures Under the Dates of July 12-16, 2021
- C.** Minutes of the Commissioners' Proceedings from July 20, 2021

- D.** Resolution Approving Community Development Block Grant Coronavirus Substantial Amendment to the 2019 Annual Action Plan
(File approved by ELT)
- E.** Resolution Approving Right-of-Way Agreement between Adams County and 100th Way, LLC, for Property Necessary for the Pecos Street Roadway and Drainage Improvements Project from West 52nd Avenue to West 58th Avenue
(File approved by ELT)
- F.** Resolution Approving the 2021 Annual Action Plan
(File approved by ELT)
- G.** Resolution Approving Development Agreement between Adams County and 6300 Broadway Associates LLC
(File approved by ELT)
- H.** Resolution Approving Intergovernmental Agreement Regarding Cost-Sharing between Adams County and the City of Westminster for the Resurfacing of 92nd Avenue - Lowell Boulevard to Federal Boulevard Project
(File approved by ELT)
- I.** Resolution Approving Right-of-Way Agreement between Adams County and Balboa Park Homes Association for Property Necessary for the York Street Roadway and Drainage Improvements Project from East 78th Avenue to East 88th Avenue
(File approved by ELT)
- J.** Resolution Authorizing the Acquisition of Property Interests Necessary for the Construction of the Improvements for the York Street Improvements Project – East 78th Avenue to East 88th Avenue
(File approved by ELT)
- K.** Resolution Approving Abatement Petitions and Authorizing the Refund of Taxes for Account Numbers P0038060, R0095464, R0094964, R0094766, and R0103239
(File approved by ELT)
- L.** Resolution Approving Adams County Colorado Lease Agreement for a Portion of the Pete Mirelez Human Services Center Located at 11860 Pecos Street, Westminster, CO 80033 between Work Options for Women and Adams County
(File approved by ELT)
- M.** Resolution Amending the Adams County Open Space Policies and Procedures and Open Space Bylaws
(File approved by ELT)

7. NEW BUSINESS

A. COUNTY MANAGER

- 1.** Resolution Approving Amendment Two to the Agreement between Adams County and American Logistics Company, LLC., to Provide Transportation Services
(File approved by ELT)
- 2.** Resolution Approving Amendment One to the Agreement between Adams County and Shiloh Home Inc., to Provide Guaranteed Beds
(File approved by ELT)
- 3.** Resolution Approving an Agreement between Adams County and Guidehouse Inc., for Customer Journey Mapping
(File approved by ELT)

4. Resolution Approving an Agreement between Adams County and Lumin8 Transportation Technologies for the Adams County Signal System Equipment Upgrade Project
(File approved by ELT)
5. Resolution Approving an Agreement between Adams County and MaxSecure Systems, Inc. for an Anti-Ligature Inmate Bunk System
(File approved by ELT)

B. COUNTY ATTORNEY

8. Motion to Adjourn into Executive Session Pursuant to C.R.S. 24-6-402(4)(b) for the Purpose of Receiving Legal Advice Regarding Workers' Compensation Coverage

9. LAND USE HEARINGS

A. Cases to be Heard

1. PLN2021-00004 Oil & Gas Amendments to the Adams County Development Standards & Regulations
(File approved by ELT)
2. RCU2021-00004 Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
(File approved by ELT)

10. ADJOURNMENT

AND SUCH OTHER MATTERS OF PUBLIC BUSINESS WHICH MAY ARISE

From: noreply@granicusideas.com
Sent: Monday, July 26, 2021 1:01 PM
To: Erica Hannah
Subject: New eComment for Board of County Commissioners on 2021-07-27 9:30 AM

Please be cautious: This email was sent from outside Adams County

New eComment for Board of County
Commissioners on 2021-07-27 9:30 AM

Kate Christensen submitted a new eComment.

Meeting: Board of County Commissioners on 2021-07-27 9:30 AM

Item: 1. 21-604 PLN2021-00004 Oil & Gas Amendments to the Adams County Development
Standards & Regulations (File approved by ELT)

eComment: 350CO is a 501(c)3 nonprofit organization with a mission to work locally towards building a global grassroots movement to solve the climate crisis. We have over 20,000 members statewide, including hundreds in Adams county, working to address the root causes of the climate crisis and to promote equitable and lasting solutions. With regards to the proposed oil and gas amendments, we urge Adams County Commissioners to go farther to support public health, safety and the environment as mandated under SB 181. This is especially important in Adams County where oil and gas activity significantly impacts communities beyond drilling. The cumulative impacts of Suncor oil refinery, Cherokee plant and all the other oil and gas drilling including the controversial Ivey site need to be taken into consideration before approving permits. Hard setbacks and reverse setbacks of 2,500 ft, with no variances, is also of the upmost importance in protecting health and safety. Kate Christensen, 350 Colorado
View and Analyze eComments

This email was sent from <https://granicusideas.com>.

Unsubscribe from future mailings

From: noreply@granicusideas.com
Sent: Monday, July 26, 2021 4:13 PM
To: Erica Hannah
Subject: New eComment for Board of County Commissioners on 2021-07-27 9:30 AM

Please be cautious: This email was sent from outside Adams County

New eComment for Board of County
Commissioners on 2021-07-27 9:30 AM

Lisa Gudmundson submitted a new eComment.

Meeting: Board of County Commissioners on 2021-07-27 9:30 AM

Item: 1. 21-604 PLN2021-00004 Oil & Gas Amendments to the Adams County Development
Standards & Regulations (File approved by ELT)

eComment: Since this only allows 1000 characters i am submitting my comment to each
Commissioner via email and requesting my comment be made part of the official record for the
hearing on 7/27/2021

[View and Analyze eComments](#)

This email was sent from <https://granicusideas.com>.

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7/26/2021

Dear Commissioners,

I am writing this comment to be added to the official record for the hearing regarding Oil and Gas operations in Adams County on 7/27/2021.

First off, I would like to thank you for taking time to update our current regulations on this matter. However, I feel that this decision was made after your decisions to allow numerous sites to be drilled. The fact that you exposed your constituents in this area to unnecessary risks and did not take their health or safety into consideration is worrisome. You decided to allow a site to be drilled behind the government center and put neighbors and employees in danger. ***I will be attaching an article regarding a recent fire at a drill site at the end of this comment.***

Here is a list of things that I hope you take into consideration when determining the new Regulations:

Setbacks-regular setbacks from homes and reverse setbacks from future development. We do not need a repeat of what happened in Firestone in 2017. Pursuant to SB-181 your duty, as elected officials, is to maintain the health and safety of your residents. Not putting adequate setbacks in place, the **minimum** of 1500-2500 feet is irresponsible and setting the County up for future lawsuits if something were to happen. You are aware of the dangers of this industry and not addressing those dangers puts you in breach of your duty as representatives.

Environment-it is your responsibility to make sure that the environment, in our County, is upheld for the health and safety of your residents. Your responsibility is to make sure our water "quality" (considering how awful our water is already). If something were to go wrong while these companies are drilling then our area would be worse off than Flint, Michigan. Since these companies are drilling through our aquifers it is only a matter of time before something goes wrong and their RADIOACTIVE materials leech or spill into our water system.

The water quality is just a small piece of the bigger picture; however, we need to cut down on the amount of water that is frivolously used to drill wells. Colorado is in a drought and eventually we will run out of water if we do not stop wasting it on industries like oil and gas. We need to make sure that we preserve our water for our children and grandchildren. Allowing this industry to contaminate our water is unconscionable and should be stopped.

You also need to make sure that our air quality is at a breathable level. I am requesting that, on "high danger air quality days" you mandate a stop of all drilling. This industry puts pollutants in the air that are compounding an already unhealthy breathing situation for your residents. Just today the air quality is at 122 AQI which is "unhealthy for sensitive groups".

Ultimately, it is your responsibility as a Commission to make sure the future of Adams County is taken into consideration when you are making deals with industries that intentionally pollute our water and air.

I would like to address the real possibility of something going wrong on one of these sites and causing undo harm and stress to the residents in Adams County. This is a real possibility and Adams County should not allow the oil and gas industry to encroach on our neighborhoods. Most of us bought our houses prior to any applications being submitted or any action brought forth by this industry. For most of us, the ones who understand health and safety are the number one priority in this area, we would not have bought homes if we knew this was a possibility. I did not decide to live here and share my living space with an industry that is dangerous and can cause harm to my family.

In Arapahoe County, on 6/6/2021 there was a large oil and gas fire near Bennett. **That fire started at approximately 13:45 hours** and numerous crews responded. The Arapahoe County Sheriff's Office closed East Quincy and Watkins Road was closed THREE MILES north of Quincy. THERE WERE NO HOUSES WITHIN A MILE OF THE SITE AND YET THERE WAS A THREE MILE ROAD CLOSURE DUE TO THE FIRE!! (usually the evacuation radius is a mile so how bad was this fire and it is not being disclosed how dangerous it was.)

There were fire crews from Bennett, South Metro Fire, hazmat and the bomb squad were also on scene for a fire at a drill site. To quote the ACSO, Officer Delgado, **"they're taking their time because of the HAZARDOUS MATERIALS and they're just trying to be extra careful."** The firefighters **didn't "start fighting the fire" until after 19:00 hours.**

Now, ask yourselves, how in the world would this have played out if it was next to the Government Building, if it was in a neighborhood, if it was near a school, how about if it was in YOUR neighborhood? How would you feel if your local government was willing to put your family, home, neighbors, the disabled, the environment in danger for an industry? Would you lay down and allow such things or would you fight to protect what matters to you?

I am asking that you take your constituents into consideration when you are determining the updates to the regulations for oil and gas operations. If your mom/dad needed to get out quick due to an accident. If your kids are in school and get locked down due to an industrial/hazmat situation. If you cannot get to your house because it is in an evacuation radius (most of the time it is a mile radius for evacuations). How about if you are told to stay in your home and turn off all a/c or furnace operations. These are all things that your constituents are worried about.

I would like to point out that the money from this industry is a carrot on a stick, but the dangers and clean up after they leave is going to cost the taxpayers in this area. As this industry is slowing being dismantled by OPEC. Intergovernmental wars over pricing, and renewable energy

it is not a good investment to expose your residents to dangers this industry presents. How many wells has Adams County had to cap after a company bails and moves on? Why should taxpayers have to pay for this?

While I know that you will probably not even read this comment I would like to assure you that more of us feel this way than don't. Our local governments have made commenting on this and being involved so cumbersome that most people just don't participate. I belong to a neighborhood group of over 100 people NRCC, who are your constituents, and feel the same way I do. Most of us feel that having a public meeting, in person, during a pandemic is irresponsible and that shows how little the County values health and safety. It is embarrassing to tell people that we are in Adams County because of the backwards leaning ways that we do things. I can tell you that the democrat majority in this County voted and worked to get you voted to uphold our values and views and thus far that is not being done. I can tell you that we will not fight for people who are not willing to do the hard work and stand up to industries and stand up for residents.

I am hoping that you will not allow any further drilling near homes just because the land is in unincorporated Adams County and you keep in mind that these companies are drilling under homes in Adams County and to add insult to injury they are leasing mineral rights for pennies on the dollar. I do not know how anyone would find this type of predatory behavior appropriate.

I would also like to note that this industry likes to boast how much it does for our communities, however, we don't have enough schools for our students, the only thing they do is pay taxes and that money goes into the appropriate coffers and is distributed per TABOR. They are not doing anything above and beyond any other industry in Colorado. They boast how many jobs they support; however, they would also have to give renewables some credit too if they are going to claim that. This industry likes to claim they put so much money into the state but then forget to mention how much they get in subsidies.

I appreciate your consideration for my suggestions and follow SB-181 to make sure our health and safety is upheld.

Sincerely,

Lisa Gudmundson

303-885-8274

Mother of an 8-year-old, Adams County Resident, born and raised in Adams County and Jefferson County (should have stood in Jeffco but found a cheap house in Adams County), member of the Palizzi family and Veteran

<https://www.airnow.gov/?city=Henderson&state=CO&country=USA>

<https://kdvr.com/news/local/chemical-facility-fire-in-arapahoe-county-several-crews-responding/>

<https://www.denverpost.com/2021/07/21/american-petroleum-institute-touts-oil-gas-economic-role/>

<https://coloradosun.com/2020/03/23/colorado-oil-and-gas-tax-breaks-severance-taxes/>



1800 GLENARM PLACE

SUITE 1100

DENVER, CO 80202

Phone 303.861.0362

WWW.COGA.ORG

July 26, 2021

VIA EMAIL – NO ORIGINAL TO FOLLOW

ATTN:

Adams County Commissioners
Greg Dean, Local Governmental Designee
Katie Keefe, Environmental Program Manager, CED
Christy Fitch, Assistant County Attorney
Erica Hannah, Planning Commission Point of Contact

RE: Colorado Oil & Gas Association – Corrections to Staff Comments at Planning
Commission Hearing

Dear Adams County Commissioners, Planning Commission, Staff, and Counsel,

The Colorado Oil & Gas Association ("COGA") submits this letter to correct erroneous and misleading comments made by staff during the Planning Commission hearing on July 8, 2021 regarding Adams County's proposed oil and gas regulation amendments. COGA does not mean to suggest staff was intentionally misleading but the facts in the record must be accurate. Thus, it is important that the Planning Commission and the Board of County Commissioners are made aware of the following clarifications prior to the public hearing on July 27.

Regarding setbacks, COGA believes the discussion regarding noise and the placement of sound walls deserves further clarification. It was stated by staff that on a recent tour, hydraulic fracturing ("frack") tanks and frack trucks were being staged outside of a location's sound walls. Staff suggested that these trucks would create unmitigated noise, which, to staff, demonstrates the necessity for setbacks to be measured from the edge of the oil and gas location instead of the Working Pad Surface or where wells and production facilities are located.¹ It should be noted that while trucks and other

¹ The state allows the Working Pad Surface of an oil and gas location to be within 2,000' of residential buildings so long as the wells, tanks, separation equipment, and compressors on a location are located more than 2,000' away. *See* COGCC Rule 604.b.(3). Within the 600 Series Rules there are other pathways to approval as well.

equipment may be staged on an access road to the location, they are not operating (fracking, blending, etc.), and thus not producing noise levels that would be deemed excessive. Sound walls exist to cover the entirety (minus ingress/egress points) of the Working Pad Surface to ensure that noise is mitigated. COGA is not aware of oil and gas operations occurring outside of sound walls. Staff should also be aware of the new requirements and mitigation measures required post-SB19-181 and understand that sites approved prior to that date may not fall under the new regulatory regime.

Staff also incorrectly stated that at the time of permitting, there is not a way to know where the sound walls could be located, so an operator could move its Working Pad Surface around, affecting nearby building units. This is incorrect. When a permit is submitted, an operator must know the location of their wells, which would be delineated on the COGCC's Form 2A permit. Operators cannot, and do not, arbitrarily decide to move their Working Pad Surface around as they choose. The Working Pad Surface location must be set so the Colorado Oil and Gas Conservation Commission ("COGCC") can evaluate the location under its Rule 604.

As a global comment, if sound walls are used by an operator to help mitigate sound, Adams County should be aware that all drilling and completions operations, other than going to and leaving the pad, happen within those sound walls. It is unreasonable and inconsistent with the COGCC to measure setbacks from the edge of the disturbed area when there will be no oil and gas activity occurring outside of the Working Pad Surface. COGA would like to make this clarification and again ask that the County re-define how it measures setbacks.

Also regarding setbacks, staff stated that the 2019 CDPHE study supports more restrictive setbacks. That is an incomplete statement at best. That study, based on modeled and not real data, concluded that under "worst-case" scenarios there may be potential for short-term health impacts. The study was based largely on oil and gas operations that occurred prior to 2014 and *before* the COGCC instituted a suite of extremely protective regulations that reduce impacts. Importantly, the CDPHE study, as CDPHE itself notes, "is not based on actual health impacts people have reported from oil and gas operations or on measured concentrations in the air surrounding the well pad."²

There is better scientific data available, also performed by CDPHE, that is based on *actual, not-modeled* oil and gas operations that are more recent. COGA has previously submitted this data to the County, which can be found in Appendix A, located in a separate attachment. Of note, this data showing no health impacts was gathered even before the COGCC adopted yet more protective regulations in its "Mission Change" rulemaking. As such, if the County is legitimately interested in science-backed outcomes, it should reduce its proposed setbacks as they are neither reasonable nor necessary.

² See CDPHE One-Pager on study at <https://drive.google.com/file/d/1ST8yZ0bUBrEzIkWsalOWCMHNjHNXarHO/view>

To the extent County staff may suggest to you that the setbacks should be retained because a waiver process is available for operators to seek lesser setbacks than those proposed, COGA believes that process to be illusory. The waiver process in the draft regulations is extremely onerous and subjective. It is on its face much more stringent than state setback reduction criteria, and COGA does not believe that such heightened scrutiny is necessary or reasonable.

In closing, COGA would like to again note that Adams County has not received ***a single*** new oil and gas permit application since March 2019. Adams County has continually publicly stated that it is a business-friendly jurisdiction, yet it continues to implement rules and draft proposed regulations that bring uncertainty and send a warning signal to the larger business community. COGA thanks Adams County in advance for its close attention to the issues addressed above.

Sincerely,

A handwritten signature in dark ink, appearing to read "R. Seastrom", is positioned above the typed name.

Ryan Seastrom, Regulatory Affairs Manager, Colorado Oil & Gas Association

cc (via email):

Mark Mathews-Brownstein Hyatt Farber Schreck, LLP

Julia Rhine-Brownstein Hyatt Farber Schreck, LLP

Rich Coolidge-Colorado Oil & Gas Association

Dan Haley-Colorado Oil & Gas Association

Christy Woodward-Colorado Oil & Gas Association

Appendix A – Supplement to COGA Redlines – Chapter 4 Draft Amendments

CDPHE (2020) (Broomfield) —Air monitoring of VOC levels ~700 feet away from wells at multi-well well pad shows no risk or acceptable risk for both short-term and long-term health effects. The Oil and Gas Health Information and Response Program (“OGHIR”) at the Colorado Department of Public Health and Environment (“CDPHE”)’s Toxicology and Risk Assessment Section deployed the Colorado Air Monitoring Mobile Laboratory (“CAMML”) approximately 700 feet from 18 wellheads at Extraction Oil & Gas’s Livingston location to conduct air sampling at baseline levels and then during all stages of operations: drilling, hydraulic fracturing, millout, and Next Generation flowback/production. Comparing the results of over 4,000 hours of monitored data to state and federal guidelines regarding acceptable health levels of VOCs, the state concluded that VOCs were “below health guideline values” and that emissions were “below what we expect would cause short- and long-term harmful health effects” for general health.

CDPHE (2020) (Weld County), —1,565 hours of initial air monitoring and 364 hours of additional air monitoring measured minimal risk or EPA “acceptable” risk for both short-term and long-term health effects at distance of 1,400 feet from multi-well well pad. In 2019 and 2020 CDPHE deployed its CAMML to the Bella Romero Academy located approximately 1,400 feet from Extraction’s Vetting location. The state concluded as follows regarding the levels of VOCs measured in the state’s first analysis period of 1,566 hours’ worth of data, “The levels of VOCs measured in all the other samples (1,565 hours) were below what we expect would cause short- and long-term non-cancer health impacts.” The state did note in a single sample taken on November 5, 2019, that there was a marginally elevated level of benzene for approximately ten minutes in the hour window compared to short-term, but not long-term, risk guidelines. The state’s report explained that the one-time anomaly “does not mean people will have negative health impacts.” To follow-up on the one-time aberration, CDPHE conducted an additional 364 hours of CAMML monitoring, concluding that “[t]he amounts of specific VOCs measured during follow-up sampling were below short- and long-term health guideline values[,]” and that “[a]dditional ‘total’ VOC monitors at the school after the CAMML left also indicate that the elevated level seen on Nov. 5 is not a common occurrence.”

CDPHE (2020) (Boulder County) —The OGHIR deployed the CAMML to collect hourly air samples and measure VOCs associated with oil and gas emissions during the Rinn Valley West flowback and early production phases. The results concluded that the “measured air concentrations of each VOC was below short-term or long-term health guideline values[,]” and that “estimates for carcinogenic VOCs, benzene and ethylbenzene, were less than 10 in one million,” which falls well within EPA’s “acceptable” risk range of 1 to 100 in one million.

CDPHE (2018) (Brighton) —Evaluation of six priority VOCs showed all individual VOCs well below short and long-term health guideline values where VOCs were measured approximately 1,500 feet from oil and gas development. In 2019 the OGHIR deployed the CAMML approximately 1,500 feet from the Dittmer location for 50 hours of continuous monitoring during drilling operations and was “unable to document conditions that suggest an ongoing health hazard at this time” due to the low VOC levels.

CDPHE (2018) (Erie), —Analysis of 60 VOC substances and found all air concentrations below short- and long-term health guideline values at a distance of approximately 1,500-2000' feet from two oil and gas locations; follow-up sampling had same result. The OGHIR collected two air samples in the early morning on May 23, 2018, when VOC levels are typically the highest. One sample was approximately 1,500-2000' feet from two oil and gas locations while the other sample was obtained from approximately 3,000 feet away. Despite the early morning sampling, the state concluded, "The levels of VOCs measured during this air sampling investigation are unlikely to cause non-cancer health effects or increased cancer risks and were below the average VOC levels that have been measured in the region." The state also observed, "All air concentrations of individual VOCs were lower than the average air concentrations measured at the regional background location for the same month." The OGHIR conducted follow-up sampling later in the year and reached the same conclusion as it previously had, determining, "The levels of VOCs measured during this air sampling investigation are unlikely to cause non-cancer health effects or increased cancer risks and were consistent with previous sampling."

CDPHE (2017)(Greeley) —Samples taken at locations 1,200-1,500 feet from oil and gas development demonstrated all oil and gas related VOCs to be at levels of low risk for short- and long-term health impacts. The OGHIR provided an air sampling canister to a Greeley resident with instructions to collect an air sample during a future incident where they perceived strong odors and/or had health concerns about emissions from the nearby Triple Creek location. The state found, "Of the 60 substances analyzed, isoprene was the only substance that slightly exceeded (2.8ppb) its long-term health-based reference level (2.0ppb). Isoprene is primarily emitted from vegetation and humans. Published information indicates that isoprene is not emitted at significant amounts from oil and gas operations and therefore, it is unlikely that Triple Creek oil and gas operation would be the main source of this substance. The results for the other 59 substances analyzed indicated that all air concentrations of individual and combined VOCs were below short- and long-term health-based reference values and approximately the same or below the average air concentrations along the Front Range."

CDPHE (2020) (Lafayette) —In 2019 the OGHIR used newly acquired technologies to collect measurements of "total" VOCs at a Lafayette residence where the resident had complained of oil and gas related health concerns. Measurements were taken from the resident's porch to measure outdoor VOCs as well as indoors due to concerns that the ventilation system was drawing volatile organic compounds from outside air into the home. The measurements revealed that most of the time VOCs were typically ten times higher indoors than outside the home, due to everyday activities like cooking, cleaning, and using nail polish. The outdoor VOCs "followed a typical pattern that is expected based on daily changes in temperature and sunlight, where the amount of 'total' VOCs increases overnight and reaches the highest point in the early morning." The state did not recommend any additional sampling due to the outdoor VOC measurements.



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Spring 2021 Open space Sales Tax Grant Awards
FROM: J. Byron Fanning, Jr., Mary Willis, and Rae-Anne Reichow
AGENCY/DEPARTMENT: Parks, Open Space and Cultural Arts
HEARD AT STUDY SESSION ON: July 20, 2021
AUTHORIZATION TO MOVE FORWARD: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners Approves

BACKGROUND:

Staff presented the Spring 2021 Grant Applications to the BOCC on July 20, 2021. During the study session, the BOCC agreed to fund all grant requests. Listed below is a financial accounting of all grant requests and their overall impact on the fund.

On March 29, 2021, the Open Space Program received 15 full grant and 5 mini grant applications for a total of 20 grant submissions. The total amount requested for open space grants in this cycle is \$9,086,673.00 which includes mini grants. The total amount available for distribution was \$18,631,014.06.

The Open Space Advisory Board (OSAB) recommended full funding of all the applications. If the Board of County Commissioners follows the OSAB's recommendations, the fund will carry a balance of \$9,544,341.06 to the next grant cycle. The projects are listed according to their ranking, with mini grants listed last.

A detailed list of projects and the Open Space Advisory Board's recommendations for funding is below.

Applicant	Project	Amount
City of Westminster	Tri-State Open Space	\$402,500.00
City of Brighton	HSV Target Property 1	\$2,500,000.00
Adams County	AC Water Efficiency Upgrades	\$100,000.00
Strasburg Metro Parks and Recreation	Community Park East Planning	\$36,085.00
City of Commerce City	Monaco Park Renovation Phase One	\$960,000.00
Adams County	Riverdale Bluffs Trail System Phase One	\$750,000.00
City of Thornton	Grange Hall Creek Park Renovation	\$985,489.00
LuBird's Light Foundation	LuBird's Playground at Stanley Marketplace	\$150,000.00
City of Brighton	Founders Plaza Phase Two	\$385,000.00
Town of Bennett	Trupp Park Phase V	\$198,000.00
City of Northglenn	Jaycee Park Ballfield Improvements	\$170,000.00
Mapleton Public Schools	Rainbow Park at Monterey	\$330,000.00
City of Federal Heights	90th Ave Tree Planting	\$100,730.00
Hyland Hills Park and Recreation	Clear Creek Valley Park Phase One	\$285,000.00
City of Thornton	Carpenter Recreation Center Renovations	\$1,711,909.00
Adams County Facilities	Adams County Sherriff's Memorial Wall	\$5,000.00
Barr Lake State Park	Lake Appreciation Day 2021	\$1,960.00
City of Northglenn	Sustainable Path to Northglenn's Trails and Waterways	\$5,000.00
City of Thornton	Stocking Fish Growth for Anglers	\$5,000.00
Town of Bennett	Community Garden Expansion	\$5,000.00

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Open Space Advisory Board, Applicants

ATTACHED DOCUMENTS:

Resolution approving the award of Open Space Grant Awards.

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 28**Cost Center:** 6202

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	8810		\$9,086,673.00
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			\$9,086,673.00

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☒ NO

Additional Note:

N/A

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING THE AWARD OF OPEN SPACE GRANT AWARDS AND
GRANT AGREEMENTS ON JULY 27, 2021

Resolution 2021 -

WHEREAS, Adams County voters approved an Open Space Sales Tax on November 3, 1999, to be used in accordance with Resolution 99-1; and,

WHEREAS, Resolution 99-1 specifies that the Board of County Commissioners shall appoint an Adams County Open Space Advisory Board to recommend projects to be funded through a grant program using 68% of the Open Space Sales Tax; and,

WHEREAS, Resolution 2020-480 was approved on November 3, 2020. Voters approved a resolution to authorize the permanent extension of an existing countywide sales tax of one-fourth of one percent (one-fourth penny per dollar) for the continued purpose of preserving open space and creating and maintaining parks and recreation facilities; setting the ballot title and text for the election; and providing the effective date of such resolution; and,

WHEREAS, the Adams County Open Space Advisory Board has received, and reviewed grant applications submitted on April 5, 2021 for tax funds collected in the second half of 2020; and,

WHEREAS, the Adams County Open Space Advisory Board made the following recommendations to the Board of County Commissioners:

Applicant	Project	Amount
City of Westminster	Tri-State Open Space	\$402,500.00
City of Brighton	HSV Target Property 1	\$2,500,000.00
Adams County	AC Water Efficiency Upgrades	\$100,000.00
Strasburg Metro Parks and Recreation	Community Park East Planning	\$36,085.00
City of Commerce City	Monaco Park Renovation Phase One	\$960,000.00
Adams County	Riverdale Bluffs Trail System Phase One	\$750,000.00
City of Thornton	Grange Hall Creek Park Renovation	\$985,489.00
LuBird's Light Foundation	LuBird's Playground at Stanley Marketplace	\$150,000.00
City of Brighton	Founders Plaza Phase Two	\$385,000.00
Town of Bennett	Trupp Park Phase V	\$198,000.00
City of Northglenn	Jaycee Park Ballfield Improvements	\$170,000.00
Mapleton Public Schools	Rainbow Park at Monterey	\$330,000.00
City of Federal Heights	90th Ave Tree Planting	\$100,730.00
Hyland Hills Park and Recreation	Clear Creek Valley Park Phase One	\$285,000.00
City of Thornton	Carpenter Recreation Center Renovations	\$1,711,909.00
Adams County Facilities	Adams County Sherriff's Memorial Wall	\$5,000.00
Barr Lake State Park	Lake Appreciation Day 2021	\$1,960.00
City of Northglenn	Sustainable Path to Northglenn's Trails and Waterways	\$5,000.00
City of Thornton	Stocking Fish Growth for Anglers	\$5,000.00
Town of Bennett	Community Garden Expansion	\$5,000.00

WHEREAS, the Board of County Commissioners has reviewed the recommendations by the Adams County Open Space Advisory Board; and,

WHEREAS, the Board of County Commissioners concurs with the recommendations of the Open Space Advisory Board and desires to award grants in the amounts listed above; and,

WHEREAS, all grant awards are contingent upon the full execution of a grant agreement between the Grantee and the County; and,

WHEREAS, the signed grant agreement must be received no later than 45 days from the award date.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners, County of Adams, State of Colorado, that the above grant awards for projects submitted April 5, 2021, be and hereby are approved.

BE IT FURTHER RESOLVED, that the Chair is authorized to execute said grant agreements on behalf of “Adams County.”

BE IT FURTHER RESOLVED, that the Director of Adams County Parks, Open Space and Cultural Arts has the authority to sign as “Grantee” for the above grant agreements awarded to Adams County.

County of Adams
Net Warrant by Fund Summary

Fund Number	Fund Description	Amount
1	General Fund	1,840,739.73
4	Capital Facilities Fund	34,282.82
5	Golf Course Enterprise Fund	43,502.99
6	Equipment Service Fund	125,194.84
7	Stormwater Utility Fund	13,117.84
13	Road & Bridge Fund	53,077.50
19	Insurance Fund	719,647.08
25	Waste Management Fund	7,101.75
28	Open Space Sales Tax Fund	344,690.20
30	Community Dev Block Grant Fund	21,149.04
31	Head Start Fund	5,485.00
35	Workforce & Business Center	17,775.00
43	Colorado Air & Space Port	559.46
		<u>3,226,323.25</u>

Net Warrants by Fund Detail

1**General Fund**

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007746	1174549	BRETSCH CANDACE C	07/07/21	1,250.00
00007747	378404	CARUSO JAMES LOUIS	07/07/21	3,075.00
00007752	1053561	SIEGEL THOMAS WEIL	07/07/21	500.00
00007754	628019	BIG PAULIE PRODUCTIONS LLC	07/08/21	32,500.00
00007755	628019	BIG PAULIE PRODUCTIONS LLC	07/08/21	32,500.00
00007756	628019	BIG PAULIE PRODUCTIONS LLC	07/08/21	17,287.66
00007757	1053458	BRYAN LAURA CHRISTINE	07/08/21	500.00
00007758	1052521	COCREATE COEVOLVE LLC	07/08/21	500.00
00007760	671123	FOUND MY KEYS	07/08/21	1,962.15
00007763	1174848	POWERDMS INC	07/08/21	25,574.03
00007766	491215	WELLPATH LLC	07/08/21	741,685.23
00007774	1054420	BAWDEN JANAE A	07/09/21	625.00
00007775	1188228	ELIZONDO ENTERTAINMENT INC	07/09/21	5,000.00
00007776	1016895	G4S SECURE SOLUTIONS USA INC	07/09/21	22,976.60
00760928	1188236	24/7 FLOOD RESPONSE INC	07/08/21	11,746.46
00760929	48724	ACCELA INC	07/08/21	134,299.68
00760931	13884	ADAMS COUNTY SHERIFF	07/08/21	1,501.14
00760932	630412	ADVANCED LAUNDRY SYSTEMS	07/08/21	2,018.98
00760934	42415	AMERICAN INCOME LIFE INS CO	07/08/21	8.10
00760936	1188199	AVILA MELISSA RENE	07/08/21	19.00
00760937	802666	BENEGAS TARA	07/08/21	2,500.00
00760940	43146	BRIGHTON CITY OF	07/08/21	400.00
00760941	43146	BRIGHTON CITY OF	07/08/21	2,200.00
00760942	463401	BUSH MELVIN E	07/08/21	65.00
00760943	661015	CHP METRO NORTH LLC	07/08/21	1,050.00
00760945	647801	CML SECURITY LLC	07/08/21	19,872.91
00760946	250958	COHEN MILSTEIN SELLERS & TOLL	07/08/21	236.26
00760947	6331	COLO ASSESSORS ASSN	07/08/21	80.00
00760948	29706	COLO ASSESSORS ASSN	07/08/21	400.00
00760949	8024	COLO COUNTY ATTORNEYS ASSN	07/08/21	500.00
00760951	9425	COLO GOVT FINANCE OFFICERS ASS	07/08/21	50.00
00760952	99357	COLO MEDICAL WASTE INC	07/08/21	4,196.00
00760955	562396	COLORADO CIVIL INFRASTRUCTURE	07/08/21	66,257.26
00760956	64269	COLUMBIA SANITARY SERVICE INC	07/08/21	9,350.00
00760957	414764	COMMUNITY MEDIATION CONCEPTS	07/08/21	237.50
00760958	134563	COOK COUNTY SHERIFF'S DEPT	07/08/21	19.00

Net Warrants by Fund Detail

1General Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00760959	134563	COOK COUNTY SHERIFF'S DEPT	07/08/21	19.00
00760960	1188081	CORONADO LEGAL SERVICES LLC	07/08/21	19.00
00760961	1175933	CREATIVE LAW NETWORK LLC	07/08/21	254.17
00760962	40658	CROWN EQUIPMENT CORP	07/08/21	86.00
00760963	163136	DEEP ROCK WATER	07/08/21	96.71
00760964	181668	DOMINION VOTING SYSTEMS INC	07/08/21	129,903.96
00760969	810281	ELLIOTT LEGAL INVESTIGATIONS	07/08/21	38.00
00760970	9496	ENVIRONMENTAL SYSTEMS RESEARCH	07/08/21	89,268.49
00760971	20882	EXTENSION ACTIVITY FUND	07/08/21	156.00
00760973	13454	FEDERAL EXPRESS CO	07/08/21	16.73
00760974	47723	FEDEX	07/08/21	67.85
00760975	1188085	FLOREZ HERMAN DEAN	07/08/21	19.00
00760977	426777	FRANCY LAW FIRM	07/08/21	19.00
00760979	12689	GALLS LLC	07/08/21	6,940.03
00760980	890774	GIRO AUTO SALES	07/08/21	19.00
00760982	675517	GREEN THOMAS D	07/08/21	65.00
00760983	808845	GRONQUIST, CHRISTOPHER L	07/08/21	65.00
00760984	698488	HANCOCK FORREST HAYES	07/08/21	65.00
00760985	853854	HANKS STEPHEN KEITH	07/08/21	2,175.00
00760986	970284	HARNETT OWEN	07/08/21	65.00
00760988	358482	HOLST AND BOETTCHER	07/08/21	19.00
00760989	535614	HR ADVANTAGE GROUP LLC	07/08/21	1,625.00
00760990	79260	IDEXX DISTRIBUTION INC	07/08/21	889.80
00760992	494909	IRON MOUNTAIN INTELLECTUAL PRO	07/08/21	950.00
00760993	859588	JAZOWSKI KAREN	07/08/21	3,450.00
00760994	615519	JCOR MECHANICAL INC	07/08/21	1,829.01
00760995	25736	JEFFERSON COUNTY	07/08/21	30.00
00760997	145356	KENNY ELECTRIC SERVICE INC	07/08/21	274.40
00760998	1179361	KOSINSKI JODEEN	07/08/21	19.00
00761000	40843	LANGUAGE LINE SERVICES	07/08/21	1,711.34
00761002	36861	LEXIS NEXIS MATTHEW BENDER	07/08/21	2,180.99
00761004	320525	LUCERO REBECCA M	07/08/21	4,683.00
00761007	51274	MCDONALD YONG HUI V	07/08/21	5,611.50
00761008	1039410	MECSTAT LABORATORIES	07/08/21	585.00
00761009	1188086	MEEKS CASEY	07/08/21	19.00
00761010	871154	MEI TOTAL ELEVATOR SOLUTIONS	07/08/21	10,471.54

Net Warrants by Fund Detail

1 General Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761011	1188200	MEJIA GUTIERREZ SILVIA	07/08/21	19.00
00761013	289813	MILE HIGH SHOOTING ACCESSORIES	07/08/21	30,864.00
00761014	374475	MOORE LAW GROUP APC	07/08/21	19.00
00761015	93018	MURPHY RICK	07/08/21	3,214.42
00761016	13591	MWI ANIMAL HEALTH	07/08/21	4,178.90
00761017	1188198	NAMORADO DALILA ISELA	07/08/21	19.00
00761021	573416	NYHOLM STEWART E	07/08/21	65.00
00761022	1004574	OCHS CRYSTAL	07/08/21	1,380.00
00761023	33716	OLD VINE PINNACLE ASSOCIATES	07/08/21	800.00
00761024	669732	PATTERSON VETERINARY SUPPLY IN	07/08/21	262.04
00761025	12691	PEARL COUNSELING ASSOCIATES	07/08/21	7,052.00
00761027	669054	PROVEST LITIGATION SERVICES	07/08/21	38.00
00761028	416524	PROVEST LLC	07/08/21	38.00
00761029	74735	RESTRUCTION CORP	07/08/21	3,400.00
00761030	422902	ROADRUNNER PHARMACY INCORPORAT	07/08/21	467.40
00761031	1187255	RODRIQUEZ PORTILLO ANA	07/08/21	50.00
00761033	669154	ROWMAN & LITTLEFIELD PUBLISHIN	07/08/21	54.58
00761035	46792	SECURE HORIZONS	07/08/21	1,550.00
00761037	1018893	SEWALD HANFLING PUBLIC AFFAIRS	07/08/21	4,285.71
00761038	13538	SHRED IT USA LLC	07/08/21	30.00
00761039	51001	SOUTHLAND MEDICAL LLC	07/08/21	208.86
00761040	315130	STANFIELD THOMSON	07/08/21	65.00
00761041	42818	STATE OF COLORADO	07/08/21	61.79
00761042	42818	STATE OF COLORADO	07/08/21	653.38
00761044	599714	SUMMIT FOOD SERVICE LLC	07/08/21	32,666.27
00761046	52553	SWEEP STAKES UNLIMITED	07/08/21	160.00
00761047	52553	SWEEP STAKES UNLIMITED	07/08/21	30.00
00761049	47341	T MOBILE	07/08/21	180.55
00761053	22538	THOMSON REUTERS - WEST	07/08/21	400.00
00761054	1173806	TOP HAT FILE AND SERVE INC	07/08/21	19.00
00761055	1186638	TORRES ADAM	07/08/21	50.00
00761056	93323	TOUCH SONIC TECHNOLOGIES INC	07/08/21	17,280.00
00761057	1094	TRI COUNTY HEALTH DEPT	07/08/21	318,457.50
00761058	666214	TYGRETT DEBRA R	07/08/21	445.00
00761060	51179	UNITED PARCEL SERVICE INC	07/08/21	23.43
00761063	1185868	WELCH MICHAEL	07/08/21	2,512.50

County of Adams
Net Warrants by Fund Detail

1		General Fund			
	Warrant	Supplier No	Supplier Name	Warrant Date	Amount
	00761065	338508	WRIGHTWAY INDUSTRIES INC	07/08/21	589.92
	00761067	678293	ZOE TRAINING & CONSULTING	07/08/21	2,500.00
Fund Total					1,840,739.73

County of Adams
Net Warrants by Fund Detail

4 Capital Facilities Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761050	206042	THAIN JEFF	07/08/21	4,000.00
00761052	498722	THERMAL & MOISTURE PROTECTION	07/08/21	3,850.00
00761066	13822	XCEL ENERGY	07/08/21	26,432.82
Fund Total				34,282.82

County of Adams
Net Warrants by Fund Detail

5 Golf Course Enterprise Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007777	6177	PROFESSIONAL RECREATION MGMT I	07/09/21	37,507.99
00760972	306171	FALCONE REFRIGERATION INC	07/08/21	2,875.00
00761032	711167	ROOFTECH CONSULTANTS INC	07/08/21	3,120.00
Fund Total				43,502.99

Net Warrants by Fund Detail

6Equipment Service Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00760991	682207	INSIGHT AUTO GLASS LLC	07/08/21	669.77
00760996	27626	JOHN ELWAY CHEVROLET	07/08/21	86,053.00
00761026	324769	PRECISE MRM LLC	07/08/21	5,832.00
00761034	16237	SAM HILL OIL INC	07/08/21	13,490.93
00761045	78871	SUN ENTERPRISES INC	07/08/21	14,393.07
00761051	790907	THE GOODYEAR TIRE AND RUBBER C	07/08/21	788.91
00761064	350373	WEX BANK	07/08/21	3,967.16
Fund Total				125,194.84

County of Adams
Net Warrants by Fund Detail

<u>7</u>		<u>Stormwater Utility Fund</u>			
<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>	
00007750	433702	QUANTUM WATER & ENVIRONMENT	07/07/21	6,400.00	
00761061	158184	UTILITY NOTIFICATION CENTER OF	07/08/21	4,371.84	
00761062	1090176	UTILO LLC	07/08/21	2,346.00	
Fund Total				13,117.84	

Net Warrants by Fund Detail

13Road & Bridge Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00760933	1180242	AEE FOOD & SPIRITS	07/08/21	4,600.00
00760965	562184	DOUBLE R EXCAVATING INC	07/08/21	14,750.00
00760966	128693	DREXEL BARRELL & CO	07/08/21	12,933.25
00760967	1167373	DUENSING THOMAS A	07/08/21	11,820.00
00760978	227532	GALLOWAY & COMPANY INC	07/08/21	3,052.50
00760999	40395	KUMAR & ASSOCIATES INC	07/08/21	4,061.75
00761001	1178811	LAURIENTI RANDOLPH	07/08/21	1,860.00
Fund Total				53,077.50

Net Warrants by Fund Detail

19**Insurance Fund**

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007753	492573	ADVANCED URGENT CARE AND OCC M	07/08/21	645.00
00007759	41962	COLO DEPT OF LABOR AND EMPLOYM	07/08/21	8,639.07
00007762	215754	PEAK FORM MEDIAL CLINIC	07/08/21	95.00
00007765	37223	UNITED HEALTH CARE INSURANCE C	07/08/21	417,101.01
00007779	523053	TRISTAR RISK MANAGEMENT	07/09/21	211,330.68
00760930	13052	ADAMS COUNTY RETIREMENT PLAN	07/08/21	433.51
00760935	1188217	ANDREWS MARY LOU	07/08/21	1,750.00
00760938	31729	BOBCAT OF THE ROCKIES	07/08/21	1,774.22
00760939	1186642	BOGAN MICHAEL	07/08/21	329.51
00760944	100027	CLAUSSEN PATRICIA A	07/08/21	885.04
00760950	17565	COLO FRAME & SUSPENSION	07/08/21	3,859.99
00760953	2157	COLO OCCUPATIONAL MEDICINE PHY	07/08/21	306.00
00760954	13297	COLO STATE TREASURER	07/08/21	47,544.13
00760976	1142496	FORENSIC DISCOVERY LLC	07/08/21	4,506.00
00760981	12805	GRANT ROBERT S	07/08/21	133.46
00760987	883606	HENDERSON CONSULTING AND EAP S	07/08/21	68.00
00761003	28730	LONG KAREN	07/08/21	54.18
00761005	1186718	MARIENTHAL JUDITH	07/08/21	135.54
00761006	636073	MASDEN MARTHA	07/08/21	123.28
00761018	61886	NATHAN DUMM & MAYER PC	07/08/21	2,647.27
00761019	61886	NATHAN DUMM & MAYER PC	07/08/21	191.17
00761020	1089885	NAVIA BENEFIT SOLUTIONS INC	07/08/21	1,800.00
00761036	46792	SECURE HORIZONS	07/08/21	15,295.02

Fund Total**719,647.08**

County of Adams
Net Warrants by Fund Detail

<u>25</u>		<u>Waste Management Fund</u>			
<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>	
00007751	433702	QUANTUM WATER & ENVIRONMENT	07/07/21	2,389.25	
00007764	433702	QUANTUM WATER & ENVIRONMENT	07/08/21	4,712.50	
Fund Total				7,101.75	

County of Adams
Net Warrants by Fund Detail

28 Open Space Sales Tax Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007749	48293	NORTHGLENN CITY OF	07/07/21	23,336.63
00007761	1116926	LUBIRDS LIGHT FOUNDATION	07/08/21	47,529.38
00007778	881762	RICARDO FLORES MAGON ACADEMY	07/09/21	273,824.19
Fund Total				344,690.20

County of Adams
Net Warrants by Fund Detail

<u>30</u>		<u>Community Dev Block Grant Fund</u>			
<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>	
00007780	1142791	WGM LAND DESIGN LTD	07/09/21	21,149.04	
			Fund Total	21,149.04	

County of Adams
Net Warrants by Fund Detail

31		Head Start Fund				
		<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
		00007748	1142987	LASHEN JODY M	07/07/21	285.00
		00761012	1090294	MIGHTY LITTLE VOICES SPEECH TH	07/08/21	5,200.00
		Fund Total				5,485.00

County of Adams
Net Warrants by Fund Detail

<u>35</u>		<u>Workforce & Business Center</u>			
<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>	
00761059	153459	ULTIMUS	07/08/21	17,775.00	
			Fund Total	17,775.00	

County of Adams
Net Warrants by Fund Detail

43 Colorado Air & Space Port

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00760968	13410	EASTERN SLOPE RURAL TELEPHONE	07/08/21	131.96
00761043	33604	STATE OF COLORADO	07/08/21	120.00
00761048	80267	SWIMS DISPOSAL	07/08/21	307.50
Fund Total				559.46

County of Adams
Net Warrants by Fund Detail

Grand Total 3,226,323.25

County of Adams
Vendor Payment Report

<u>2051</u>	<u>ANS - Admin & Customer Care</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Animal Control/Shelter					
	RODRIQUEZ PORTILLO ANA	00001	998970	395654	07/07/21	50.00
	TORRES ADAM	00001	998971	395654	07/07/21	50.00
					Account Total	100.00
					Department Total	100.00

County of Adams
Vendor Payment Report

<u>3164</u>	<u>Byers/Shamrock Blade Stations</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Art Collection					
	THAIN JEFF	00004	998952	395620	07/06/21	4,000.00
					Account Total	4,000.00
					Department Total	4,000.00

County of Adams
Vendor Payment Report

<u>1074</u>	<u>CA- Risk Management</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Safety-Drug & AI Test/Med Cert					
	ADVANCED URGENT CARE AND OCC M	00019	999034	395694	07/07/21	645.00
	COLO OCCUPATIONAL MEDICINE PHY	00019	998994	395671	07/07/21	306.00
	PEAK FORM MEDIAL CLINIC	00019	999035	395694	07/07/21	95.00
					Account Total	1,046.00
					Department Total	1,046.00

County of Adams
Vendor Payment Report

<u>4</u>	<u>Capital Facilities Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	THERMAL & MOISTURE PROTECTION	00004	999143	395809	07/08/21	3,850.00
					Account Total	3,850.00
					Department Total	3,850.00

County of Adams
Vendor Payment Report

<u>4302</u>	<u>CASP Administration</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Water/Sewer/Sanitation					
	SWIMS DISPOSAL	00043	998921	395525	07/02/21	<u>307.50</u>
					Account Total	<u>307.50</u>
					Department Total	<u><u>307.50</u></u>

County of Adams
Vendor Payment Report

<u>4304</u>	<u>CASP Operations/Maintenance</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Licenses and Fees					
	STATE OF COLORADO	00043	998920	395525	06/30/21	30.00
	STATE OF COLORADO	00043	998920	395525	06/30/21	32.00
	STATE OF COLORADO	00043	998920	395525	06/30/21	58.00
					Account Total	120.00
	Telephone					
	EASTERN SLOPE RURAL TELEPHONE	00043	999041	395701	07/07/21	131.96
					Account Total	131.96
					Department Total	251.96

County of Adams
Vendor Payment Report

<u>1022</u>	<u>CLK Elections</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Destruction of Records					
	SHRED IT USA LLC	00001	998893	395399	07/01/21	30.00
					Account Total	30.00
					Department Total	30.00

County of Adams
Vendor Payment Report

<u>30</u>	<u>Community Dev Block Grant Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	WGM LAND DESIGN LTD	00030	999210	395957	07/09/21	22,262.15
					Account Total	22,262.15
	Retainages Payable					
	WGM LAND DESIGN LTD	00030	999210	395957	07/09/21	1,113.11-
					Account Total	1,113.11-
					Department Total	21,149.04

County of Adams
Vendor Payment Report

<u>1041</u>	<u>County Assessor</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Education & Training					
	COLO ASSESSORS ASSN	00001	998641	395142	06/29/21	10.00
	COLO ASSESSORS ASSN	00001	998642	395142	06/29/21	10.00
	COLO ASSESSORS ASSN	00001	998644	395142	06/29/21	10.00
	COLO ASSESSORS ASSN	00001	998652	395142	06/29/21	50.00
	COLO ASSESSORS ASSN	00001	998950	395616	07/06/21	400.00
					Account Total	480.00
					Department Total	480.00

County of Adams
Vendor Payment Report

<u>1013</u>	<u>County Attorney</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Books					
	ROWMAN & LITTLEFIELD PUBLISHIN	00001	998942	395612	07/06/21	54.58
	THOMSON REUTERS - WEST	00001	998941	395612	07/06/21	400.00
					Account Total	454.58
	Consultant Services					
	CREATIVE LAW NETWORK LLC	00001	998938	395612	07/06/21	254.17
					Account Total	254.17
	Education & Training					
	COLO COUNTY ATTORNEYS ASSN	00001	998939	395612	07/06/21	500.00
					Account Total	500.00
	Messenger/Delivery Service					
	FEDERAL EXPRESS CO	00001	998940	395612	07/06/21	16.73
					Account Total	16.73
	Other Professional Serv					
	SWEEP STAKES UNLIMITED	00001	998936	395612	07/06/21	160.00
	SWEEP STAKES UNLIMITED	00001	998937	395612	07/06/21	30.00
					Account Total	190.00
					Department Total	1,415.48

County of Adams
Vendor Payment Report

<u>2031</u>	<u>County Coroner</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Maintenance Contracts					
	CROWN LIFT TRUCKS	00001	998824	395377	07/01/21	86.00
					Account Total	86.00
	Medical Services					
	CARUSO JAMES LOUIS	00001	998922	395528	07/02/21	3,075.00
					Account Total	3,075.00
	Minor Equipment					
	KENNY ELECTRIC SERVICE INC	00001	998815	395377	07/01/21	274.40
					Account Total	274.40
	Operating Supplies					
	SOUTHLAND MEDICAL LLC	00001	998823	395377	07/01/21	208.86
					Account Total	208.86
	Other Professional Serv					
	BRETSCH CANDACE C	00001	998896	395409	07/01/21	1,250.00
	COLO MEDICAL WASTE INC	00001	998817	395377	07/01/21	654.00
	COLO MEDICAL WASTE INC	00001	998818	395377	07/01/21	1,835.00
	COLO MEDICAL WASTE INC	00001	998819	395377	07/01/21	1,707.00
	FEDEX	00001	998826	395377	07/01/21	48.48
	FEDEX	00001	998828	395377	07/01/21	19.37
	HANKS STEPHEN KEITH	00001	998811	395373	07/01/21	2,175.00
	JAZOWSKI KAREN	00001	998812	395375	07/01/21	3,450.00
	LUCERO REBECCA M	00001	998813	395376	07/01/21	2,436.00
	LUCERO REBECCA M	00001	998814	395376	07/01/21	2,247.00
	MECSTAT LABORATORIES	00001	998820	395377	07/01/21	195.00
	MECSTAT LABORATORIES	00001	998821	395377	07/01/21	195.00
	MECSTAT LABORATORIES	00001	998822	395377	07/01/21	195.00
	OCHS CRYSTAL	00001	998932	395608	07/06/21	1,380.00
	UNITED PARCEL SERVICE INC	00001	998827	395377	07/01/21	23.43
					Account Total	17,810.28
	Software and Licensing					
	IRON MOUNTAIN INTELLECTUAL PRO	00001	998816	395377	07/01/21	950.00
					Account Total	950.00
					Department Total	22,404.54

County of Adams
Vendor Payment Report

<u>6</u>	<u>Equipment Service Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	INSIGHT AUTO GLASS LLC	00006	999044	395789	07/08/21	40.00
	INSIGHT AUTO GLASS LLC	00006	999045	395789	07/08/21	197.92
	INSIGHT AUTO GLASS LLC	00006	999047	395789	07/08/21	431.85
	JOHN ELWAY CHEVROLET	00006	999048	395789	07/08/21	39,365.00
	JOHN ELWAY CHEVROLET	00006	999049	395789	07/08/21	46,688.00
	PRECISE MRM LLC	00006	999054	395789	07/08/21	5,832.00
	SAM HILL OIL INC	00006	999052	395789	07/08/21	2,644.12
	SAM HILL OIL INC	00006	999053	395789	07/08/21	6,424.60
	SAM HILL OIL INC	00006	999046	395789	07/08/21	4,422.21
	SUN ENTERPRISES INC	00006	999050	395789	07/08/21	14,393.07
	THE GOODYEAR TIRE AND RUBBER C	00006	999072	395789	07/08/21	788.91
	WEX BANK	00006	999051	395789	07/08/21	3,967.16
					Account Total	125,194.84
					Department Total	125,194.84

County of Adams
Vendor Payment Report

9244	Extension- 4-H/Youth	Fund	Voucher	Batch No	GL Date	Amount
	Operating Supplies					
	AMERICAN INCOME LIFE INS CO	00001	998967	395647	07/07/21	8.10
	EXTENSION ACTIVITY FUND	00001	998787	395361	07/01/21	156.00
					Account Total	164.10
					Department Total	164.10

County of Adams
Vendor Payment Report

<u>1018</u>	<u>Finance General Accounting</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Membership Dues					
	COLO GOVT FINANCE OFFICERS ASS	00001	998864	395385	07/01/21	50.00
					Account Total	50.00
					Department Total	50.00

County of Adams
Vendor Payment Report

<u>3165</u>	<u>Fleet/Public Works Bldg Constr</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Buildings					
	XCEL ENERGY	00004	998951	395619	07/06/21	26,432.82
					Account Total	26,432.82
					Department Total	26,432.82

County of Adams
Vendor Payment Report

<u>5025</u>	<u>FO - Club House Maintenance</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	FALCONE REFRIGERATION INC	00005	998983	395669	07/07/21	<u>2,875.00</u>
					Account Total	<u>2,875.00</u>
					Department Total	<u><u>2,875.00</u></u>

County of Adams
Vendor Payment Report

<u>1114</u>	<u>FO - District Attorney Bldg.</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	MEI TOTAL ELEVATOR SOLUTIONS	00001	998991	395669	07/07/21	199.00
					Account Total	199.00
	Maintenance Contracts					
	BRIGHTON CITY OF	00001	998984	395669	07/07/21	400.00
					Account Total	400.00
					Department Total	599.00

County of Adams
Vendor Payment Report

<u>1077</u>	<u>FO - Government Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	MEI TOTAL ELEVATOR SOLUTIONS	00001	998987	395669	07/07/21	2,977.33
	MEI TOTAL ELEVATOR SOLUTIONS	00001	998988	395669	07/07/21	2,789.09
	MEI TOTAL ELEVATOR SOLUTIONS	00001	998989	395669	07/07/21	3,633.42
					Account Total	9,399.84
					Department Total	9,399.84

County of Adams
Vendor Payment Report

<u>1071</u>	<u>FO - Justice Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	MEI TOTAL ELEVATOR SOLUTIONS	00001	998990	395669	07/07/21	223.54
	MEI TOTAL ELEVATOR SOLUTIONS	00001	998992	395669	07/07/21	52.16
					Account Total	275.70
	Maintenance Contracts					
	BRIGHTON CITY OF	00001	998985	395669	07/07/21	2,200.00
					Account Total	2,200.00
					Department Total	2,475.70

County of Adams
Vendor Payment Report

<u>1111</u>	<u>FO - Parks Facilities</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	MEI TOTAL ELEVATOR SOLUTIONS	00001	998986	395669	07/07/21	<u>597.00</u>
					Account Total	<u>597.00</u>
					Department Total	<u><u>597.00</u></u>

County of Adams
Vendor Payment Report

<u>2009</u>	<u>FO - Sheriff Maintenance</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	24/7 FLOOD RESPONSE INC	00001	998981	395669	07/07/21	11,746.46
					Account Total	11,746.46
					Department Total	11,746.46

County of Adams
Vendor Payment Report

<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	ACCELA INC	00001	999138	395809	07/08/21	134,299.68
	ADVANCED LAUNDRY SYSTEMS	00001	999085	395789	07/08/21	2,018.98
	BAWDEN JANAE A	00001	999209	395957	07/09/21	250.00
	BAWDEN JANAE A	00001	999209	395957	07/09/21	125.00
	BAWDEN JANAE A	00001	999209	395957	07/09/21	250.00
	BIG PAULIE PRODUCTIONS LLC	00001	999120	395803	07/08/21	32,500.00
	BIG PAULIE PRODUCTIONS LLC	00001	999121	395803	07/08/21	32,500.00
	BIG PAULIE PRODUCTIONS LLC	00001	999122	395803	07/08/21	17,287.66
	BRYAN LAURA CHRISTINE	00001	999118	395803	07/08/21	250.00
	BRYAN LAURA CHRISTINE	00001	999118	395803	07/08/21	125.00
	BRYAN LAURA CHRISTINE	00001	999118	395803	07/08/21	125.00
	CHP METRO NORTH LLC	00001	999142	395809	07/08/21	1,050.00
	CML SECURITY LLC	00001	999092	395789	07/08/21	13,000.00
	CML SECURITY LLC	00001	999092	395789	07/08/21	6,872.91
	COCREATE COEVOLVE LLC	00001	999117	395803	07/08/21	125.00
	COCREATE COEVOLVE LLC	00001	999117	395803	07/08/21	375.00
	COHEN MILSTEIN SELLERS & TOLL	00001	999165	395809	07/08/21	236.26
	COLORADO CIVIL INFRASTRUCTURE	00001	999164	395809	07/08/21	48,372.00
	COLORADO CIVIL INFRASTRUCTURE	00001	999111	395789	07/08/21	21,372.48
	COLUMBIA SANITARY SERVICE INC	00001	999162	395809	07/08/21	9,350.00
	COMMUNITY MEDIATION CONCEPTS	00001	999163	395809	07/08/21	237.50
	DOMINION VOTING SYSTEMS INC	00001	999077	395789	07/08/21	6,541.89
	DOMINION VOTING SYSTEMS INC	00001	999078	395789	07/08/21	115,212.07
	DOMINION VOTING SYSTEMS INC	00001	999079	395789	07/08/21	8,150.00
	ELIZONDO ENTERTAINMENT INC	00001	999203	395957	07/09/21	5,000.00
	ENVIRONMENTAL SYSTEMS RESEARCH	00001	999135	395809	07/08/21	89,268.49
	FOUND MY KEYS	00001	999114	395803	07/08/21	1,378.60
	FOUND MY KEYS	00001	999115	395803	07/08/21	583.55
	G4S SECURE SOLUTIONS USA INC	00001	999204	395957	07/09/21	4,692.32
	G4S SECURE SOLUTIONS USA INC	00001	999205	395957	07/09/21	4,560.30
	G4S SECURE SOLUTIONS USA INC	00001	999206	395957	07/09/21	4,612.38
	G4S SECURE SOLUTIONS USA INC	00001	999207	395957	07/09/21	4,565.37
	G4S SECURE SOLUTIONS USA INC	00001	999208	395957	07/09/21	4,546.23
	GALLS LLC	00001	999094	395789	07/08/21	139.97
	GALLS LLC	00001	999095	395789	07/08/21	312.33

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Vendor Payment Report

<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	GALLS LLC	00001	999096	395789	07/08/21	214.46
	GALLS LLC	00001	999097	395789	07/08/21	117.15
	GALLS LLC	00001	999098	395789	07/08/21	1,542.25
	GALLS LLC	00001	999099	395789	07/08/21	196.20
	GALLS LLC	00001	999100	395789	07/08/21	123.55
	GALLS LLC	00001	999101	395789	07/08/21	202.37
	GALLS LLC	00001	999102	395789	07/08/21	155.00
	GALLS LLC	00001	999103	395789	07/08/21	123.55
	GALLS LLC	00001	999104	395789	07/08/21	139.97
	GALLS LLC	00001	999105	395789	07/08/21	3,075.00
	GALLS LLC	00001	999106	395789	07/08/21	294.22
	GALLS LLC	00001	999107	395789	07/08/21	87.80
	GALLS LLC	00001	999108	395789	07/08/21	137.82
	GALLS LLC	00001	999109	395789	07/08/21	24.54
	GALLS LLC	00001	999110	395789	07/08/21	53.85
	HR ADVANTAGE GROUP LLC	00001	999056	395789	07/08/21	500.00
	HR ADVANTAGE GROUP LLC	00001	999056	395789	07/08/21	1,125.00
	IDEXX DISTRIBUTION INC	00001	999154	395809	07/08/21	550.05
	IDEXX DISTRIBUTION INC	00001	999155	395809	07/08/21	339.75
	JCOR MECHANICAL INC	00001	999145	395809	07/08/21	1,925.27
	LEXIS NEXIS MATTHEW BENDER	00001	999080	395789	07/08/21	2,180.99
	MCDONALD YONG HUI V	00001	999084	395789	07/08/21	5,611.50
	MILE HIGH SHOOTING ACCESSORIES	00001	999093	395789	07/08/21	24,481.00
	MILE HIGH SHOOTING ACCESSORIES	00001	999093	395789	07/08/21	6,383.00
	MURPHY RICK	00001	999083	395789	07/08/21	3,214.42
	MWI ANIMAL HEALTH	00001	999148	395809	07/08/21	125.94
	MWI ANIMAL HEALTH	00001	999149	395809	07/08/21	173.36
	MWI ANIMAL HEALTH	00001	999150	395809	07/08/21	45.42
	MWI ANIMAL HEALTH	00001	999156	395809	07/08/21	2,582.14
	MWI ANIMAL HEALTH	00001	999157	395809	07/08/21	125.94
	MWI ANIMAL HEALTH	00001	999158	395809	07/08/21	1,126.10
	OLD VINE PINNACLE ASSOCIATES	00001	999140	395809	07/08/21	800.00
	PATTERSON VETERINARY SUPPLY IN	00001	999151	395809	07/08/21	249.45
	PATTERSON VETERINARY SUPPLY IN	00001	999152	395809	07/08/21	8.97
	PATTERSON VETERINARY SUPPLY IN	00001	999159	395809	07/08/21	3.62
	PEARL COUNSELING ASSOCIATES	00001	999082	395789	07/08/21	7,052.00

Vendor Payment Report

<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	POWERDMS INC	00001	999119	395803	07/08/21	25,574.03
	RESTRUCTION CORP	00001	999146	395809	07/08/21	3,400.00
	ROADRUNNER PHARMACY INCORPORAT	00001	999153	395809	07/08/21	467.40
	SEWALD HANFLING PUBLIC AFFAIRS	00001	999074	395789	07/08/21	4,285.71
	SIEGEL THOMAS WEIL	00001	999000	395673	07/07/21	250.00
	SIEGEL THOMAS WEIL	00001	999000	395673	07/07/21	250.00
	STATE OF COLORADO	00001	999065	395789	07/08/21	61.79
	STATE OF COLORADO	00001	999066	395789	07/08/21	653.38
	SUMMIT FOOD SERVICE LLC	00001	999090	395789	07/08/21	22,452.63
	SUMMIT FOOD SERVICE LLC	00001	999091	395789	07/08/21	3,760.71
	TOUCH SONIC TECHNOLOGIES INC	00001	999088	395789	07/08/21	17,280.00
	TRI COUNTY HEALTH DEPT	00001	999073	395789	07/08/21	318,457.50
	TYGRET DEBRA R	00001	999089	395789	07/08/21	445.00
	WELLPATH LLC	00001	999112	395803	07/08/21	619,498.44
	WELLPATH LLC	00001	999113	395803	07/08/21	122,186.79
	WRIGHTWAY INDUSTRIES INC	00001	999161	395809	07/08/21	589.92
	ZOE TRAINING & CONSULTING	00001	999075	395789	07/08/21	2,500.00
					Account Total	1,777,490.92
	Retainages Payable					
	COLORADO CIVIL INFRASTRUCTURE	00001	999111	395789	07/08/21	1,068.62-
	COLORADO CIVIL INFRASTRUCTURE	00001	999164	395809	07/08/21	2,418.60-
	JCOR MECHANICAL INC	00001	999145	395809	07/08/21	96.26-
					Account Total	3,583.48-
					Department Total	1,773,907.44

County of Adams
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<u>5</u>	<u>Golf Course Enterprise Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	ROOFTECH CONSULTANTS INC	00005	999144	395809	07/08/21	3,120.00
					Account Total	3,120.00
	Vendor Fee Sales Tax - State					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	2,074.38
					Account Total	2,074.38
					Department Total	5,194.38

County of Adams
Vendor Payment Report

<u>5026</u>	<u>Golf Course- Maintenance</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Repair & Maint Supplies					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	313.09
					Account Total	313.09
					Department Total	313.09

County of Adams
Vendor Payment Report

<u>5021</u>	<u>Golf Course- Pro Shop</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	495.00
					Account Total	495.00
	Golf Carts					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	185.93
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	944.00
					Account Total	1,129.93
	Golf Merchandise					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	857.58
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	4,050.07
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	1,389.28
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	599.96
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	303.78
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	1,723.79-
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	2,795.49
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	10,619.59
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	10,038.96
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	691.20
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	1,077.50
					Account Total	30,699.62
	Janitorial Services					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	1,149.73
					Account Total	1,149.73
	Other Professional Serv					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	346.29
					Account Total	346.29
	Repair & Maint Supplies					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	652.45
					Account Total	652.45
	Security Service					
	PROFESSIONAL RECREATION MGMT I	00005	999202	395953	07/09/21	647.50
					Account Total	647.50
					Department Total	35,120.52

County of Adams
Vendor Payment Report

<u>31</u>	<u>Head Start Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	LASHEN JODY M	00031	999001	395673	07/07/21	285.00
	MIGHTY LITTLE VOICES SPEECH TH	00031	999069	395789	07/08/21	5,200.00
					Account Total	5,485.00
					Department Total	5,485.00

County of Adams
Vendor Payment Report

<u>8613</u>	<u>Insurance - UHC EPO Medical</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Claims					
	UNITED HEALTH CARE INSURANCE C	00019	998791	395363	07/01/21	417,101.01
					Account Total	417,101.01
					Department Total	417,101.01

County of Adams
Vendor Payment Report

<u>19</u>	<u>Insurance Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Ins. Premium-Vision					
	ADAMS COUNTY RETIREMENT PLAN	00019	998799	395366	07/01/21	4.99
	BOGAN MICHAEL	00019	998809	395371	07/01/21	7.22
					Account Total	12.21
	Received not Vouchered Clrg					
	COLO FRAME & SUSPENSION	00019	999070	395789	07/08/21	1,580.09
	COLO FRAME & SUSPENSION	00019	999071	395789	07/08/21	2,279.90
	COLO STATE TREASURER	00019	999175	395809	07/08/21	47,544.13
	HENDERSON CONSULTING AND EAP S	00019	999147	395809	07/08/21	68.00
	NATHAN DUMM & MAYER PC	00019	999166	395809	07/08/21	2,647.27
	NATHAN DUMM & MAYER PC	00019	999167	395809	07/08/21	191.17
	NAVIA BENEFIT SOLUTIONS INC	00019	999067	395789	07/08/21	900.00
	NAVIA BENEFIT SOLUTIONS INC	00019	999068	395789	07/08/21	900.00
					Account Total	56,110.56
	Retiree Dental - Delta Premier					
	ADAMS COUNTY RETIREMENT PLAN	00019	998799	395366	07/01/21	39.70
	BOGAN MICHAEL	00019	998809	395371	07/01/21	40.00
					Account Total	79.70
	Retiree Med - AARP RX					
	ADAMS COUNTY RETIREMENT PLAN	00019	998799	395366	07/01/21	102.60
	BOGAN MICHAEL	00019	998809	395371	07/01/21	102.60
					Account Total	205.20
	Retiree Med - Kaiser					
	CLAUSSEN PATRICIA A	00019	998810	395371	07/01/21	221.26
	CLAUSSEN PATRICIA A	00019	998810	395371	07/01/21	221.26
	CLAUSSEN PATRICIA A	00019	998810	395371	07/01/21	221.26
	CLAUSSEN PATRICIA A	00019	998810	395371	07/01/21	221.26
					Account Total	885.04
	Retiree Med - Pacificare					
	SECURE HORIZONS	00019	999042	395705	07/07/21	15,295.02
					Account Total	15,295.02
	Retiree Med - UHC-MED					
	ADAMS COUNTY RETIREMENT PLAN	00019	998799	395366	07/01/21	286.22
	BOGAN MICHAEL	00019	998809	395371	07/01/21	179.69

Vendor Payment Report

<u>19</u>	<u>Insurance Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	GRANT ROBERT S	00019	998806	395371	07/01/21	65.82
	GRANT ROBERT S	00019	998806	395371	07/01/21	67.64
	LONG KAREN	00019	998807	395371	07/01/21	54.18
	MARIENTHAL JUDITH	00019	998808	395371	07/01/21	67.77
	MARIENTHAL JUDITH	00019	998808	395371	07/01/21	67.77
					Account Total	789.09
	Suspense - Misc. Clearing					
	MASDEN MARTHA	00019	5409	395502	07/02/21	123.28
					Account Total	123.28
					Department Total	73,500.10

County of Adams
Vendor Payment Report

8611	Insurance- Property/Casualty	Fund	Voucher	Batch No	GL Date	Amount
	Auto Physical Damage					
	BOBCAT OF THE ROCKIES	00019	998995	395671	07/07/21	1,774.22
					Account Total	1,774.22
	General Liab - Other than Prop					
	ANDREWS MARY LOU	00019	998997	395671	07/07/21	1,750.00
	FORENSIC DISCOVERY LLC	00019	998935	395612	07/06/21	4,506.00
					Account Total	6,256.00
					Department Total	8,030.22

County of Adams
Vendor Payment Report

<u>8617</u>	<u>Insurance- Workers Comp</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Licenses and Fees					
	COLO DEPT OF LABOR AND EMPLOYM	00019	999036	395694	07/07/21	8,639.07
					Account Total	8,639.07
	Workers Compensation					
	TRISTAR RISK MANAGEMENT	00019	999197	395945	07/09/21	211,330.68
					Account Total	211,330.68
					Department Total	219,969.75

County of Adams
Vendor Payment Report

<u>1056</u>	<u>IT Help Desk & Servers</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Temporary Labor					
	WELCH MICHAEL	00001	998771	395354	07/01/21	1,012.50
	WELCH MICHAEL	00001	998772	395354	07/01/21	1,500.00
					Account Total	2,512.50
					Department Total	2,512.50

County of Adams
Vendor Payment Report

6202	Open Space Tax- Grants	Fund	Voucher	Batch No	GL Date	Amount
	Grants to Other Instit					
	LUBIRDS LIGHT FOUNDATION	00028	998778	395358	07/01/21	47,529.38
	NORTHGLENN CITY OF	00028	998803	395370	07/01/21	23,336.63
	RICARDO FLORES MAGON ACADEMY	00028	998968	395649	07/07/21	273,824.19
					Account Total	344,690.20
					Department Total	344,690.20

County of Adams
Vendor Payment Report

<u>1015</u>	<u>People Services</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Insurance Premiums					
	SECURE HORIZONS	00001	999043	395705	07/07/21	1,550.00
					Account Total	1,550.00
	Membership Dues					
	JEFFERSON COUNTY	00001	997939	394416	06/18/21	30.00
					Account Total	30.00
	Other Communications					
	T MOBILE	00001	999168	394416	07/08/21	6.06
	T MOBILE	00001	999169	394416	07/08/21	30.56
	T MOBILE	00001	999170	394416	07/08/21	30.56
	T MOBILE	00001	999171	394416	07/08/21	30.56
	T MOBILE	00001	999172	394416	07/08/21	30.91
	T MOBILE	00001	999173	394416	07/08/21	30.91
	T MOBILE	00001	999174	394416	07/08/21	20.99
					Account Total	180.55
	Tuition Reimbursement					
	BENEGAS TARA	00001	997938	394416	06/18/21	2,500.00
					Account Total	2,500.00
					Department Total	4,260.55

County of Adams
Vendor Payment Report

<u>1089</u>	<u>PLN- Boards & Commissions</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Professional Serv					
	BUSH MELVIN E	00001	998948	395614	07/06/21	65.00
	GREEN THOMAS D	00001	998947	395614	07/06/21	65.00
	GRONQUIST, CHRISTOPHER L	00001	998949	395614	07/06/21	65.00
	HANCOCK FORREST HAYES	00001	998943	395614	07/06/21	65.00
	HARNETT OWEN	00001	998945	395614	07/06/21	65.00
	NYHOLM STEWART E	00001	998946	395614	07/06/21	65.00
	STANFIELD THOMSON	00001	998944	395614	07/06/21	65.00
					Account Total	455.00
					Department Total	455.00

County of Adams
Vendor Payment Report

3056	PW - Capital Improvement Plan	Fund	Voucher	Batch No	GL Date	Amount
	Land					
	DUENSING THOMAS A	00013	998102	394659	06/23/21	11,820.00
	GALLOWAY & COMPANY INC	00013	997696	394170	06/16/21	3,052.50
					Account Total	14,872.50
	Road & Streets					
	AEE FOOD & SPIRITS	00013	998103	394659	06/23/21	4,600.00
	LAURIENTI RANDOLPH	00013	997729	394170	06/16/21	1,860.00
					Account Total	6,460.00
					Department Total	21,332.50

County of Adams
Vendor Payment Report

13	Road & Bridge Fund	Fund	Voucher	Batch No	GL Date	Amount
	Received not Vouchered Clrg					
	DOUBLE R EXCAVATING INC	00013	999076	395789	07/08/21	14,750.00
	DREXEL BARRELL & CO	00013	999055	395789	07/08/21	12,933.25
	KUMAR & ASSOCIATES INC	00013	999137	395809	07/08/21	4,061.75
					Account Total	31,745.00
					Department Total	31,745.00

County of Adams
Vendor Payment Report

<u>2011</u>	<u>SHF- Admin Services Division</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Operating Supplies					
	DEEP ROCK WATER	00001	998963	395646	07/07/21	96.71
					Account Total	96.71
					Department Total	96.71

County of Adams
Vendor Payment Report

<u>2015</u>	<u>SHF- Civil Section</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Sheriff's Fees					
	AVILA MELISSA RENE	00001	998954	395623	07/06/21	19.00
	COOK COUNTY SHERIFF'S DEPT	00001	998933	395606	06/30/21	19.00
	COOK COUNTY SHERIFF'S DEPT	00001	998934	395606	06/30/21	19.00
	CORONADO LEGAL SERVICES LLC	00001	998924	395606	06/30/21	19.00
	ELLIOTT LEGAL INVESTIGATIONS	00001	998959	395623	07/06/21	19.00
	ELLIOTT LEGAL INVESTIGATIONS	00001	998960	395623	07/06/21	19.00
	FLOREZ HERMAN DEAN	00001	998925	395606	06/30/21	19.00
	FRANCY LAW FIRM	00001	998956	395623	07/06/21	19.00
	GIRO AUTO SALES	00001	998928	395606	06/30/21	19.00
	HOLST AND BOETTCHER	00001	998929	395606	06/30/21	19.00
	KOSINSKI JODEEN	00001	998927	395606	06/30/21	19.00
	MEEKS CASEY	00001	998926	395606	06/30/21	19.00
	MEJIA GUTIERREZ SILVIA	00001	998955	395623	07/06/21	19.00
	MOORE LAW GROUP APC	00001	998958	395623	07/06/21	19.00
	NAMORADO DALILA ISELA	00001	998953	395623	07/06/21	19.00
	PROVEST LITIGATION SERVICES	00001	998930	395606	06/30/21	19.00
	PROVEST LITIGATION SERVICES	00001	998931	395606	06/30/21	19.00
	PROVEST LLC	00001	998961	395623	07/06/21	19.00
	PROVEST LLC	00001	998962	395623	07/06/21	19.00
	TOP HAT FILE AND SERVE INC	00001	998957	395623	07/06/21	19.00
					Account Total	380.00
					Department Total	380.00

County of Adams
Vendor Payment Report

<u>2016</u>	<u>SHF- Detective Division</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Interpreting Services					
	LANGUAGE LINE SERVICES	00001	998964	395646	07/07/21	<u>322.26</u>
					Account Total	<u>322.26</u>
					Department Total	<u><u>322.26</u></u>

County of Adams
Vendor Payment Report

<u>2071</u>	<u>SHF- Detention Facility</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Interpreting Services					
	LANGUAGE LINE SERVICES	00001	998964	395646	07/07/21	1,002.04
					Account Total	1,002.04
	Operating Supplies					
	SUMMIT FOOD SERVICE LLC	00001	998965	395646	07/07/21	6,452.93
					Account Total	6,452.93
					Department Total	7,454.97

County of Adams
Vendor Payment Report

<u>2017</u>	<u>SHF- Patrol Division</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Interpreting Services					
	LANGUAGE LINE SERVICES	00001	998964	395646	07/07/21	373.10
					Account Total	373.10
					Department Total	373.10

County of Adams
Vendor Payment Report

2018	SHF- Records/Warrants Section	Fund	Voucher	Batch No	GL Date	Amount
	Extraditions					
	ADAMS COUNTY SHERIFF	00001	998966	395646	07/07/21	1,501.14
					Account Total	1,501.14
	Interpreting Services					
	LANGUAGE LINE SERVICES	00001	998964	395646	07/07/21	13.94
					Account Total	13.94
					Department Total	1,515.08

County of Adams
Vendor Payment Report

<u>3701</u>	<u>Stormwater Administration</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Professional Serv					
	UTILITY NOTIFICATION CENTER OF	00007	998897	395412	07/01/21	2,232.12
	UTILITY NOTIFICATION CENTER OF	00007	998898	395412	07/01/21	2,139.72
					Account Total	4,371.84
					Department Total	4,371.84

County of Adams
Vendor Payment Report

<u>7</u>	<u>Stormwater Utility Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	QUANTUM WATER & ENVIRONMENT	00007	998998	395673	07/07/21	6,400.00
	UTILO LLC	00007	999134	395809	07/08/21	2,346.00
					Account Total	8,746.00
					Department Total	8,746.00

County of Adams
Vendor Payment Report

<u>25</u>	<u>Waste Management Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	QUANTUM WATER & ENVIRONMENT	00025	999116	395803	07/08/21	4,712.50
	QUANTUM WATER & ENVIRONMENT	00025	998999	395673	07/07/21	2,389.25
					Account Total	7,101.75
					Department Total	7,101.75

County of Adams
Vendor Payment Report

<u>35</u>	<u>Workforce & Business Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	ULTIMUS	00035	999139	395809	07/08/21	17,775.00
					Account Total	17,775.00
					Department Total	17,775.00

County of Adams
Vendor Payment Report

Grand Total 3,226,323.25

County of Adams
Net Warrant by Fund Summary

Fund Number	Fund Description	Amount
1	General Fund	1,788,662.28
4	Capital Facilities Fund	2,300.10
5	Golf Course Enterprise Fund	213,755.20
6	Equipment Service Fund	93,827.27
13	Road & Bridge Fund	2,841,075.86
19	Insurance Fund	767,051.32
30	Community Dev Block Grant Fund	63,528.00
31	Head Start Fund	1,205.08
35	Workforce & Business Center	21,880.38
43	Colorado Air & Space Port	59,984.27
50	FLATROCK Facility Fund	4,576.49
94	Sheriff Payables	22,606.00
		<u>5,880,452.25</u>

Net Warrants by Fund Detail

1General Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007782	1008782	ANGEL ARMOR LLC	07/14/21	937.27
00007785	1017428	B&R INDUSTRIES	07/14/21	2,738.76
00007788	378404	CARUSO JAMES LOUIS	07/14/21	2,050.00
00007789	37193	CINA & CINA FORENSIC CONSULTIN	07/14/21	19,850.00
00007792	1016895	G4S SECURE SOLUTIONS USA INC	07/14/21	11,147.40
00007793	1178350	GUZMANS PARTY RENTALS	07/14/21	2,870.00
00007794	286794	HOUSING AUTHORITY THE CITY OF	07/14/21	550,121.50
00007798	373844	SOLARWINDS WORLDWIDE LLC	07/14/21	2,385.00
00007803	625677	CODE 4 SECURITY SERVICES LLC	07/15/21	480.00
00007813	625677	CODE 4 SECURITY SERVICES LLC	07/16/21	9,263.00
00761069	43744	AUTOMATED BUILDING SOLUTIONS I	07/14/21	22,250.00
00761071	13160	BRIGHTON CITY OF (WATER)	07/14/21	1,196.81
00761072	13160	BRIGHTON CITY OF (WATER)	07/14/21	755.21
00761073	13160	BRIGHTON CITY OF (WATER)	07/14/21	27,555.61
00761074	13160	BRIGHTON CITY OF (WATER)	07/14/21	117.70
00761075	13160	BRIGHTON CITY OF (WATER)	07/14/21	21,372.46
00761076	8973	C & R ELECTRICAL CONTRACTORS I	07/14/21	1,619.50
00761077	209334	COLO NATURAL GAS INC	07/14/21	35.03
00761078	13409	EASTERN DISPOSE ALL	07/14/21	163.50
00761079	1184327	ETHOS ENVIRONMENTAL LLC	07/14/21	3,364.88
00761080	13565	INTERMOUNTAIN REA	07/14/21	46.82
00761082	32686	SPECIALTY INCENTIVES INC	07/14/21	2,252.61
00761083	25335	STANLEY CONVERGENT SECURITY S	07/14/21	586.50
00761084	1094	TRI COUNTY HEALTH DEPT	07/14/21	6,218.75
00761085	13822	XCEL ENERGY	07/14/21	7,533.99
00761086	13822	XCEL ENERGY	07/14/21	97.85
00761087	8821021	CRISIS CENTER	07/15/21	221.50
00761089	42779	ADAMS COUNTY COMMUNICATION CEN	07/15/21	404,849.59
00761090	93203	ADAMS COUNTY EDUCATION CONSORT	07/15/21	10,000.00
00761093	13884	ADAMS COUNTY SHERIFF	07/15/21	3,096.71
00761094	91631	ADAMSON POLICE PRODUCTS	07/15/21	1,906.43
00761095	433987	ADCO DISTRICT ATTORNEY'S OFFIC	07/15/21	1,391.54
00761096	8579	AGFINITY INC	07/15/21	50.00
00761098	1188685	ALEXANDER PAUL	07/15/21	212.00
00761099	12012	ALSCO AMERICAN INDUSTRIAL	07/15/21	201.14
00761101	50314	APEX SOFTWARE	07/15/21	2,720.00

Net Warrants by Fund Detail

1General Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761102	221351	APEX SYSTEMS GROUP LLC	07/15/21	285.00
00761104	322973	ARMORED KNIGHTS INC	07/15/21	3,264.34
00761108	40942	BI INCORPORATED	07/15/21	21,828.96
00761109	1139376	BLACK JARRED	07/15/21	104.00
00761112	463401	BUSH MELVIN E	07/15/21	65.00
00761118	881501	CARWIN LARRY M JR	07/15/21	212.00
00761119	56250	CCR EVENT GROUP	07/15/21	8,572.00
00761120	37266	CENTURY LINK	07/15/21	183.00
00761126	1188239	CHARLEIGH TRANSCRIPTION LLC	07/15/21	348.75
00761128	647801	CML SECURITY LLC	07/15/21	17,281.76
00761129	1188695	COLEY TYLER	07/15/21	53.00
00761134	5050	COLO DIST ATTORNEY COUNCIL	07/15/21	168.00
00761137	2157	COLO OCCUPATIONAL MEDICINE PHY	07/15/21	849.00
00761138	1128468	COLORADO DRAGON BOAT FESTIVAL	07/15/21	515.00
00761139	1188682	COLORADO HISPANIC CHAMBER OF C	07/15/21	25,000.00
00761140	48089	COMCAST BUSINESS	07/15/21	2,100.00
00761141	612089	COMMERCIAL CLEANING SYSTEMS	07/15/21	108,362.67
00761143	274030	COMMUNICATION CONSTRUCTION & E	07/15/21	6,060.00
00761144	1154230	COMMUNITY UPLIFT PARTNERSHIP	07/15/21	18,179.58
00761146	1189578	COVETRUS PHARMACY SERVICES LLC	07/15/21	54.00
00761147	1188688	DELISA GINO	07/15/21	106.00
00761148	44656	DENVER HEALTH & HOSPITAL AUTHO	07/15/21	1,360.00
00761149	13377	DENVER REGIONAL COUNCIL OF	07/15/21	62,300.00
00761154	808844	DUPRIEST JOHN FIELDEN	07/15/21	130.00
00761155	1188691	EHRHARDT JASON	07/15/21	106.00
00761156	23417	ERGOMETRICS & APPLIED PERSONNE	07/15/21	272.60
00761161	339325	FLEXENTIAL PROFESSIONAL SERVIC	07/15/21	1,850.01
00761162	1188238	FLOYD LISA JO	07/15/21	560.00
00761163	698569	FOREST SEAN	07/15/21	130.00
00761164	1190278	FROM THE HIP PHOTO LLC	07/15/21	1,500.00
00761165	1189195	FULL SPEED AUTOMOTIVE	07/15/21	300.00
00761166	12689	GALLS LLC	07/15/21	13,799.75
00761167	293118	GARNER, ROSIE	07/15/21	130.00
00761169	1186637	GEREK MARY LOUISE	07/15/21	125.00
00761172	675517	GREEN THOMAS D	07/15/21	65.00
00761173	808845	GRONQUIST, CHRISTOPHER L	07/15/21	65.00

Net Warrants by Fund Detail

1 General Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761174	373932	GROUPE SHAREGATE INC	07/15/21	9,588.00
00761175	1188692	HAMANN GAVIN	07/15/21	53.00
00761176	999746	HAMMERTON N SUSAN	07/15/21	380.00
00761177	970284	HARNETT OWEN	07/15/21	65.00
00761179	14991	HELTON & WILLIAMSEN PC	07/15/21	7,580.80
00761181	293122	HERRERA, AARON	07/15/21	65.00
00761182	10864	HILLYARD - DENVER	07/15/21	38,055.99
00761183	350168	HOFFER MICHELLE L	07/15/21	200.00
00761185	79260	IDEXX DISTRIBUTION INC	07/15/21	794.35
00761186	675514	IMPROVEMENT ASSURANCE GROUP	07/15/21	3,666.66
00761188	32276	INSIGHT PUBLIC SECTOR	07/15/21	22,558.48
00761190	746356	J. BROWER PSYCHOLOGICAL SERVIC	07/15/21	1,400.00
00761193	145356	KENNY ELECTRIC SERVICE INC	07/15/21	3,748.00
00761194	1029847	KING SOOPERS	07/15/21	100.00
00761195	44695	KNS COMMUNICATIONS CONSULTANTS	07/15/21	2,355.80
00761196	170624	KODIAK RANCH LLC	07/15/21	6,000.00
00761197	485045	KORBY LANDSCAPE LLC	07/15/21	17,072.86
00761198	1187079	KUM & GO	07/15/21	100.00
00761200	192058	LADWIG MICHAEL V MD PC	07/15/21	384.00
00761202	976517	LIFE RECOVERY CENTER	07/15/21	1,615.00
00761205	1173829	LOOMIS ARMORED	07/15/21	833.00
00761208	975291	MADDUX THOMAS SCOTT	07/15/21	65.00
00761209	1188530	MARTIN CORY	07/15/21	28.04
00761210	810888	MARTINEZ JUSTIN PAUL	07/15/21	65.00
00761211	744824	MARTINEZ SOPHIE	07/15/21	200.00
00761213	38338	MCKAY LORI A	07/15/21	27.00
00761214	304690	MILE HIGH YOUTH CORPS	07/15/21	29,880.00
00761215	1068447	MOORE IACOFANO GOLTSMAN INC	07/15/21	7,631.48
00761216	173917	MULLIGAN CAROLYN	07/15/21	325.00
00761217	13591	MWI ANIMAL HEALTH	07/15/21	1,924.40
00761218	193800	NATL SLED PULLERS ASSN LLC	07/15/21	17,000.00
00761219	1175744	NEWTON RUNNING COMPANY INC	07/15/21	737.30
00761220	16428	NICOLETTI-FLATER ASSOCIATES	07/15/21	411.00
00761221	13774	NORTH PECOS WATER & SANITATION	07/15/21	41.46
00761222	1029852	NORTH SUBURBAN MEDICAL CENTER	07/15/21	50.00
00761223	1175934	NURF TERF LLC	07/15/21	5,000.00

Net Warrants by Fund Detail

1General Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761224	573416	NYHOLM STEWART E	07/15/21	65.00
00761226	470643	ONENECK IT SOLUTIONS LLC	07/15/21	8,501.83
00761227	1026844	OTAK INC A COLORADO CORPORATIO	07/15/21	2,628.25
00761229	632233	PIKE MATTHEW	07/15/21	125.00
00761230	1177061	PITCHER COLETTE	07/15/21	125.00
00761231	192059	POINT SPORTS/ERGOMED	07/15/21	360.00
00761232	837076	PSYCHOLOGICAL DIMENSIONS	07/15/21	5,625.00
00761234	53054	RICHARDSON SHARON	07/15/21	130.00
00761236	8681	RIVERDALE RESTAURANT	07/15/21	2,936.75
00761238	1129845	ROSE DAVID E	07/15/21	130.00
00761239	51032	ROTARY CLUB OF NORTHGLENN THOR	07/15/21	275.00
00761244	574170	SCHULTZ PUBLIC AFFAIRS LLC	07/15/21	5,416.67
00761245	13538	SHRED IT USA LLC	07/15/21	123.00
00761247	10449	SIR SPEEDY	07/15/21	1,090.98
00761249	1184412	SNI COMPANIES	07/15/21	4,000.00
00761251	13932	SOUTH ADAMS WATER & SANITATION	07/15/21	487.86
00761253	42818	STATE OF COLORADO	07/15/21	1,849.84
00761254	42818	STATE OF COLORADO	07/15/21	351.70
00761255	42818	STATE OF COLORADO	07/15/21	15.50
00761256	42818	STATE OF COLORADO	07/15/21	67.79
00761257	42818	STATE OF COLORADO	07/15/21	1.06
00761258	42818	STATE OF COLORADO	07/15/21	10,274.69
00761259	42818	STATE OF COLORADO	07/15/21	3,216.67
00761260	42818	STATE OF COLORADO	07/15/21	31.68
00761261	42818	STATE OF COLORADO	07/15/21	455.31
00761262	42818	STATE OF COLORADO	07/15/21	7.15
00761265	1186984	STIVERS STAFFING SERVICES LLC	07/15/21	1,632.00
00761266	222651	STRAIGHT LINE SAWCUTTING	07/15/21	38,925.00
00761268	599714	SUMMIT FOOD SERVICE LLC	07/15/21	34,180.57
00761271	426037	SWIRE COCA-COLA USA	07/15/21	2,633.52
00761272	1047964	SYMMETRY ENERGY SOLUTIONS LLC	07/15/21	10,611.91
00761273	618144	T&G PECOS LLC	07/15/21	1,800.00
00761275	1188687	THOMAS SCOTT	07/15/21	159.00
00761276	385142	THOMPSON GREGORY PAUL	07/15/21	130.00
00761277	925078	TIGCHELAAR MATTHEW E	07/15/21	236.25
00761280	666214	TYGRETT DEBRA R	07/15/21	235.00

Net Warrants by Fund Detail

1General Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761281	1189190	TYLER WALKER MUSIC	07/15/21	2,500.00
00761283	158184	UTILITY NOTIFICATION CENTER OF	07/15/21	327.36
00761284	514923	VANINO SHERI DR LLC	07/15/21	237.50
00761286	28566	VERIZON WIRELESS	07/15/21	40.01
00761287	28617	VERIZON WIRELESS	07/15/21	3,225.93
00761288	1188684	WALENCZAK MATTHEW	07/15/21	212.00
00761289	1189270	WARD YEUTTER CARKHUFF MADISON	07/15/21	1,026.78
00761291	46796	WESTMINSTER CITY OF	07/15/21	5,049.03
00761292	18645	WILBUR-ELLIS COMPANY LLC	07/15/21	3,233.35
00761293	1188686	WILKES JEREMY	07/15/21	159.00
00761294	40340	WINDSTREAM COMMUNICATIONS	07/15/21	1,710.74
00761295	13822	XCEL ENERGY	07/15/21	91.69
00761296	13822	XCEL ENERGY	07/15/21	120.60
00761297	13822	XCEL ENERGY	07/15/21	12,717.69
00761298	13822	XCEL ENERGY	07/15/21	87.71
00761299	13822	XCEL ENERGY	07/15/21	1,111.62
00761300	13822	XCEL ENERGY	07/15/21	50.74
00761301	13822	XCEL ENERGY	07/15/21	101.70
00761302	13822	XCEL ENERGY	07/15/21	66.73
00761303	678293	ZOE TRAINING & CONSULTING	07/15/21	2,057.00
00761304	33604	STATE OF COLORADO	07/15/21	254.02
00761306	1189889	HARTNETT ALEXANDER P	07/16/21	17,500.00
Fund Total				1,788,662.28

County of Adams
Net Warrants by Fund Detail

<u>4</u>		<u>Capital Facilities Fund</u>			
<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>	
00761117	1100769	CAN AMERICAN DRILLING	07/15/21	1,502.60	
00761248	897973	SM ROCHA LLC	07/15/21	797.50	
			Fund Total	2,300.10	

Net Warrants by Fund Detail

5Golf Course Enterprise Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007797	6177	PROFESSIONAL RECREATION MGMT I	07/14/21	149,781.52
00007808	6177	PROFESSIONAL RECREATION MGMT I	07/15/21	53,898.23
00761100	12012	ALSCO AMERICAN INDUSTRIAL	07/15/21	114.41
00761110	22068	BT CONSTRUCTION	07/15/21	820.00
00761111	9822	BUCKEYE WELDING SUPPLY CO INC	07/15/21	30.60
00761113	13206	C P S DISTRIBUTORS INC	07/15/21	89.05
00761136	14008	COLO GOLF & TURF INC	07/15/21	806.00
00761170	160270	GOLF & SPORT SOLUTIONS	07/15/21	842.06
00761178	927372	HARRELLS LLC	07/15/21	580.00
00761189	2202	INTERSTATE BATTERY OF ROCKIES	07/15/21	104.85
00761199	11496	L L JOHNSON DIST	07/15/21	598.51
00761212	46175	MASEK GOLF CAR COMPANY	07/15/21	2,739.97
00761246	89126	SIMPLOT PARTNERS	07/15/21	1,550.00
00761267	79543	SUC N UP INC	07/15/21	1,800.00
Fund Total				213,755.20

County of Adams
Net Warrants by Fund Detail

6 Equipment Service Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761158	346750	FACTORY MOTOR PARTS	07/15/21	8,615.40
00761187	682207	INSIGHT AUTO GLASS LLC	07/15/21	1,772.44
00761192	26418	JOHN DEERE COMPANY	07/15/21	47,022.13
00761240	16237	SAM HILL OIL INC	07/15/21	35,770.42
00761274	790907	THE GOODYEAR TIRE AND RUBBER C	07/15/21	646.88
Fund Total				93,827.27

Net Warrants by Fund Detail

13

Road & Bridge Fund

Warrant	Supplier No	Supplier Name	Warrant Date	Amount
00007781	100083	ALDERMAN BERNSTEIN LLC	07/14/21	12,226.81
00007783	89295	ARVADA CITY OF	07/14/21	24,096.76
00007784	89296	AURORA CITY OF	07/14/21	261,140.99
00007786	89297	BENNETT TOWN OF	07/14/21	12,095.84
00007787	89298	BRIGHTON CITY OF	07/14/21	172,071.77
00007790	89299	COMMERCE CITY CITY OF	07/14/21	209,686.24
00007791	89300	FEDERAL HEIGHTS CITY OF	07/14/21	34,896.33
00007795	362129	MARTIN MARIETTA MATERIALS INC	07/14/21	313,760.73
00007796	89301	NORTHGLENN CITY OF	07/14/21	99,190.57
00007799	89302	THORNTON CITY OF	07/14/21	385,387.35
00007800	89304	WESTMINSTER CITY OF	07/14/21	205,937.01
00761088	1189186	100th WAY LLC	07/15/21	1,044.00
00761097	1092	AGGREGATE INDUSTRIES	07/15/21	1,029,547.71
00761106	1186349	AZAR LYNNE	07/15/21	200.00
00761107	1189573	BALBOA PARK HOMES ASSOCIATION	07/15/21	996.00
00761150	237568	DESIGN WORKSHOP	07/15/21	6,112.75
00761151	1187604	DEVONSHIRE LLC	07/15/21	33,680.00
00761159	1186367	FISCHER ROBERT E	07/15/21	200.00
00761171	1186345	GONZALEZ MARIA D	07/15/21	320.00
00761180	1187601	HENDERSON JENNIFER D	07/15/21	850.00
00761184	1187602	HUBERT COLIN	07/15/21	250.00
00761201	1178811	LAURIENTI RANDOLPH	07/15/21	16,140.00
00761203	1187603	LINEBARGER TAYLOR JULIE	07/15/21	240.00
00761207	1189244	LUCERO JOHN BENITO	07/15/21	800.00
00761225	1186341	OLSEN KRISTA R	07/15/21	240.00
00761233	1188237	PUNT DENNIS A	07/15/21	660.00
00761237	1173656	ROMERO JR HECTOR	07/15/21	16,750.00
00761241	1188243	SAMORA MARILYN S	07/15/21	655.00
00761243	1186340	SCHNACK JR THEODORE LEE	07/15/21	360.00
00761269	1189185	SUNDAY MICHAEL	07/15/21	200.00
00761278	1186351	TOTTEN HUEY KAY	07/15/21	204.00
00761285	1186344	VELANDO RODRIGO	07/15/21	200.00
00761290	1187585	WELBY GLEN OWNERS ASSOCIATION	07/15/21	936.00

Fund Total

2,841,075.86

Net Warrants by Fund Detail

19Insurance Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007809	37223	UNITED HEALTH CARE INSURANCE C	07/15/21	286,487.24
00007810	37223	UNITED HEALTH CARE INSURANCE C	07/15/21	407,965.37
00007815	63300	TALX CORPORATION	07/16/21	1,861.25
00761068	68455	ANDERSON MANDY L	07/14/21	24,000.00
00761081	64854	KING & GREISEN LLP	07/14/21	16,000.00
00761114	726898	CA SHORT COMPANY	07/15/21	1,760.50
00761135	17565	COLO FRAME & SUSPENSION	07/15/21	17,800.83
00761160	986661	FIT SOLDIERS LLC	07/15/21	300.00
00761191	13771	JOE'S TOWING & RECOVERY	07/15/21	167.00
00761204	855793	LOCKTON COMPANIES	07/15/21	10,250.00
00761228	1129923	PARENTE LISA	07/15/21	300.00
00761242	1188027	SAMPELL CHRISTINE	07/15/21	159.13
Fund Total				767,051.32

Net Warrants by Fund Detail

30Community Dev Block Grant Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007801	29064	TIERRA ROJO CORPORATION	07/14/21	11,550.00
00007804	1152902	LUCEROS LLC	07/15/21	11,046.00
00007805	1141131	MI RANCHITO NEVERIA LLC	07/15/21	3,397.50
00007806	1043599	PARTY CLOZ & BRIDRES DREAMS	07/15/21	2,500.00
00007807	866134	PG CONSTRUCTION SERVICES INC	07/15/21	19,409.00
00761115	45138	CAKES BY KAREN	07/15/21	7,029.50
00761270	1174687	SUPREME CLEANERS INC	07/15/21	8,596.00
Fund Total				63,528.00

Net Warrants by Fund Detail

31Head Start Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761091	252050	ADAMS COUNTY HUMAN SERVICES	07/15/21	15.30
00761121	37266	CENTURY LINK	07/15/21	424.30
00761122	37266	CENTURY LINK	07/15/21	149.68
00761123	37266	CENTURY LINK	07/15/21	149.86
00761124	37266	CENTURY LINK	07/15/21	199.88
00761125	327914	CESCO LINGUISTIC SERVICE INC	07/15/21	231.06
00761131	5078	COLO DEPT OF HUMAN SERVICES	07/15/21	35.00
Fund Total				1,205.08

Net Warrants by Fund Detail

35**Workforce & Business Center**

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761092	252050	ADAMS COUNTY HUMAN SERVICES	07/15/21	62.98
00761116	1183616	CALDERA CECEILA	07/15/21	320.00
00761132	95017	COLO DEPT OF REVENUE	07/15/21	33.00
00761133	95017	COLO DEPT OF REVENUE	07/15/21	18.52
00761145	1483	COMPUTER SYSTEMS DESIGN	07/15/21	4,800.00
00761152	365710	DRIVESAFE	07/15/21	89.00
00761153	365710	DRIVESAFE	07/15/21	35.00
00761157	5686	EXPRESS SERVICES INC	07/15/21	2,686.88
00761168	1187605	GEMTRAGO INC	07/15/21	500.00
00761250	1186318	SOLIS BALDERRAMA ANAHI	07/15/21	335.00
00761252	1064152	SPECIALIZED ELECTRIC COMPANY	07/15/21	3,000.00
00761279	827482	TURING SCHOOL OF SOFTWARE AND	07/15/21	10,000.00
Fund Total				<hr/> 21,880.38

Net Warrants by Fund Detail

43Colorado Air & Space Port

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00007802	709816	CITY SERVICEVALCON LLC	07/15/21	30,403.35
00007812	709816	CITY SERVICEVALCON LLC	07/16/21	19,296.56
00007814	80249	OFFEN PETROLEUM INC	07/16/21	2,072.82
00761103	228213	ARAMARK REFRESHMENT SERVICES	07/15/21	133.22
00761105	80118	AT&T CORP	07/15/21	111.90
00761127	852482	CLEARWAY ENERGY GROUP LLC	07/15/21	3,090.10
00761206	112383	LOTTMAN OIL COMPANY	07/15/21	361.00
00761235	51224	RID A PEST EXTERMINATORS INC	07/15/21	400.00
00761263	33604	STATE OF COLORADO	07/15/21	1,863.00
00761264	33604	STATE OF COLORADO	07/15/21	16.55
00761282	25377	UNITED GLASS SERVICE INC	07/15/21	2,235.77
Fund Total				59,984.27

County of Adams
Net Warrants by Fund Detail

50 FLATROCK Facility Fund

<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>
00761070	43744	AUTOMATED BUILDING SOLUTIONS I	07/14/21	2,900.00
00761142	612089	COMMERCIAL CLEANING SYSTEMS	07/15/21	1,671.14
00761305	33604	STATE OF COLORADO	07/15/21	5.35
Fund Total				4,576.49

County of Adams
Net Warrants by Fund Detail

<u>94</u>		<u>Sheriff Payables</u>			
<u>Warrant</u>	<u>Supplier No</u>	<u>Supplier Name</u>	<u>Warrant Date</u>	<u>Amount</u>	
00761130	5556	COLO BUREAU INVESTIGATION-IDEN	07/15/21	22,606.00	
Fund Total				22,606.00	

County of Adams
Net Warrants by Fund Detail

Grand Total 5,880,452.25

County of Adams
Vendor Payment Report

<u>99800</u>	<u>All Ofc Shared Direct</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Postage & Freight					
	ADAMS COUNTY HUMAN SERVICES	00035	999194	395660	07/08/21	62.98
					Account Total	62.98
					Department Total	62.98

County of Adams
Vendor Payment Report

<u>3161</u>	<u>Animal Shelter Construction</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Operating Supplies					
	SPECIALTY INCENTIVES INC	00004	998314	394959	06/25/21	2,252.61
					Account Total	2,252.61
					Department Total	2,252.61

County of Adams
Vendor Payment Report

<u>1011</u>	<u>Board of County Commissioners</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Travel & Transportation					
	NEWTON RUNNING COMPANY INC	00001	999176	395816	07/08/21	273.00
	NEWTON RUNNING COMPANY INC	00001	999178	395817	07/08/21	464.30
					Account Total	737.30
					Department Total	737.30

County of Adams
Vendor Payment Report

<u>4</u>	<u>Capital Facilities Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	CAN AMERICAN DRILLING	00004	999542	396345	07/15/21	1,502.60
	SM ROCHA LLC	00004	999514	396345	07/15/21	797.50
					Account Total	2,300.10
					Department Total	2,300.10

County of Adams
Vendor Payment Report

<u>4302</u>	<u>CASP Administration</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Coffee					
	ARAMARK REFRESHMENT SERVICES	00043	999414	396253	06/30/21	66.61
					Account Total	66.61
	Telephone					
	AT&T CORP	00043	999415	396253	07/14/21	97.02
					Account Total	97.02
					Department Total	163.63

County of Adams
Vendor Payment Report

<u>4308</u>	<u>CASP ATCT</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Telephone					
	AT&T CORP	00043	999415	396253	07/14/21	7.44
					Account Total	7.44
					Department Total	7.44

County of Adams
Vendor Payment Report

<u>4303</u>	<u>CASP FBO</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Coffee					
	ARAMARK REFRESHMENT SERVICES	00043	999414	396253	06/30/21	66.61
					Account Total	66.61
	Misc Revenues					
	STATE OF COLORADO	00043	999424	396260	07/14/21	61.00-
	STATE OF COLORADO	00043	999424	396260	07/14/21	.09
	STATE OF COLORADO	00043	999425	396260	07/14/21	.20-
	STATE OF COLORADO	00043	999425	396260	07/14/21	.45-
					Account Total	61.56-
	Oil					
	LOTTMAN OIL COMPANY	00043	999421	396253	06/30/21	361.00
					Account Total	361.00
					Department Total	366.05

County of Adams
Vendor Payment Report

<u>4304</u>	<u>CASP Operations/Maintenance</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Education & Training					
	RID A PEST EXTERMINATORS INC	00043	999426	396261	07/14/21	400.00
					Account Total	400.00
	Gas & Electricity					
	CLEARWAY ENERGY GROUP LLC	00043	999416	396253	07/14/21	1,219.48
	CLEARWAY ENERGY GROUP LLC	00043	999417	396253	07/14/21	761.33
	CLEARWAY ENERGY GROUP LLC	00043	999418	396253	07/14/21	557.50
	CLEARWAY ENERGY GROUP LLC	00043	999419	396253	07/14/21	551.79
					Account Total	3,090.10
	Gasoline					
	OFFEN PETROLEUM INC	00043	999565	396368	07/15/21	2,072.82
					Account Total	2,072.82
	Telephone					
	AT&T CORP	00043	999415	396253	07/14/21	7.44
					Account Total	7.44
					Department Total	5,570.36

County of Adams
Vendor Payment Report

<u>941018</u>	<u>CDBG 2018/2019</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Grants to Other Inst.-Pgm. Cst					
	CAKES BY KAREN	00030	999010	395679	07/07/21	7,029.50
	LUCEROS LLC	00030	999335	396159	07/13/21	11,046.00
	MI RANCHITO NEVERIA LLC	00030	999198	395947	07/09/21	3,397.50
	PARTY CLOZ & BRIDRES DREAMS	00030	998852	395384	07/01/21	2,500.00
	SUPREME CLEANERS INC	00030	999002	395675	07/07/21	8,596.00
					Account Total	32,569.00
	Grants to Other Institutions					
	PG CONSTRUCTION SERVICES INC	00030	998277	394928	06/25/21	15,838.00
	PG CONSTRUCTION SERVICES INC	00030	998804	395369	07/01/21	3,571.00
	TIERRA ROJO CORPORATION	00030	998276	394926	06/25/21	11,550.00
					Account Total	30,959.00
					Department Total	63,528.00

County of Adams
Vendor Payment Report

<u>1020</u>	<u>CLK Administration</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Membership Dues					
	ROTARY CLUB OF NORTHGLENN THOR	00001	999136	395808	07/08/21	275.00
					Account Total	275.00
					Department Total	275.00

County of Adams
Vendor Payment Report

<u>1023</u>	<u>CLK Motor Vehicle</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Destruction of Records					
	SHRED IT USA LLC	00001	998661	395146	06/29/21	123.00
					Account Total	123.00
					Department Total	123.00

County of Adams
Vendor Payment Report

<u>43</u>	<u>Colorado Air & Space Port</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Colorado Sales Tax Payable					
	STATE OF COLORADO	00043	999424	396260	07/14/21	1,923.91
	STATE OF COLORADO	00043	999425	396260	07/14/21	17.20
					Account Total	1,941.11
	Received not Vouchered Clrg					
	CITY SERVICEVALCON LLC	00043	999567	396369	07/15/21	30,403.35
	CITY SERVICEVALCON LLC	00043	999633	396470	07/16/21	19,296.56
	UNITED GLASS SERVICE INC	00043	999470	396337	07/15/21	2,235.77
					Account Total	51,935.68
					Department Total	53,876.79

County of Adams
Vendor Payment Report

9264	Community Recovery	Fund	Voucher	Batch No	GL Date	Amount
	Grants to Other Instit					
	HOUSING AUTHORITY THE CITY OF	00001	999336	396165	07/13/21	550,121.50
					Account Total	550,121.50
	Other Professional Serv					
	TRI COUNTY HEALTH DEPT	00001	998326	394959	06/25/21	6,218.75
					Account Total	6,218.75
					Department Total	556,340.25

County of Adams
Vendor Payment Report

<u>1041</u>	<u>County Assessor</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Software and Licensing					
	APEX SOFTWARE	00001	999237	396049	07/12/21	2,720.00
					Account Total	2,720.00
					Department Total	2,720.00

County of Adams
Vendor Payment Report

<u>2031</u>	<u>County Coroner</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Medical Services					
	CARUSO JAMES LOUIS	00001	999338	396170	07/13/21	2,050.00
	CINA & CINA FORENSIC CONSULTIN	00001	999339	396171	07/13/21	19,850.00
					Account Total	21,900.00
					Department Total	21,900.00

County of Adams
Vendor Payment Report

<u>1051</u>	<u>District Attorney</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Court Reporting Transcripts					
	CHARLEIGH TRANSCRIPTION LLC	00001	999003	395676	07/07/21	348.75
	MCKAY LORI A	00001	999006	395676	07/07/21	27.00
					Account Total	375.75
	Other Professional Serv					
	CRISIS CENTER	00001	999227	396040	07/12/21	221.50
	FLOYD LISA JO	00001	999004	395676	07/07/21	560.00
	FROM THE HIP PHOTO LLC	00001	999437	396263	07/14/21	1,500.00
	HAMMERTON N SUSAN	00001	999005	395676	07/07/21	380.00
	TIGCHELAAR MATTHEW E	00001	999007	395676	07/07/21	236.25
	VANINO SHERI DR LLC	00001	999008	395676	07/07/21	237.50
	WARD YEUTTER CARKHUFF MADISON	00001	999228	396040	07/12/21	980.00
					Account Total	4,115.25
	Witness Fees					
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999224	396040	07/12/21	212.80
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999224	396040	07/12/21	60.00
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999225	396040	07/12/21	22.06
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999225	396040	07/12/21	11.72
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999225	396040	07/12/21	4.57
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999225	396040	07/12/21	4.57
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999226	396040	07/12/21	2.57
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999226	396040	07/12/21	14.61
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999226	396040	07/12/21	14.61
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999226	396040	07/12/21	18.26
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999226	396040	07/12/21	22.06
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999226	396040	07/12/21	37.77
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999427	396263	07/14/21	12.97
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999427	396263	07/14/21	12.97
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999428	396263	07/14/21	12.58
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999428	396263	07/14/21	47.80
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999428	396263	07/14/21	133.60
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999428	396263	07/14/21	60.00
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999428	396263	07/14/21	9.43
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999428	396263	07/14/21	9.43
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999428	396263	07/14/21	9.43

County of Adams
Vendor Payment Report

1051	District Attorney	Fund	Voucher	Batch No	GL Date	Amount
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999429	396263	07/14/21	29.00
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999429	396263	07/14/21	25.96
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999429	396263	07/14/21	20.48
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999429	396263	07/14/21	9.43
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	999429	396263	07/14/21	9.43
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998899	395506	07/02/21	13.73
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998899	395506	07/02/21	12.45
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998899	395506	07/02/21	21.04
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998899	395506	07/02/21	17.16
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998900	395506	07/02/21	11.88
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998901	395506	07/02/21	43.33
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998901	395506	07/02/21	20.76
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998901	395506	07/02/21	20.76
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	33.72
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	33.72
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	16.73
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	3.59
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	7.82
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	1.47
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	1.47
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	33.13
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998904	395506	07/02/21	11.92
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998904	395506	07/02/21	16.73
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998904	395506	07/02/21	3.91
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998904	395506	07/02/21	28.04
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998904	395506	07/02/21	11.92
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998905	395506	07/02/21	3.46
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998905	395506	07/02/21	3.46
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	60.00
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	29.00
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	40.00
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	4.04
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	4.39
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	21.32
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	1.94
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998906	395506	07/02/21	22.54

County of Adams
Vendor Payment Report

<u>1051</u>	<u>District Attorney</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	MARTIN CORY	00001	999009	395676	07/07/21	28.04
	WARD YEUTTER CARKHUFF MADISON	00001	999228	396040	07/12/21	46.78
Account Total						1,458.36
Department Total						5,949.36

County of Adams
Vendor Payment Report

<u>7041</u>	<u>Economic Development Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Grants to Other Instit					
	ADAMS COUNTY EDUCATION CONSORT	00001	999179	395818	07/08/21	10,000.00
					Account Total	10,000.00
					Department Total	10,000.00

County of Adams
Vendor Payment Report

<u>99500</u>	<u>Employment First</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Testing/Licensing Employment					
	COLO DEPT OF REVENUE	00035	999190	395660	07/08/21	33.00
	COLO DEPT OF REVENUE	00035	999191	395660	07/08/21	18.52
	DRIVESAFE	00035	999192	395660	07/08/21	89.00
	DRIVESAFE	00035	999193	395660	07/08/21	35.00
					Account Total	175.52
					Department Total	175.52

County of Adams
Vendor Payment Report

<u>6</u>	<u>Equipment Service Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	FACTORY MOTOR PARTS	00006	999473	396337	07/15/21	8,615.40
	INSIGHT AUTO GLASS LLC	00006	999475	396337	07/15/21	314.22
	INSIGHT AUTO GLASS LLC	00006	999476	396337	07/15/21	310.60
	INSIGHT AUTO GLASS LLC	00006	999477	396337	07/15/21	265.96
	INSIGHT AUTO GLASS LLC	00006	999478	396337	07/15/21	40.00
	INSIGHT AUTO GLASS LLC	00006	999479	396337	07/15/21	40.00
	INSIGHT AUTO GLASS LLC	00006	999550	396345	07/15/21	526.00
	INSIGHT AUTO GLASS LLC	00006	999472	396337	07/15/21	275.66
	JOHN DEERE COMPANY	00006	999443	396337	07/15/21	47,022.13
	SAM HILL OIL INC	00006	999474	396337	07/15/21	2,481.28
	SAM HILL OIL INC	00006	999480	396337	07/15/21	10,580.10
	SAM HILL OIL INC	00006	999549	396345	07/15/21	22,709.04
	THE GOODYEAR TIRE AND RUBBER C	00006	999441	396337	07/15/21	646.88
					Account Total	93,827.27
					Department Total	93,827.27

County of Adams
Vendor Payment Report

<u>98802</u>	<u>ESF Supplemental PY20</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Clnt Trng- OJT					
	SPECIALIZED ELECTRIC COMPANY	00035	998976	395660	07/07/21	3,000.00
					Account Total	3,000.00
					Department Total	3,000.00

County of Adams
Vendor Payment Report

<u>1018</u>	<u>Finance General Accounting</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Printing External					
	SIR SPEEDY	00001	999422	396255	07/14/21	1,090.98
					Account Total	1,090.98
					Department Total	1,090.98

County of Adams
Vendor Payment Report

<u>50</u>	<u>FLATROCK Facility Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Colorado Sales Tax Payable					
	STATE OF COLORADO	00050	999558	396348	07/15/21	5.54
					Account Total	5.54
	Received not Vouchered Clrg					
	COMMERCIAL CLEANING SYSTEMS	00050	999464	396337	07/15/21	1,671.14
					Account Total	1,671.14
					Department Total	1,676.68

County of Adams
Vendor Payment Report

<u>1076</u>	<u>FO - Adams County Svc Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	Energy Cap Bill ID=11820	00001	999254	396058	06/23/21	12,717.69
	Energy Cap Bill ID=11828	00001	999255	396058	06/25/21	702.65
					Account Total	13,420.34
					Department Total	13,420.34

County of Adams
Vendor Payment Report

<u>1091</u>	<u>FO - Administration</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	Energy Cap Bill ID=11813	00001	998540	395096	06/18/21	35.03
	Energy Cap Bill ID=11816	00001	998541	395096	06/17/21	97.85
	Energy Cap Bill ID=11819	00001	999257	396058	06/23/21	87.71
	Energy Cap Bill ID=11823	00001	999258	396058	06/21/21	1,111.62
					Account Total	1,332.21
	Water/Sewer/Sanitation					
	EASTERN DISPOSE ALL	00001	998324	394959	06/25/21	72.50
					Account Total	72.50
					Department Total	1,404.71

County of Adams
Vendor Payment Report

<u>1114</u>	<u>FO - District Attorney Bldg.</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	Energy Cap Bill ID=11821	00001	999260	396058	06/24/21	101.70
					Account Total	101.70
					Department Total	101.70

County of Adams
Vendor Payment Report

<u>2090</u>	<u>FO - Flatrock Facility</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	AUTOMATED BUILDING SOLUTIONS I	00050	998318	394959	06/25/21	<u>2,900.00</u>
					Account Total	<u>2,900.00</u>
					Department Total	<u><u>2,900.00</u></u>

County of Adams
Vendor Payment Report

<u>1077</u>	<u>FO - Government Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	AUTOMATED BUILDING SOLUTIONS I	00001	998315	394959	06/25/21	4,900.00
	AUTOMATED BUILDING SOLUTIONS I	00001	998316	394959	06/25/21	4,900.00
	AUTOMATED BUILDING SOLUTIONS I	00001	998317	394959	06/25/21	4,900.00
	STANLEY CONVERGENT SECURITY S	00001	998313	394959	06/25/21	586.50
					Account Total	15,286.50
					Department Total	15,286.50

County of Adams
Vendor Payment Report

<u>1070</u>	<u>FO - Honnen/Plan&Devel/MV Ware</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	Energy Cap Bill ID=11818	00001	999249	396058	06/23/21	120.60
					Account Total	120.60
	Water/Sewer/Sanitation					
	Energy Cap Bill ID=11824	00001	999250	396058	06/20/21	487.86
					Account Total	487.86
					Department Total	608.46

County of Adams
Vendor Payment Report

<u>1079</u>	<u>FO - Human Services Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	Energy Cap Bill ID=11815	00001	998539	395096	06/18/21	7,533.99
					Account Total	7,533.99
	Water/Sewer/Sanitation					
	Energy Cap Bill ID=11825	00001	999256	396058	06/16/21	2,703.69
					Account Total	2,703.69
					Department Total	10,237.68

County of Adams
Vendor Payment Report

<u>1071</u>	<u>FO - Justice Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	AUTOMATED BUILDING SOLUTIONS I	00001	998320	394959	06/25/21	2,900.00
					Account Total	2,900.00
	Gas & Electricity					
	Energy Cap Bill ID=11826	00001	999251	396058	06/25/21	1,397.13
					Account Total	1,397.13
					Department Total	4,297.13

County of Adams
Vendor Payment Report

<u>1111</u>	<u>FO - Parks Facilities</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Building Repair & Maint					
	AUTOMATED BUILDING SOLUTIONS I	00001	998319	394959	06/25/21	4,650.00
					Account Total	4,650.00
	Gas & Electricity					
	Energy Cap Bill ID=11822	00001	999259	396058	06/24/21	50.74
					Account Total	50.74
					Department Total	4,700.74

County of Adams
Vendor Payment Report

1112	FO - Sheriff HQ/Coroner Bldg	Fund	Voucher	Batch No	GL Date	Amount
	Water/Sewer/Sanitation					
	Energy Cap Bill ID=11811	00001	998542	395096	06/16/21	1,196.81
	Energy Cap Bill ID=11812	00001	998543	395096	06/16/21	755.21
					Account Total	1,952.02
					Department Total	1,952.02

County of Adams
Vendor Payment Report

<u>2009</u>	<u>FO - Sheriff Maintenance</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	Energy Cap Bill ID=11817	00001	999261	396058	06/24/21	66.73
	Energy Cap Bill ID=11830	00001	999262	396058	06/25/21	8,512.13
					Account Total	8,578.86
	Water/Sewer/Sanitation					
	Energy Cap Bill ID=11808	00001	998544	395096	06/16/21	27,555.61
	Energy Cap Bill ID=11809	00001	998545	395096	06/16/21	117.70
	Energy Cap Bill ID=11810	00001	998546	395096	06/16/21	21,372.46
					Account Total	49,045.77
					Department Total	57,624.63

County of Adams
Vendor Payment Report

<u>1075</u>	<u>FO - Strasburg/Whittier</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	Energy Cap Bill ID=11814	00001	998538	395096	06/18/21	46.82
					Account Total	46.82
	Water/Sewer/Sanitation					
	EASTERN DISPOSE ALL	00001	998325	394959	06/25/21	91.00
					Account Total	91.00
					Department Total	137.82

County of Adams
Vendor Payment Report

<u>1072</u>	<u>FO - West Services Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Water/Sewer/Sanitation					
	Energy Cap Bill ID=11827	00001	999252	396058	06/16/21	776.12
	Energy Cap Bill ID=11829	00001	999253	396058	06/16/21	1,569.22
					Account Total	2,345.34
					Department Total	2,345.34

County of Adams
Vendor Payment Report

3098	General Capital Improvements	Fund	Voucher	Batch No	GL Date	Amount
	Other Professional Serv					
	C & R ELECTRICAL CONTRACTORS I	00004	998321	394959	06/25/21	1,619.50
	ETHOS ENVIRONMENTAL LLC	00004	998322	394959	06/25/21	687.44
	ETHOS ENVIRONMENTAL LLC	00004	998323	394959	06/25/21	2,677.44
					Account Total	4,984.38
					Department Total	4,984.38

County of Adams
Vendor Payment Report

<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Cash Over/Short					
	ADCO DISTRICT ATTORNEY'S OFFIC	00001	998903	395506	07/02/21	8.00
					Account Total	8.00
	Colorado Sales Tax Payable					
	STATE OF COLORADO	00001	999560	396348	07/15/21	262.45
					Account Total	262.45
	Diversion Restitution Payable					
	AGFINITY INC	00001	999430	396263	07/14/21	50.00
	BLACK JARRED	00001	999432	396263	07/14/21	104.00
	FULL SPEED AUTOMOTIVE	00001	999431	396263	07/14/21	300.00
	KING SOOPERS	00001	999433	396263	07/14/21	100.00
	KUM & GO	00001	999434	396263	07/14/21	100.00
	LOOMIS ARMORED	00001	999435	396263	07/14/21	833.00
	NORTH SUBURBAN MEDICAL CENTER	00001	999436	396263	07/14/21	50.00
					Account Total	1,537.00
	Received not Vouchered Clrg					
	ADAMS COUNTY COMMUNICATION CEN	00001	999485	396337	07/15/21	393,225.67
	ADAMS COUNTY COMMUNICATION CEN	00001	999485	396337	07/15/21	11,623.92
	ADAMSON POLICE PRODUCTS	00001	999489	396337	07/15/21	664.25
	ADAMSON POLICE PRODUCTS	00001	999489	396337	07/15/21	75.27
	ADAMSON POLICE PRODUCTS	00001	999491	396337	07/15/21	28.91
	ADAMSON POLICE PRODUCTS	00001	999491	396337	07/15/21	75.09
	ADAMSON POLICE PRODUCTS	00001	999492	396337	07/15/21	28.50
	ADAMSON POLICE PRODUCTS	00001	999493	396337	07/15/21	119.95
	ADAMSON POLICE PRODUCTS	00001	999494	396337	07/15/21	104.85
	ADAMSON POLICE PRODUCTS	00001	999495	396337	07/15/21	85.00
	ADAMSON POLICE PRODUCTS	00001	999496	396337	07/15/21	14.25
	ADAMSON POLICE PRODUCTS	00001	999497	396337	07/15/21	575.41
	ADAMSON POLICE PRODUCTS	00001	999498	396337	07/15/21	134.95
	ALSCO AMERICAN INDUSTRIAL	00001	999510	396337	07/15/21	89.01
	ALSCO AMERICAN INDUSTRIAL	00001	999510	396337	07/15/21	112.13
	ANGEL ARMOR LLC	00001	999401	396240	07/14/21	937.27
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	339.42
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	68.83
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	339.42

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<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	68.83
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	136.08
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	68.83
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	136.08
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	68.83
	ARMORED KNIGHTS INC	00001	999467	396337	07/15/21	339.42
	ARMORED KNIGHTS INC	00001	999526	396345	07/15/21	339.72
	ARMORED KNIGHTS INC	00001	999526	396345	07/15/21	339.72
	ARMORED KNIGHTS INC	00001	999526	396345	07/15/21	339.72
	ARMORED KNIGHTS INC	00001	999526	396345	07/15/21	339.72
	ARMORED KNIGHTS INC	00001	999526	396345	07/15/21	339.72
	B&R INDUSTRIES	00001	999402	396240	07/14/21	2,738.76
	BI INCORPORATED	00001	999482	396337	07/15/21	21,828.96
	CCR EVENT GROUP	00001	999519	396345	07/15/21	8,572.00
	CML SECURITY LLC	00001	999509	396337	07/15/21	17,281.76
	CODE 4 SECURITY SERVICES LLC	00001	999632	396470	07/16/21	9,263.00
	COMCAST BUSINESS	00001	999552	396345	07/15/21	2,100.00
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	22,149.02
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	4,947.14
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	3,541.20
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	3,941.60
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	3,550.21
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	1,616.45
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	833.80
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	842.12
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	8,029.69
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	4,499.80
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	974.22
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	705.78
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	1,992.39
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	964.38
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	689.30
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	1,894.34
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	515.02
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	755.60
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	31,966.31

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<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	1,257.46
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	400.61
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	525.20
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	988.00
	COMMERCIAL CLEANING SYSTEMS	00001	999463	396337	07/15/21	10,783.03
	COMMUNITY UPLIFT PARTNERSHIP	00001	999456	396337	07/15/21	18,179.58
	COVETRUS PHARMACY SERVICES LLC	00001	999471	396337	07/15/21	54.00
	FLEXENTIAL PROFESSIONAL SERVIC	00001	999543	396345	07/15/21	1,850.01
	G4S SECURE SOLUTIONS USA INC	00001	999388	396240	07/14/21	11,147.40
	GALLS LLC	00001	999499	396337	07/15/21	18.56
	GALLS LLC	00001	999500	396337	07/15/21	1,127.50
	GALLS LLC	00001	999501	396337	07/15/21	45.25
	GALLS LLC	00001	999502	396337	07/15/21	21.68
	GALLS LLC	00001	999502	396337	07/15/21	246.91
	GALLS LLC	00001	999503	396337	07/15/21	163.62
	GALLS LLC	00001	999504	396337	07/15/21	311.97
	GALLS LLC	00001	999505	396337	07/15/21	71.90
	GALLS LLC	00001	999505	396337	07/15/21	164.45
	GALLS LLC	00001	999506	396337	07/15/21	150.15
	GALLS LLC	00001	999507	396337	07/15/21	95.26
	GALLS LLC	00001	999508	396337	07/15/21	11,382.50
	GROUPE SHAREGATE INC	00001	999469	396337	07/15/21	9,588.00
	GUZMANS PARTY RENTALS	00001	999389	396240	07/14/21	1,435.00
	GUZMANS PARTY RENTALS	00001	999390	396240	07/14/21	1,435.00
	HARTNETT ALEXANDER P	00001	999630	396457	07/16/21	17,500.00
	HELTON & WILLIAMSEN PC	00001	999445	396337	07/15/21	5,863.40
	HELTON & WILLIAMSEN PC	00001	999446	396337	07/15/21	1,717.40
	HILLYARD - DENVER	00001	999455	396337	07/15/21	2,024.56
	HILLYARD - DENVER	00001	999483	396337	07/15/21	36,031.43
	IDEXX DISTRIBUTION INC	00001	999548	396345	07/15/21	375.64
	IDEXX DISTRIBUTION INC	00001	999442	396337	07/15/21	418.71
	IMPROVEMENT ASSURANCE GROUP	00001	999454	396337	07/15/21	3,666.66
	INSIGHT PUBLIC SECTOR	00001	999461	396337	07/15/21	9,550.00
	INSIGHT PUBLIC SECTOR	00001	999462	396337	07/15/21	13,008.48
	J. BROWER PSYCHOLOGICAL SERVIC	00001	999481	396337	07/15/21	1,400.00
	KENNY ELECTRIC SERVICE INC	00001	999562	396354	07/15/21	1,915.21

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<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	KENNY ELECTRIC SERVICE INC	00001	999563	396354	07/15/21	1,832.79
	KODIAK RANCH LLC	00001	999460	396337	07/15/21	6,000.00
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	1,456.17
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	970.78
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	1,194.80
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	1,245.32
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	549.73
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	541.48
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	888.67
	KORBY LANDSCAPE LLC	00001	999448	396337	07/15/21	1,689.48
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	1,456.17
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	970.78
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	1,194.80
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	1,245.32
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	549.73
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	541.48
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	888.67
	KORBY LANDSCAPE LLC	00001	999449	396337	07/15/21	1,689.48
	LIFE RECOVERY CENTER	00001	999523	396345	07/15/21	95.00
	LIFE RECOVERY CENTER	00001	999524	396345	07/15/21	1,520.00
	MILE HIGH YOUTH CORPS	00001	999521	396345	07/15/21	29,880.00
	MOORE IACOFANO GOLTSMAN INC	00001	999527	396345	07/15/21	7,631.48
	MWI ANIMAL HEALTH	00001	999544	396345	07/15/21	367.80
	MWI ANIMAL HEALTH	00001	999545	396345	07/15/21	24.12
	MWI ANIMAL HEALTH	00001	999546	396345	07/15/21	21.72
	MWI ANIMAL HEALTH	00001	999547	396345	07/15/21	1,510.76
	NATL SLED PULLERS ASSN LLC	00001	999459	396337	07/15/21	17,000.00
	ONENECK IT SOLUTIONS LLC	00001	999453	396337	07/15/21	5,361.31
	OTAK INC A COLORADO CORPORATIO	00001	999458	396337	07/15/21	2,398.75
	OTAK INC A COLORADO CORPORATIO	00001	999529	396345	07/15/21	229.50
	SCHULTZ PUBLIC AFFAIRS LLC	00001	999447	396337	07/15/21	5,416.67
	SNI COMPANIES	00001	999465	396337	07/15/21	1,600.00
	SNI COMPANIES	00001	999466	396337	07/15/21	2,400.00
	SOLARWINDS WORLDWIDE LLC	00001	999387	396240	07/14/21	2,385.00
	STATE OF COLORADO	00001	999530	396345	07/15/21	1,849.84
	STATE OF COLORADO	00001	999531	396345	07/15/21	351.70

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<u>1</u>	<u>General Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	STATE OF COLORADO	00001	999533	396345	07/15/21	15.50
	STATE OF COLORADO	00001	999534	396345	07/15/21	67.79
	STATE OF COLORADO	00001	999535	396345	07/15/21	1.06
	STATE OF COLORADO	00001	999536	396345	07/15/21	10,274.69
	STATE OF COLORADO	00001	999537	396345	07/15/21	3,216.67
	STATE OF COLORADO	00001	999538	396345	07/15/21	31.68
	STATE OF COLORADO	00001	999540	396345	07/15/21	455.31
	STATE OF COLORADO	00001	999541	396345	07/15/21	7.15
	STIVERS STAFFING SERVICES LLC	00001	999468	396337	07/15/21	1,632.00
	STRAIGHT LINE SAWCUTTING	00001	999525	396345	07/15/21	38,925.00
	SUMMIT FOOD SERVICE LLC	00001	999487	396337	07/15/21	22,941.07
	SUMMIT FOOD SERVICE LLC	00001	999488	396337	07/15/21	3,873.13
	SWIRE COCA-COLA USA	00001	999516	396337	07/15/21	2,633.52
	T&G PECOS LLC	00001	999484	396337	07/15/21	1,800.00
	TYGRET DEBRA R	00001	999486	396337	07/15/21	235.00
	WILBUR-ELLIS COMPANY LLC	00001	999512	396337	07/15/21	3,233.35
	ZOE TRAINING & CONSULTING	00001	999457	396337	07/15/21	2,057.00
Account Total						928,615.37
Department Total						930,422.82

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<u>9252</u>	<u>GF- Admin/Org Support</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Membership Dues					
	COLORADO HISPANIC CHAMBER OF C	00001	999177	395818	07/08/21	25,000.00
	DENVER REGIONAL COUNCIL OF	00001	999400	396244	07/14/21	62,300.00
					Account Total	87,300.00
					Department Total	87,300.00

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<u>5026</u>	<u>Golf Course- Maintenance</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Contract Employment					
	PROFESSIONAL RECREATION MGMT I	00005	999384	396238	07/14/21	25,917.22
	PROFESSIONAL RECREATION MGMT I	00005	999384	396238	07/14/21	3,096.24
					Account Total	29,013.46
	Equipment Rental					
	BUCKEYE WELDING SUPPLY CO INC	00005	999241	396051	07/12/21	30.60
					Account Total	30.60
	Grounds Maintenance					
	BT CONSTRUCTION	00005	999240	396051	07/12/21	820.00
	C P S DISTRIBUTORS INC	00005	999126	395805	07/08/21	89.05
	GOLF & SPORT SOLUTIONS	00005	999127	395805	07/08/21	421.88
	GOLF & SPORT SOLUTIONS	00005	999242	396051	07/12/21	420.18
	HARRELLS LLC	00005	999128	395805	07/08/21	580.00
	L L JOHNSON DIST	00005	999129	395805	07/08/21	93.02
	SIMPLOT PARTNERS	00005	999247	396051	07/12/21	1,550.00
					Account Total	3,974.13
	Other Repair & Maint					
	SUC N UP INC	00005	999133	395805	07/08/21	1,800.00
					Account Total	1,800.00
	Repair & Maint Supplies					
	ALSCO AMERICAN INDUSTRIAL	00005	999239	396051	07/12/21	58.28
	ALSCO AMERICAN INDUSTRIAL	00005	999123	395805	07/08/21	56.13
					Account Total	114.41
	Vehicle Parts & Supplies					
	COLO GOLF & TURF INC	00005	999124	395805	07/08/21	250.00-
	INTERSTATE BATTERY OF ROCKIES	00005	999243	396051	07/12/21	104.85
	L L JOHNSON DIST	00005	999244	396051	07/12/21	107.51
	L L JOHNSON DIST	00005	999245	396051	07/12/21	88.96
	L L JOHNSON DIST	00005	999246	396051	07/12/21	309.02
					Account Total	360.34
					Department Total	35,292.94

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<u>5021</u>	<u>Golf Course- Pro Shop</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Contract Employment					
	PROFESSIONAL RECREATION MGMT I	00005	999384	396238	07/14/21	22,184.21
	PROFESSIONAL RECREATION MGMT I	00005	999384	396238	07/14/21	2,700.56
					Account Total	24,884.77
	Golf Carts					
	COLO GOLF & TURF INC	00005	999125	395805	07/08/21	1,056.00
	MASEK GOLF CAR COMPANY	00005	999130	395805	07/08/21	2,500.00
	MASEK GOLF CAR COMPANY	00005	999131	395805	07/08/21	170.47
	MASEK GOLF CAR COMPANY	00005	999132	395805	07/08/21	69.50
					Account Total	3,795.97
	Other Professional Serv					
	PROFESSIONAL RECREATION MGMT I	00005	999238	396050	07/12/21	149,781.52
					Account Total	149,781.52
					Department Total	178,462.26

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<u>31</u>	<u>Head Start Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	CESCO LINGUISTIC SERVICE INC	00031	999515	396345	07/15/21	75.00
	CESCO LINGUISTIC SERVICE INC	00031	999517	396345	07/15/21	156.06
					Account Total	231.06
					Department Total	231.06

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<u>935121</u>	<u>HHS Grant</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Professional Serv					
	COLO DEPT OF HUMAN SERVICES	00031	999370	396039	07/12/21	35.00
					Account Total	35.00
	Postage & Freight					
	ADAMS COUNTY HUMAN SERVICES	00031	999214	396039	07/12/21	15.30
					Account Total	15.30
	Telephone					
	CENTURY LINK	00031	999215	396039	07/12/21	424.30
	CENTURY LINK	00031	999221	396039	07/12/21	149.68
	CENTURY LINK	00031	999222	396039	07/12/21	149.86
	CENTURY LINK	00031	999223	396039	07/12/21	199.88
					Account Total	923.72
					Department Total	974.02

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8613	Insurance - UHC EPO Medical	Fund	Voucher	Batch No	GL Date	Amount
	Claims					
	UNITED HEALTH CARE INSURANCE C	00019	999340	396178	07/13/21	286,487.24
	UNITED HEALTH CARE INSURANCE C	00019	999341	396178	07/13/21	407,965.37
					Account Total	694,452.61
					Department Total	694,452.61

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<u>19</u>	<u>Insurance Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	CA SHORT COMPANY	00019	999564	396354	07/15/21	1,760.50
	COLO FRAME & SUSPENSION	00019	999555	396345	07/15/21	12,172.23
	COLO FRAME & SUSPENSION	00019	999556	396345	07/15/21	5,628.60
	FIT SOLDIERS LLC	00019	999518	396345	07/15/21	300.00
	JOE'S TOWING & RECOVERY	00019	999553	396345	07/15/21	167.00
	LOCKTON COMPANIES	00019	999513	396345	07/15/21	10,250.00
	PARENTE LISA	00019	999444	396337	07/15/21	300.00
	TALX CORPORATION	00019	999634	396470	07/16/21	1,861.25
					Account Total	32,439.58
	Retiree Med - UHC-MED					
	SAMPELL CHRISTINE	00019	999353	396186	07/13/21	159.13
					Account Total	159.13
					Department Total	32,598.71

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<u>8611</u>	<u>Insurance- Property/Casualty</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	General Liab - Other than Prop					
	ANDERSON MANDY L	00019	999231	396043	07/12/21	24,000.00
	KING & GREISEN LLP	00019	999232	396043	07/12/21	16,000.00
					Account Total	40,000.00
					Department Total	40,000.00

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<u>1058</u>	<u>IT Network/Telecom</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Communications Equipment					
	KNS COMMUNICATIONS CONSULTANTS	00001	999308	396146	07/13/21	2,355.80
	ONENECK IT SOLUTIONS LLC	00001	999305	396145	07/13/21	1,635.26
	ONENECK IT SOLUTIONS LLC	00001	999306	396145	07/13/21	1,505.26
					Account Total	5,496.32
	Other Professional Serv					
	APEX SYSTEMS GROUP LLC	00001	999309	396146	07/13/21	285.00
	COMMUNICATION CONSTRUCTION & E	00001	999307	396146	07/13/21	1,840.00
	COMMUNICATION CONSTRUCTION & E	00001	999300	396143	07/13/21	3,900.00
	COMMUNICATION CONSTRUCTION & E	00001	999301	396143	07/13/21	320.00
	UTILITY NOTIFICATION CENTER OF	00001	999296	396143	07/13/21	130.68
	UTILITY NOTIFICATION CENTER OF	00001	999298	396143	07/13/21	196.68
					Account Total	6,672.36
	Telephone					
	WINDSTREAM COMMUNICATIONS	00001	999403	396246	07/14/21	1,710.74
					Account Total	1,710.74
					Department Total	13,879.42

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<u>99650</u>	<u>Misc Reimbursable Purchases</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Apprenticeship					
	GEMTRAGO INC	00035	998923	395227	07/06/21	500.00
					Account Total	500.00
					Department Total	500.00

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<u>9253</u>	<u>Office of Cultural Affairs</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Special Events					
	COLORADO DRAGON BOAT FESTIVAL	00001	999141	395810	07/08/21	515.00
					Account Total	515.00
					Department Total	515.00

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<u>2061</u>	<u>PKS - Weed & Pest</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Communications					
	VERIZON WIRELESS	00001	999185	395831	07/08/21	40.01
					Account Total	40.01
					Department Total	40.01

County of Adams
Vendor Payment Report

<u>5010</u>	<u>PKS- Fair</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Fair Expenses-General					
	GEREK MARY LOUISE	00001	999216	396038	07/12/21	125.00
	MULLIGAN CAROLYN	00001	999217	396038	07/12/21	325.00
	NURF TERF LLC	00001	999218	396038	07/12/21	5,000.00
	PIKE MATTHEW	00001	999219	396038	07/12/21	125.00
	PITCHER COLETTE	00001	999220	396038	07/12/21	125.00
					Account Total	5,700.00
	Liquor Sales					
	STATE OF COLORADO	00001	999560	396348	07/15/21	8.43-
					Account Total	8.43-
	Regional Park Rentals					
	MARTINEZ SOPHIE	00001	999183	395831	07/08/21	200.00
					Account Total	200.00
	Security Service					
	CODE 4 SECURITY SERVICES LLC	00001	999385	396239	07/14/21	240.00
	CODE 4 SECURITY SERVICES LLC	00001	999386	396239	07/14/21	240.00
					Account Total	480.00
	Special Events					
	ALEXANDER PAUL	00001	999057	395790	07/08/21	212.00
	CARWIN LARRY M JR	00001	999182	395831	07/08/21	212.00
	COLEY TYLER	00001	999058	395790	07/08/21	53.00
	DELISA GINO	00001	999059	395790	07/08/21	106.00
	EHRHARDT JASON	00001	999060	395790	07/08/21	106.00
	HAMANN GAVIN	00001	999061	395790	07/08/21	53.00
	RIVERDALE RESTAURANT	00001	999187	395837	07/08/21	2,936.75
	THOMAS SCOTT	00001	999062	395790	07/08/21	159.00
	TYLER WALKER MUSIC	00001	999213	396037	07/12/21	2,500.00
	WALENCZAK MATTHEW	00001	999063	395790	07/08/21	212.00
	WILKES JEREMY	00001	999064	395790	07/08/21	159.00
					Account Total	6,708.75
					Department Total	13,080.32

County of Adams
Vendor Payment Report

<u>5016</u>	<u>PKS- Trail Ranger Patrol</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Gas & Electricity					
	XCEL ENERGY	00001	999186	395831	07/08/21	91.69
					Account Total	91.69
	Water/Sewer/Sanitation					
	NORTH PECOS WATER & SANITATION	00001	999184	395831	07/08/21	41.46
					Account Total	41.46
					Department Total	133.15

County of Adams
Vendor Payment Report

1089	PLN- Boards & Commissions	Fund	Voucher	Batch No	GL Date	Amount
	Other Professional Serv					
	BUSH MELVIN E	00001	998526	395039	06/28/21	65.00
	DUPRIEST JOHN FIELDEN	00001	999264	396120	07/13/21	65.00
	DUPRIEST JOHN FIELDEN	00001	997814	394299	06/17/21	65.00
	FOREST SEAN	00001	997815	394299	06/17/21	65.00
	FOREST SEAN	00001	999265	396120	07/13/21	65.00
	GARNER, ROSIE	00001	999266	396120	07/13/21	65.00
	GARNER, ROSIE	00001	997816	394299	06/17/21	65.00
	GREEN THOMAS D	00001	998524	395039	06/28/21	65.00
	GRONQUIST, CHRISTOPHER L	00001	998527	395039	06/28/21	65.00
	HARNETT OWEN	00001	998528	395039	06/28/21	65.00
	HERRERA, AARON	00001	999267	396120	07/13/21	65.00
	MADDUX THOMAS SCOTT	00001	999270	396120	07/13/21	65.00
	MARTINEZ JUSTIN PAUL	00001	997817	394299	06/17/21	65.00
	NYHOLM STEWART E	00001	998525	395039	06/28/21	65.00
	RICHARDSON SHARON	00001	999268	396120	07/13/21	65.00
	RICHARDSON SHARON	00001	997818	394299	06/17/21	65.00
	ROSE DAVID E	00001	999271	396120	07/13/21	65.00
	ROSE DAVID E	00001	997820	394299	06/17/21	65.00
	THOMPSON GREGORY PAUL	00001	997819	394299	06/17/21	65.00
	THOMPSON GREGORY PAUL	00001	999269	396120	07/13/21	65.00
					Account Total	1,300.00
					Department Total	1,300.00

County of Adams
Vendor Payment Report

<u>3058</u>	<u>PW - ADA Transition Implement.</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Land					
	PUNT DENNIS A	00013	999180	395523	07/07/21	660.00
	SAMORA MARILYN S	00013	999181	395523	07/07/21	655.00
					Account Total	1,315.00
					Department Total	1,315.00

County of Adams
Vendor Payment Report

<u>3019</u>	<u>PW - Admin/Org</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Payments To Cities-Sales Taxes					
	ARVADA CITY OF	00013	999361	396189	07/13/21	24,096.76
	AURORA CITY OF	00013	999362	396189	07/13/21	261,140.99
	BENNETT TOWN OF	00013	999363	396189	07/13/21	12,095.84
	BRIGHTON CITY OF	00013	999364	396189	07/13/21	172,071.77
	COMMERCE CITY CITY OF	00013	999365	396189	07/13/21	209,686.24
	FEDERAL HEIGHTS CITY OF	00013	999366	396189	07/13/21	34,896.33
	NORTHGLENN CITY OF	00013	999367	396189	07/13/21	99,190.57
	THORNTON CITY OF	00013	999368	396189	07/13/21	385,387.35
	WESTMINSTER CITY OF	00013	999369	396189	07/13/21	205,937.01
					Account Total	1,404,502.86
					Department Total	1,404,502.86

County of Adams
Vendor Payment Report

<u>3056</u>	<u>PW - Capital Improvement Plan</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Land					
	ALDERMAN BERNSTEIN LLC	00013	999277	396141	07/13/21	1,905.00
	ALDERMAN BERNSTEIN LLC	00013	999278	396141	07/13/21	10,129.81
	ALDERMAN BERNSTEIN LLC	00013	999279	396141	07/13/21	192.00
	LAURIENTI RANDOLPH	00013	999027	395523	07/07/21	16,140.00
					Account Total	28,366.81
	Road & Streets					
	100th WAY LLC	00013	999200	395523	07/09/21	1,044.00
	AZAR LYNNE	00013	998282	394937	06/25/21	200.00
	BALBOA PARK HOMES ASSOCIATION	00013	999311	395959	07/13/21	996.00
	DEVONSHIRE LLC	00013	998912	395523	07/02/21	33,680.00
	FISCHER ROBERT E	00013	998284	394937	06/25/21	200.00
	GONZALEZ MARIA D	00013	998281	394937	06/25/21	320.00
	HENDERSON JENNIFER D	00013	998909	395523	07/02/21	850.00
	HUBERT COLIN	00013	998910	395523	07/02/21	250.00
	LINEBARGER TAYLOR JULIE	00013	998911	395523	07/02/21	240.00
	LUCERO JOHN BENITO	00013	999211	395959	07/09/21	800.00
	OLSEN KRISTA R	00013	998279	394937	06/25/21	240.00
	ROMERO JR HECTOR	00013	998919	395523	07/02/21	16,750.00
	SCHNACK JR THEODORE LEE	00013	998278	394937	06/25/21	360.00
	SUNDAY MICHAEL	00013	999201	395523	07/09/21	200.00
	TOTTEN HUEY KAY	00013	998283	394937	06/25/21	204.00
	VELANDO RODRIGO	00013	998280	394937	06/25/21	200.00
	WELBY GLEN OWNERS ASSOCIATION	00013	998908	395523	07/02/21	936.00
					Account Total	57,470.00
					Department Total	85,836.81

County of Adams
Vendor Payment Report

<u>97755</u>	<u>Recover CO Program</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Clnt Trng-Tuition					
	TURING SCHOOL OF SOFTWARE AND	00035	999272	395660	07/13/21	5,000.00
					Account Total	5,000.00
					Department Total	5,000.00

County of Adams
Vendor Payment Report

<u>13</u>	<u>Road & Bridge Fund</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	AGGREGATE INDUSTRIES	00013	999520	396337	07/15/21	1,083,734.43
	DESIGN WORKSHOP	00013	999528	396345	07/15/21	6,112.75
					Account Total	1,089,847.18
	Retainages Payable					
	AGGREGATE INDUSTRIES	00013	999520	396337	07/15/21	54,186.72-
	MARTIN MARIETTA MATERIALS INC	00013	999399	396240	07/14/21	313,760.73
					Account Total	259,574.01
					Department Total	1,349,421.19

County of Adams
Vendor Payment Report

2092	Sheriff Flatrock	Fund	Voucher	Batch No	GL Date	Amount
	Merchandise					
	STATE OF COLORADO	00050	999558	396348	07/15/21	.18-
	STATE OF COLORADO	00050	999558	396348	07/15/21	.01-
					Account Total	.19-
					Department Total	.19-

County of Adams
Vendor Payment Report

94	Sheriff Payables	Fund	Voucher	Batch No	GL Date	Amount
	Fingerprint Cards - CBI					
	COLO BUREAU INVESTIGATION-IDEN	00094	999332	396147	07/13/21	22,606.00
					Account Total	22,606.00
					Department Total	22,606.00

County of Adams
Vendor Payment Report

<u>2004</u>	<u>Sheriff Training</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Education & Training					
	HOFFER MICHELLE L	00001	999317	396138	07/13/21	200.00
					Account Total	200.00
					Department Total	200.00

County of Adams
Vendor Payment Report

<u>2008</u>	<u>SHF - Training Academy</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	119.04
					Account Total	119.04
					Department Total	119.04

County of Adams
Vendor Payment Report

<u>2011</u>	<u>SHF- Admin Services Division</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Contract Employment					
	NICOLETTI-FLATER ASSOCIATES	00001	999319	396138	07/13/21	411.00
					Account Total	411.00
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	1,095.67
					Account Total	1,095.67
	Other Professional Serv					
	COLO OCCUPATIONAL MEDICINE PHY	00001	999324	396138	07/13/21	849.00
	ERGOMETRICS & APPLIED PERSONNE	00001	999318	396138	07/13/21	272.60
	LADWIG MICHAEL V MD PC	00001	999314	396138	07/13/21	384.00
	POINT SPORTS/ERGOMED	00001	999313	396138	07/13/21	360.00
	PSYCHOLOGICAL DIMENSIONS	00001	999321	396138	07/13/21	5,625.00
					Account Total	7,490.60
					Department Total	8,997.27

County of Adams
Vendor Payment Report

<u>2015</u>	<u>SHF- Civil Section</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	445.93
					Account Total	445.93
					Department Total	445.93

County of Adams
Vendor Payment Report

<u>2016</u>	<u>SHF- Detective Division</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Medical Services					
	DENVER HEALTH & HOSPITAL AUTHO	00001	999325	396138	07/13/21	680.00
	DENVER HEALTH & HOSPITAL AUTHO	00001	999326	396138	07/13/21	680.00
					Account Total	1,360.00
	Other Communications					
	CENTURY LINK	00001	999312	396138	07/13/21	183.00
	VERIZON WIRELESS	00001	999329	396138	07/13/21	40.01
					Account Total	223.01
					Department Total	1,583.01

County of Adams
Vendor Payment Report

<u>2071</u>	<u>SHF- Detention Facility</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Operating Supplies					
	SUMMIT FOOD SERVICE LLC	00001	999322	396138	07/13/21	7,366.37
					Account Total	7,366.37
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	401.10
					Account Total	401.10
					Department Total	7,767.47

County of Adams
Vendor Payment Report

<u>2072</u>	<u>SHF- Justice Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	30.89
					Account Total	30.89
					Department Total	30.89

County of Adams
Vendor Payment Report

<u>2010</u>	<u>SHF- MIS Unit</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	172.07
					Account Total	172.07
					Department Total	172.07

County of Adams
Vendor Payment Report

<u>2017</u>	<u>SHF- Patrol Division</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Books					
	COLO DIST ATTORNEY COUNCIL	00001	999316	396138	07/13/21	168.00
					Account Total	168.00
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	562.83
					Account Total	562.83
					Department Total	730.83

County of Adams
Vendor Payment Report

<u>2018</u>	<u>SHF- Records/Warrants Section</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Extraditions					
	ADAMS COUNTY SHERIFF	00001	999330	396138	07/13/21	3,096.71
					Account Total	3,096.71
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	40.01
					Account Total	40.01
					Department Total	3,136.72

County of Adams
Vendor Payment Report

<u>2005</u>	<u>SHF- TAC Section</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Other Communications					
	VERIZON WIRELESS	00001	999329	396138	07/13/21	318.38
					Account Total	318.38
					Department Total	318.38

County of Adams
Vendor Payment Report

<u>97700</u>	<u>WIOA DLW PROGRAM</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Clnt Trng-Tuition					
	TURING SCHOOL OF SOFTWARE AND	00035	999272	395660	07/13/21	5,000.00
					Account Total	5,000.00
					Department Total	5,000.00

County of Adams
Vendor Payment Report

<u>97500</u>	<u>WIOA YOUTH OLDER</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Clnt Trng-Work Experience					
	CALDERA CECEILA	00035	999248	395660	07/12/21	260.00
	CALDERA CECEILA	00035	998671	395227	06/30/21	60.00
	SOLIS BALDERRAMA ANAHI	00035	998672	395227	06/30/21	95.00
	SOLIS BALDERRAMA ANAHI	00035	999263	395660	07/12/21	240.00
					Account Total	655.00
					Department Total	655.00

County of Adams
Vendor Payment Report

<u>35</u>	<u>Workforce & Business Center</u>	<u>Fund</u>	<u>Voucher</u>	<u>Batch No</u>	<u>GL Date</u>	<u>Amount</u>
	Received not Vouchered Clrg					
	COMPUTER SYSTEMS DESIGN	00035	999522	396345	07/15/21	4,800.00
	EXPRESS SERVICES INC	00035	999450	396337	07/15/21	443.04
	EXPRESS SERVICES INC	00035	999451	396337	07/15/21	1,468.52
	EXPRESS SERVICES INC	00035	999452	396337	07/15/21	775.32
					Account Total	7,486.88
					Department Total	7,486.88

County of Adams
Vendor Payment Report

Grand Total 5,880,452.25



**Board of County Commissioners
Minutes of Commissioners' Proceedings**

Eva J. Henry - District #1
Charles "Chaz" Tedesco - District #2
Emma Pinter - District #3
Steve O'Dorisio - District #4
Lynn Baca - District #5

**Tuesday
July 20, 2021
9:30 AM**

1. ROLL CALL

Rollcall

Present: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca

2. PLEDGE OF ALLEGIANCE

3. MOTION TO APPROVE AGENDA

A motion was made by Commissioner Tedesco, seconded by Commissioner O'Dorisio, that this Agenda be approved. The motion carried by the following vote:

Aye: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca

4. AWARDS AND PRESENTATIONS

A. Employees of the Season Presentation

5. PUBLIC COMMENT

A. Citizen Communication

A total of 30 minutes is allocated at this time for public comment and each speaker will be limited to 3 minutes. If there are additional requests from the public to address the Board, time will be allocated at the end of the meeting to complete public comment. The chair requests that there be no public comment on issues for which a prior public hearing has been held before this Board.

B. Elected Officials' Communication

6. CONSENT CALENDAR

A motion was made by Commissioner O'Dorisio, seconded by Commissioner Baca, that this Consent Calendar be approved. The motion carried by the following vote:

Aye: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca

- A.** List of Expenditures Under the Dates of June 21-25, 2021
- B.** List of Expenditures Under the Dates of June 28 - July 2, 2021
- C.** Minutes of the Commissioners' Proceedings from June 29, 2021
- D.** Resolution Approving Deed of Conservation Easement from Adams County to the City of Commerce City on the Falcon Resources Property
(File approved by ELT)
- E.** Resolution Approving Right-of-Way Agreement between Adams County and Theodore G. Castillo, for Property Necessary for the Pecos Street Roadway and Drainage Improvements Project from West 52nd Avenue to West 58th Avenue
(File approved by ELT)
- F.** Resolution Approving Encroachment Agreement between Adams County and Theodore Castillo for Improvements in County Right-of-Way
(File approved by ELT)
- G.** Resolution Approving Lease Agreement for Office Space at South Platte Crossing between Adams County and Early Childhood Partnership of Adams County
(File approved by ELT)
- H.** Resolution Approving Homeward Adams: The Homelessness Reduction Strategic Framework
(File approved by ELT)
- I.** Resolution Correcting and Superseding Exhibit A for Resolution 2021-316 Authorizing Third Supplemental Appropriations to the 2021 Adams County Government Budget
(File approved by ELT)

- J.** Resolution Regarding Defense and Indemnification of Richard A. Reigenborn as a Defendant Pursuant to C.R.S. § 24-10-101, Et Seq.
(File approved by ELT)
- K.** Resolution Accepting a Warranty Deed from James R. Kruse to Adams County for Right-of-Way Purposes
(File approved by ELT)
- L.** Resolution Accepting Warranty Deed Conveying Property from Maria Soto and Edgar Enrique Soto to Adams County for Road Right-of-Way
(File approved by ELT)
- M.** Resolution Accepting Quitclaim Deed Conveying Property from Pete Marin, Jr., to Adams County for Road Right-of-Way
(File approved by ELT)
- N.** Resolution Accepting Quitclaim Deed Conveying Property from Talmadge Family Trust to Adams County for Road Right-of-Way
(File approved by ELT)
- O.** Resolution Accepting Warranty Deed Conveying Property from Mt. Zion Lutheran Church to Adams County for Road Right-of-Way
(File approved by ELT)
- P.** Resolution Approving Agreement between Adams County, Colorado, the City of Aurora, Colorado and Bayaud Enterprises Inc. Regarding Adams County Day Works
(File approved by ELT)
- Q.** Resolution Adopting Hearing Officer's Recommendations for Decision Regarding Property Tax Abatement Petitions
(File approved by ELT)
- R.** Resolution Accepting a Permanent Drainage Easement from Copeland Holdings, LLC to Adams County for Storm Water Drainage Purposes
(File approved by ELT)
- S.** Resolution Approving Right-of-Way Agreement between Adams County and James Stewart for Property Necessary for the Pecos Street Roadway and Drainage Improvements Project from West 52nd Avenue to West 58th Avenue
(File approved by ELT)

- T. Resolution Approving Right-of-Way Agreement between Adams County and Theodore G. Castillo, for Property Necessary for the Pecos Street Roadway and Drainage Improvements Project from West 52nd Avenue to West 58th Avenue (File approved by ELT)
- U. Resolution Approving the Adams County Head Start Year Two of Five Continuation Grant Application for 2021-2022 (File approved by ELT)

7. NEW BUSINESS

A. COUNTY MANAGER

1. Resolution Approving Amendment Two to the Agreement between Adams County and Keefe Commissary Network, LLC, for Commissary Services (File approved by ELT)
A motion was made by Commissioner Baca, seconded by Commissioner Tedesco, that this New Business be approved. The motion carried by the following vote:
Aye: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca
2. Resolution Approving an Agreement between Adams County and Express Staffing Agency for Subsidized Employment Services (File approved by ELT)
A motion was made by Commissioner Tedesco, seconded by Commissioner Pinter, that this New Business be approved. The motion carried by the following vote:
Aye: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca
3. Resolution Approving Amendment One to the Agreement between Adams County and RockSol Consulting Group, Inc., for Professional Engineering Services for the 62nd Avenue Improvements Project (File approved by ELT)
A motion was made by Commissioner Tedesco, seconded by Commissioner Baca, that this New Business be approved. The motion carried by the following vote:
Aye: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca

4. Resolution Approving an Agreement between Adams County and Senior Hub for a Home Delivered Meals Program
(File approved by ELT)
A motion was made by Commissioner Pinter, seconded by Commissioner O'Dorisio, that this New Business be approved. The motion carried by the following vote:

Aye: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca

B. COUNTY ATTORNEY

Motion to Adjourn into Executive Session Pursuant to C.R.S. 24-6-402(4)(b) for the Purpose of Receiving Legal Advice Regarding Union Ratification

A motion was made by Commissioner Baca, seconded by Commissioner Pinter, that this Executive Session be approved. The motion carried by the following vote:

Aye: 5 - Commissioner Henry, Commissioner Tedesco, Commissioner Pinter, Commissioner O'Dorisio, and Commissioner Baca

8. ADJOURNMENT

AND SUCH OTHER MATTERS OF PUBLIC BUSINESS WHICH MAY ARISE



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Approving Community Development Block Grant Coronavirus Second Substantial Amendment to the 2019 Annual Action Plan
FROM: Jennifer Grafton, Community & Economic Development Director
AGENCY/DEPARTMENT: Community & Economic Development
HEARD AT STUDY SESSION ON: June 22, 2021 and June 29, 2021
AUTHORIZATION TO MOVE FORWARD: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: Board of County Commissioners approve the CDBG-CV Second Substantial Amendment to the 2019 AAP, which outlines CDBG-CV projects, and authorize the Chair to execute related agreements and program documents.

BACKGROUND:

Adams County is the participating jurisdiction for the Adams County Urban County which annually receives and allocates Community Development Block Grant (CDBG) funds from U.S. Department of Housing and Urban Development (HUD). Adams County received a special allocation of funds through the CDBG Program to be used to prevent, prepare for, and respond to the COVID-19 pandemic (coronavirus). This allocation was authorized by the Coronavirus Aid, Relief, and Economic Security Act (CARES Act). The additional CARES Act funding will provide \$819,890 in Community Development Block Grant Coronavirus (CDBG-CV) funds to Adams County. All CDBG-CV funds must be utilized for COVID-19 response and recovery.

To move forward with utilizing CDBG-CV, the County's 2019 AAP must be amended and submitted to HUD. The attached 2019 AAP amendment outlines the CDBG-CV projects and the funding contributions, as follows:

Organization	Project	Funding Amount
Growing Home	Food Assistance	\$50,000
Almost Home	Mortgage/Utility Assistance	\$90,403
Food for Thought	Food Assistance – Focus on Children in Poverty	\$50,000
Project Angel Heart	Food Assistance – Focus on Medically Compromised	\$50,000
Intervention, Inc.	Mortgage/Rent/Utility Assistance – Focus on Domestic Violence	\$75,000

The Senior Hub	Food Assistance	\$75,000
Shiloh House	Youth Services	\$75,000
There With Care	Mortgage/Rent/Utility Assistance – Focus on Critically Ill Children	\$50,000
City of Northglenn	Homeless ID Services with Colorado Legal Services	\$50,000
Brighton Housing Authority	Hotel Vouchers – Focus on Domestic Violence	\$90,509
Adams County	Administration (20%)	\$163,978

The recommended projects outlined above focus on outcomes in the Urban County areas: Unincorporated Adams County, Town of Bennett, and the cities of Northglenn, Brighton, and Federal Heights. The amended plan was open for public comment period July 1, 2021 through July 27, 2021.

Further, staff is seeking Board authorization for the following: Chair to execute HUD required forms to receive CDBG-CV.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

County Attorney Office

ATTACHED DOCUMENTS:

Resolution
Draft 2019 Annual Action Plan Second Substantial Amendment

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 30**Cost Center:** 941018

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	8810		6,710,658
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			6,710,658

New FTEs requested: ☐ **YES** ☐ **NO**

Future Amendment Needed: ☐ **YES** ☐ **NO**

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING COMMUNITY DEVELOPMENT BLOCK GRANT
CORONAVIRUS SECOND SUBSTANTIAL AMENDMENT TO THE 2019 ANNUAL
ACTION PLAN

Resolution 2021-

WHEREAS, the U.S. Department of Housing and Urban Development (HUD) has designated Adams County (County) as Urban Entitlement County under the Community Development Block Grant (CDBG) Program; and,

WHEREAS, through the Coronavirus Aid, Relief, and Economic Security Act (CARES Act), Adams County received a special allocation of funds to prevent, prepare for, and respond to the COVID-19 pandemic (coronavirus); and,

WHEREAS, the CARES Act allocated \$830,131 to Adams County in Community Development Block Grant Coronavirus (CDBG-CV) funds on April 2, 2020; and,

WHEREAS, the first CDBG-CV Substantial Amendment was approved at public hearing on June 30, 2020; and,

WHEREAS, HUD, through the CARES Act, allocated an additional \$819,890 to Adams County in CDBG-CV funding on September 11, 2020; and,

WHEREAS, in response to the Presidentially declared National Emergency surrounding COVID-19, Adams County has identified local community development, economic development, and housing needs that need to urgently be addressed; and,

WHEREAS, to help aid in the recovery efforts with COVID-19, Adams County will utilize the additional CDBG-CV funds for public service programs which will prevent, prepare for, or respond to the coronavirus; and,

WHEREAS, Adams County must provide a Second Substantial Amendment to the 2019 Annual Action Plan to accommodate the CDBG-CV projects as governed by and in accordance with the County's Citizen Participation Plan (CPP); and,

WHEREAS, Adams County has made the Substantial Amendment available to the public for comment for five-days pursuant to HUD's waived public comment period requirements.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the CDBG-CV Second Substantial Amendment to the 2019 Annual Action Plan be approved.

BE IT FURTHER RESOLVED, that the Chair is authorized to sign HUD required forms to receive CDBG-CV, upon approval from the County Attorney's Office.

BE IT FURTHER RESOLVED, that the Director of the Community & Economic Development Department and the Community Development Manager are hereby authorized to sign necessary non-contractual documents to carry out the ongoing activities of the 2019 Annual Action Plan and Substantial Amendments.

2019 Annual Action Plan (AAP) Second Substantial Amendment



Adams County Community & Economic Development

Community Development Division

Executive Summary

AP-05 Executive Summary - 91.200(c), 91.220(b)

1. Introduction

An Annual Action Plan (AAP) is required by the U.S. Department of Housing and Urban Development (HUD) from all jurisdictions receiving Community Development Block Grant (CDBG) and HOME Investment Partnerships Program (HOME) funds. The 2019 AAP is Adams County's (County) fifth program year Action Plan for the 2015-2019 Consolidated Plan (Con Plan). It outlines the County's needs, goals, and strategies for the 2019 program year (July 1, 2019 – June 30, 2020) and addresses citizen involvement, including information on available and potential resources. The priorities developed in this plan target a wide range of issues from basic needs, such as the availability of affordable housing for families and individuals, to overall community quality of life issues, such as improving facilities that provide services to low- and moderate- income (LMI) residents.

The 2019 AAP was developed in accordance with HUD guidelines 24 Code of Federal Regulations (CFR) Part 91.220. This document represents a cooperative effort between the County, cities of Thornton, Westminster, Northglenn, Federal Heights, Brighton, and Town of Bennett, the public, and housing and service providers.

Adams County Community Development administers of the CDBG and HOME programs and works with the Urban County and HOME Consortia members to accomplish the goals in the Consolidated Plan. The Urban County areas consists of the cities of Northglenn, Federal Heights, Brighton, Town of Bennett, and unincorporated Adams County. The HOME Consortia areas include the Urban County areas, as well as the cities of Thornton and Westminster.

2. Summarize the objectives and outcomes identified in the Plan

This could be a restatement of items or a table listed elsewhere in the plan or a reference to another location. It may also contain any essential items from the housing and homeless needs assessment, the housing market analysis or the strategic plan.

Adams County has set the below Priorities and Objectives for the term of the Con Plan. These priorities and objectives were discussed with key community members, Urban County members, and used to solicit applications for CDBG and HOME funding for the 2019 program year. The proposed activities for the 2019 program year must align to the Con Plan's Priorities and Objectives outlined below:

Priorities & Objectives

Priority: Housing

Objective #1 Rental housing is available for the low and very low-income populations where rental housing rates are low

Objective #2 Affordable housing is located in areas easily adjacent to services including transit by the low to moderate-income populations

Objective #3 Affordable housing is available for low-income renters that want to buy

Objective #4 Aging housing stock of low to moderate-income owner-occupied units is rehabilitated and/or repaired

Priority: Community and Economic Development

Objective #1 More job services and job creation for Adams County residents

Objective #2 Public facilities and community resources are created and enhanced to support low to moderate-income populations

Objective #3 Invest strategically in neighborhoods to assist in revitalization

Priority: Seniors and other Prioritized Populations

Objective #1 Prioritized populations have housing options, especially those earning less than 40% AMI

Objective #2 Services available for at-risk children

Objective #3 Prioritized populations are educated about housing and service options

Objective #4 Housing and services options near transit are enhanced for prioritized populations

Objective #5 Integration of prioritized populations into the community

3. Evaluation of past performance

This is an evaluation of past performance that helped lead the grantee to choose its goals or projects.

The County maintains positive relationships with organizations and Urban County members responsible for undertaking many of the projects described in the AAP. Past project and program successes with these partners helped shape the County's goals for the 2019 program year. Due to historic commitment deficiencies, the County has been proactively setting the stage to commit and spend prior year resources by prioritizing "shovel ready" projects. The County has also continued to meet its timeliness ratio since 2015 program year. This outcome is a result of the County being committed to ensuring timeliness by choosing realistic and feasible projects that met those goals and objectives defined in the Con Plan. In addition, the County has taken several steps to improve the required monitoring process for Subgrantees and Subrecipients. This has improved the County's communication with all partners and ensures a positive relationship with any compliance issues. The County continues to have ongoing conversations with the HOME Consortia members regarding the County's expectations for long-term monitoring. The County is committed to ensuring compliance with all federal regulations through its monitoring obligations.

4. Summary of Citizen Participation Process and consultation process

Summary from citizen participation section of plan.

The County included a variety of outreach efforts to have optimal public input that would inform the AAP. These efforts included service provider/key partner meetings, newspaper notifications, Urban County and HOME Consortia meetings, the County's webpage, and public hearings. Information regarding the proposed 2019 activities was available on the County's website for public comment for more than 30 days. Outreach efforts varied to reach diverse populations and ensure that the input received was insightful and representative of all County residents. It also encouraged the participation of those in specialized populations such as non-English speaking, persons with disabilities, residents of public housing, low-income residents and seniors. Adams County published the draft AAP, solicited input from providers and the public, and held a public hearing to approve the final plan for submittal to HUD.

5. Summary of public comments

This could be a brief narrative summary or reference an attached document from the Citizen Participation section of the Con Plan.

Adams County held a public comment period from June 19, 2019 to July 23, 2019 for the Annual Action Plan. No public comments were received during this time. Furthermore, no public comments were provided at the July 23, 2019 Public Hearing for the Annual Action Plan. Notice of the public comment period and public hearing were posted in three local papers: the Northglenn-Thornton Sentinel and

Brighton Standard Blade. Additionally, notice of the public comment period was posted on the Adams County website.

Adams County held a public comment period from April 15, 2020 to April 20, 2020 for the AAP CARES Act Amendment. No public comments were received during this time. Furthermore, no public comments were provided at the April 21, 2020 Public Hearing for the AAP. Notice of the public comment period and public hearing was posted on the Adams County website in accordance with the Adams County Citizen Participation Plan.

Adams County held a public comment period from September 3, 2020 to September 20, 2020 for a substantial amendment to the AAP, with a final opportunity for public comment at the October 6, 2020 Adams County Board of County Commissioners public hearing. No public comments were received during this time. Notice of the public comment period and public hearing was posted on the Adams County website in accordance with the Adams County Citizen Participation Plan.

Adams County will hold a public comment period in accordance with the waivers for the CARES Act CDBG waivers from July 1, 2021 to July 12, 2021 for a second substantial amendment to the AAP, with a final opportunity for public comment at the Adams County Board of County Commissioners public hearing on July 13, 2021.

6. Summary of comments or views not accepted and the reasons for not accepting them

No comments were received.

7. Summary

No comments were received.

PR-05 Lead & Responsible Agencies - 91.200(b)

1. Agency/entity responsible for preparing/administering the Consolidated Plan

The following are the agencies/entities responsible for preparing the Consolidated Plan and those responsible for administration of each grant program and funding source.

Agency Role	Name	Department/Agency
Lead Agency	ADAMS COUNTY	
CDBG Administrator	ADAMS COUNTY	Adams County Community Development
HOME Administrator	ADAMS COUNTY	Adams County Community Development
ESG Administrator		

Table 1 – Responsible Agencies

Narrative

The County's strives to improve the quality of life for its residents through the management of grant-funded programs for housing, community development, and neighborhood revitalization. The common thread of the funds administered by the County is to benefit low- and moderate-income residents. Eighty percent (80%) of all funds and programs administered by the County directly impact the lives of low- and moderate-income residents. The County continues to opt out of Emergency Services Grant (ESG) funding and allocates those funds to the State of Colorado who administers the grant. With this arrangement, non-profits only have to apply to the State for ESG and are considered a first priority for the County's ESG allocation.

Consolidated Plan Public Contact Information

Melissa Scheere, Community Development Manager, Community and Economic Development Department

Adams County Government Center

4430 S. Adams County Pkwy

Brighton, CO 80601

mscheere@adcogov.org

AP-10 Consultation - 91.100, 91.200(b), 91.215(l)

1. Introduction

Adams County worked with a variety of agencies and municipalities that provide services to residents in order to collect data around housing, services and community development needs. Key partner focus groups and interviews were held to collect the data to inform the development of the Con Plan, the AAP, the 2017 Housing Needs Assessment (HNA), and the County's 2018 Balanced Housing Plan (BHP).

To gain a more thorough understanding of the housing situation in Adams County, three focus groups and a series of interviews with community leaders were conducted in late 2016 for the HNA. The County then held additional stakeholder engagement events to shape the BHP. The BHP's purpose is to take the information collected from the HNA and stakeholder input, and present defined goals and outcomes through a multifaceted and collaborative approach. As a result, the following goals were created to further speak to the many barriers in achieving “balanced housing” across a county with a diverse population and housing needs:

- Utilize New and Existing Tools
 - Reduce Constraints to Development
 - Expand Opportunities for Housing
- For more information, the final HNA and BHP can be found at <https://www.adcogov.org/BHP>. The BHP was ratified in July 2018.

Provide a concise summary of the jurisdiction’s activities to enhance coordination between public and assisted housing providers and private and governmental health, mental health and service agencies (91.215(l)).

Adams County works in collaboration with the cities of Westminster and Thornton through the HOME Consortia to distribute HOME funds for eligible projects that create or preserve housing. Adams County also works with local certified Community Housing Development Organizations (CHDOs) and local housing authorities to provide essential services. These organizations include Community Resources and Housing Development Corporation (CRHDC), Unison Housing Partners (UHP), formally Adams County Housing Authority, and the Brighton Housing Authority (BHA).

Describe coordination with the Continuum of Care and efforts to address the needs of homeless persons (particularly chronically homeless individuals and families, families with children, veterans, and unaccompanied youth) and persons at risk of homelessness.

Metro Denver Homeless Initiative (MDHI) works with homeless providers throughout the metro Denver region to coordinate homeless service efforts. In Adams County specifically, MDHI has a VISTA member placement with UHP to assist with coordinating the annual Point-in-Time homeless count. MDHI is developing a regional coordinated assessment system, building a housing pipeline, and engaging other community partners to provide services to individuals homeless or at risk of becoming homeless throughout the metro Denver region. MDHI staff was consulted during the development of the 2015-2019 Con Plan. Adams County continues to coordinate with homeless providers working in the County to fund programs serving homeless individuals, families, families with children, veterans, youth, and persons at risk of becoming homeless.

In 2017, the Burnes Center presented the results of their study on homelessness in the County to the County to the Board of County Commissioners. The plan provided a number of short- and long-term recommendations. Since then the County has a team dedicated to addressing poverty and homelessness in Adams County.

Describe consultation with the Continuum(s) of Care that serves the jurisdiction's area in determining how to allocate ESG funds, develop performance standards for and evaluate outcomes of projects and activities assisted by ESG funds, and develop funding, policies and procedures for the operation and administration of HMIS

Not applicable.

2. Agencies, groups, organizations and others who participated in the process and consultations

Table 2 – Agencies, groups, organizations who participated

1	Agency/Group/Organization	City of Westminster
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Public Housing Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed HOME activities.
2	Agency/Group/Organization	City of Thornton
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Public Housing Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed HOME activities.
3	Agency/Group/Organization	ADAMS COUNTY HOUSING AUTHORITY
	Agency/Group/Organization Type	Housing Services - Housing
	What section of the Plan was addressed by Consultation?	Public Housing Needs Affordable Housing
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed HOME activities.

4	Agency/Group/Organization	BRIGHTON HOUSING AUTHORITY
	Agency/Group/Organization Type	Housing
	What section of the Plan was addressed by Consultation?	Public Housing Needs
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed HOME activities.
5	Agency/Group/Organization	Community Resources and Housing Development Corp
	Agency/Group/Organization Type	Housing Services - Housing
	What section of the Plan was addressed by Consultation?	Public Housing Needs
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed CHDO activities.
9	Agency/Group/Organization	CITY OF FEDERAL HEIGHTS
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Economic Development Minor Home Repair Program
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed CDBG activities.
10	Agency/Group/Organization	City of Brighton
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Seniors and Other Prioritized Populations, Minor Home Repair Program

	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed CDBG activities.
11	Agency/Group/Organization	CITY OF NORTHGLENN
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Economic Development Infrastructure Improvements
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed CDBG activities.
12	Agency/Group/Organization	TOWN OF BENNETT
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Economic Development Public Facility
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the 2019 AAP by discussing proposed CDBG activities.
13	Agency/Group/Organization	ADAMS COUNTY
	Agency/Group/Organization Type	Other government - County Grantee Department
	What section of the Plan was addressed by Consultation?	Sustainability, Minor Home Repair Program and Infrastructure Improvements

	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Adams County Community and Economic Development Department and the Board of County Commissioners participated in the development of the 2019 AAP by discussing proposed CDBG and HOME activities.
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Identify any Agency Types not consulted and provide rationale for not consulting

Not applicable.

Other local/regional/state/federal planning efforts considered when preparing the Plan

Name of Plan	Lead Organization	How do the goals of your Strategic Plan overlap with the goals of each plan?
Continuum of Care	Metro Denver Homeless Initiative (MDHI)	Adams County uses the MDHI Point in Time annual homeless count, and other research and coordination efforts to develop plans for serving homeless persons in Adams County.

Table 3 – Other local / regional / federal planning efforts

Narrative

Not required - NA

AP-12 Participation - 91.401, 91.105, 91.200(c)

1. Summary of citizen participation process/Efforts made to broaden citizen participation Summarize citizen participation process and how it impacted goal-setting

The County included a variety of outreach efforts for citizen participation to provide valuable input included in the AAP. These efforts included service provider/key partner meetings, newspaper notifications, Urban County and HOME Consortia meetings, the County's webpage, and public hearings. The County has also made available information regarding the AAP and related citizen participation process on the County's website. Outreach efforts varied to reach diverse populations to include input that was insightful and representative of all Adams County residents. It also encouraged the participation of those in specialized populations such as non-English speakers, persons with disabilities, residents of public housing, low-income residents and seniors. Adams County encouraged participation by local institutions, members of the Continuum of Care, service providers, special needs providers, nonprofit organizations, and housing developers. This data was then analyzed by staff who incorporated the findings on housing, special needs, and community development into the priority outcomes. By determining the Priorities, the County was able to allocate funds to the appropriate agencies to provide those necessary services. Residents were encouraged to provide comments on the draft AAP through a publicized thirty (30) day public review period. The County publicized the availability of the draft AAP in multiple local newspapers and on the County's webpage on the County's website. Substantial amendments followed the CARES Act CDBG waivers which allowed a minimum of a five-day public comment period before submission to HUD.

Citizen Participation Outreach

Sort Order	Mode of Outreach	Target of Outreach	Summary of response/at tendance	Summary of comments received	Summary of comments not accepted and reasons	URL (If applicable)
1	Internet Outreach	Non-targeted/b road community	The County utilized its website to continually updates the public on upcoming public hearings, funding allocations, and reports, including the AAP.			www.adcogov.org/community-development
2	Public Hearing	Non-targeted/b road community	The AAP Public Hearing on July 23, 2019.			http://adcogov.legistar.com/calendar.aspx
3	Newspaper Ad	Non-targeted/b road community	The County published a Notice of Public Hearing and Request for Public Comments on June 19, 2019 in multiple local newspapers.			

Sort Order	Mode of Outreach	Target of Outreach	Summary of response/attendance	Summary of comments received	Summary of comments not accepted and reasons	URL (If applicable)
4	Urban County Hearings	Urban County Members	Urban County members had public hearings for the proposed 2019 CDBG activities.			

Table 4 – Citizen Participation Outreach

Expected Resources

AP-15 Expected Resources - 91.420(b), 91.220(c)(1,2)

Introduction

Adams County's allocation of HUD funds (CDBG and HOME) is determined annually, and only after it receives a formal letter from HUD regarding the amount for each program. CDBG funds are allocated to jurisdictions that are Urban County members with projects in the County. Adams County is a HOME consortia, which includes the cities of Thornton and Westminster, as well as the Urban County areas. HOME funds are allocated to the two Consortia cities, and throughout the year to housing projects within the HOME Consortia and Urban County areas.

Federal dollars leverage additional funds in many of the projects completed as part of the Con Plan. Federal dollars are limited, and agencies completing projects will often utilize other funds to complete projects. The leveraged dollars represent a benefit to all Adams County residents. They stretch the grant funds received by the County, while allowing projects to precede that benefit either the area or a specific clientele. At the same time, it aids the agencies supplying the leveraged funds in meeting their goals. In addition to CDBG and HOME funds, Adams County provides local grants to human service organizations serving the County's low income individuals and families through its Community Enrichment Grant.

Each of these funding streams has allowed Adams County to target at-risk populations and leverage fixed program year allocations. These funding streams helped provide resources, services, and opportunities to people that may not qualify under HOME or CDBG guidelines and to neighborhoods that may not have been targeted with regular program year funding.

CDBG prior year resources total \$0 and \$948,000 in Program Income is projected.

HOME Prior Year Resources total \$878,762. Program Income that will be programmed in the 2019 program year is \$316,867 for activities related to HOME approved activities.

CDBG-CV Amendment

In the spring of 2020, Adams County was allocated \$830,131 in additional CDBG Coronavirus (CDBG-CV) funding under the Coronavirus Aid, Relief, and Economic Security Act (CARES) Act to address households and businesses throughout the county dealing with economic turbulence from the Coronavirus pandemic. In the spring of 2021, Adams County was allocated an additional \$819,890 in CDBG-CV funding in order to

prevent, prepare for, or respond to COVID-19.

Anticipated Resources

Program	Source of Funds	Uses of Funds	Expected Amount Available Year 1				Expected Amount Available Remainder of ConPlan \$	Narrative Description
			Annual Allocation: \$	Program Income: \$	Prior Year Resources: \$	Total: \$		
CDBG	public - federal	Acquisition Admin and Planning Economic Development Housing Public Improvements Public Services	1,364,927	948,000	0	2,312,927	0	Adams County will allocate 2019 CDBG funds to its Urban County members (four local jurisdictions) for their proposed projects.
HOME	public - federal	Acquisition Homebuyer assistance Homeowner rehab Multifamily rental new construction Multifamily rental rehab New construction for ownership TBRA	949,905	316,867	878,762	2,145,534	0	HOME funds are allocated in Thornton, Westminster (HOME Consortia), and throughout the county. Adams County uses 10% of HOME funds for administration of programs.

Program	Source of Funds	Uses of Funds	Expected Amount Available Year 1				Expected Amount Available Remainder of ConPlan \$	Narrative Description
			Annual Allocation: \$	Program Income: \$	Prior Year Resources: \$	Total: \$		
ESG	public - federal	Conversion and rehab for transitional housing Financial Assistance Overnight shelter Rapid re-housing (rental assistance) Rental Assistance Services Transitional housing	0	0	0	0	0	ESG funds are allocated to the State of Colorado.
Other	public - federal	Other	1,650,021	0	0	1,650,021	0	CDBG-CV funds to prevent, prepare for, and respond to coronavirus (COVID-19).

Table 2 - Expected Resources – Priority Table

Explain how federal funds will leverage those additional resources (private, state and local funds), including a description of how matching requirements will be satisfied

County funded projects use a variety of other leveraged funds to cover the total cost of projects. HOME funded projects use Low Income Housing Tax Credit (LIHTC) equity, State of Colorado funds, private equity, and other resources to cover the cost of the development. CDBG typically leverage locally funded projects and/or help support gaps in funding that meet the goals of the Con Plan. Activities funded by HOME will have the required twenty-five (25%) match from previous program years and from fee reductions by local jurisdictions. In order to be

considered HOME match, the funding must be a non-federal permanent contribution to affordable housing contributed in an eligible manner and properly documented. Adams County encourages all HOME funded projects to have program funding match.

If appropriate, describe publically owned land or property located within the jurisdiction that may be used to address the needs identified in the plan

Adams County and local jurisdictions may choose to provide publically held land for housing, community facility, and other eligible HOME and CDBG projects. No specific parcels are being used in the 2019 program year.

Discussion

Not required - NA

Annual Goals and Objectives

AP-20 Annual Goals and Objectives - 91.420, 91.220(c)(3)&(e)

Goals Summary Information

Sort Order	Goal Name	Start Year	End Year	Category	Geographic Area	Needs Addressed	Funding	Goal Outcome Indicator
1	Construction of New Rental Housing	2015	2019	Affordable Housing	County-Wide City of Westminster	Housing Needs Seniors and other Prioritized Populations	HOME: \$848,635	Rental units constructed: 356 Household Housing Unit
3	Preservation of Existing Housing Stock	2015	2019	Affordable Housing	County-Wide City of Federal Heights City of Brighton	Housing Needs Community and Economic Development Needs Seniors and other Prioritized Populations	CDBG: \$657,708	Rental units rehabilitated: 10 Household Housing Unit Homeowner Housing Rehabilitated: 22 Household Housing Unit Housing Code Enforcement/Foreclosed Property Care: 625 Household Housing Unit
7	Infrastructure Improvements	2015	2019	Non-Housing Community Development	County-Wide City of Northglenn City of Brighton	Community and Economic Development Needs	CDBG: \$820,091	Public Facility or Infrastructure Activities other than Low/Moderate Income Housing Benefit: 13480 Persons Assisted
8	Increase Job Services and Job Creation	2015	2020	Non-Housing Community Development	County-Wide	Community and Economic Development Needs	CDBG: \$640,000	Jobs created/retained: 40 Jobs

Sort Order	Goal Name	Start Year	End Year	Category	Geographic Area	Needs Addressed	Funding	Goal Outcome Indicator
10	Emergency Housing and Shelter for the Homeless	2015	2020	Homeless	County-Wide	Seniors and other Prioritized Populations	CDBG-CV: \$90,509	Homeless Person Overnight Shelter: 73 Persons Assisted
11	Youth Services and Facilities for At-Risk Children	2015	2019	Non-Homeless Special Needs Non-Housing Community Development	County-Wide	Housing Needs Seniors and other Prioritized Populations	CDBG-CV: \$75,000	Public service activities other than Low/Moderate Income Housing Benefit: 76 Persons Assisted
12	Homeless Prevention Services	2015	2019	Homeless	County-Wide	Homelessness	CDBG-CV: \$265,403	Public service activities other than Low/Moderate Income Housing Benefit: 31 Persons Assisted Public service activities for Low/Moderate Income Housing Benefit: 365 Households Assisted
13	Senior and Disability Services and Facilities	2015	2019	Non-Homeless Special Needs	County-Wide	Seniors and other Prioritized Populations	CDBG-CV: \$225,000	Public service activities other than Low/Moderate Income Housing Benefit: 5553 Persons Assisted

Table 3 – Goals Summary

Goal Descriptions

1	Goal Name	Construction of New Rental Housing
	Goal Description	<p>St. Mark Village is a 216, six (6) building, LIHTC project located at the NW corner of 97th Avenue and Federal Boulevard. The project will be financed with non-competitive private activity bonds issued by CHFA. One hundred percent (100%) of the units in the community will serve families earning at or below 60% AMI.</p> <p>Harris Park Apartments is a 24 unit of senior housing development. The development will offer community space and will be located at 73rd and Lowell Blvd. The project will serve households at or below 80% AMI.</p> <p>7401 Broadway is the County's first land contribution for affordable housing. The existing building is the former Adams County Child and Family Service Center donated to Unison Housing Partners. The office building will be an adaptive reuse into residential units and new walkup units will be constructed. The project will result in 116 units of affordable housing, all serving 70% or less AMI.</p>

3	Goal Name	Preservation of Existing Housing Stock
	Goal Description	<p>The Minor Home Repair (MHR) Program will serve low-to-moderate income homeowners throughout the City of Federal Heights. The program will address essential home repairs to promote decent, safe and sanitary conditions as well as accessibility issues. County staff will administer the MHR program for the City. The City has allocated \$23,386 in CDBG for the MHR program.</p> <p>City of Federal Heights will utilize its remaining CDBG allocation (\$79,701) to continue operating its Rental Inspection Program. The Rental Inspection Program promotes affordable, safe rental housing for its residents by administering a city-wide program to bring rental properties into code compliance.</p> <p>GRID Alternatives will utilize a portion of Adams County CDBG funds (\$154,621) to provide rooftop solar photovoltaic systems on owner occupied low-to-moderate income homes in unincorporated Adams County.</p> <p>Brighton Housing Authority (BHA) will utilize \$400,000 in HOME funds to rehabilitate BHA owned North 5th Avenue and South 18th Avenue duplexes. Rehabilitations will improve site accessibility and energy efficiency to ten (10) units benefiting persons of under 80% AMI. All units are three and four bedroom units.</p>

7	Goal Name	Infrastructure Improvements
	Goal Description	<p>In 2018, the City of Northglenn proposed to install new infrastructure for a bicycle/pedestrian plan in its low to moderate income neighborhoods to improve overall mobility and accessibility for residents to other residential areas as well as connections to neighborhood services in commercial areas and public facilities. The City has requested its 2019 allocation (\$233,590) to be used for the same project, however, it will be used in different low-to-moderate income areas.</p> <p>City of Brighton is proposing to utilize its CDBG allocation (\$186,501) to improve Southern Street for pedestrian and multi-modal connectivity. The project will improve overall mobility and accessibility to the community. The surrounding areas meet the low-to-moderate income requirement.</p> <p>Adams County Public Works is proposing to use a portion of Adams County's CDBG allocation (\$400,000) to provide safe and adequate public improvements in a low-to-moderate income neighborhood, Sherrelwood. Improvements will focus on ADA compliant sidewalks and overall safe connectivity.</p>
8	Goal Name	Increase Job Services and Job Creation
	Goal Description	In response to the COVID-19 pandemic, Adams County is putting together a program to assist for-profit businesses to avoid job loss caused by business closures related to social distancing. Funding can provide short-term working capital assistance to small businesses to enable retention of jobs and provide organizational stability. The program would allow local businesses to apply for a small business grant, up to \$35,000, to retain jobs, following specified criteria.
10	Goal Name	Emergency Housing and Shelter for the Homeless
	Goal Description	Projects that address emergency housing and shelter for the homeless.
11	Goal Name	Youth Services and Facilities for At-Risk Children
	Goal Description	CDBG-CV funds will be used to allow Shiloh House to provide foster care services to foster children infected with coronavirus.

12	Goal Name	Homeless Prevention Services
	Goal Description	These projects will address mortgage and utility assistance to help prevent homelessness and other public services.
13	Goal Name	Senior and Disability Services and Facilities
	Goal Description	Public services for seniors and other prioritized populations.

AP-35 Projects - 91.420, 91.220(d)

Introduction

Adams County has allocated CDBG and HOME funds to projects in 2019 that meet the County's 2015-2019 Con Plan's Priority Needs and Annual Goals.

CDBG projects include minor home rehabilitation and public infrastructure. Adams County and the cities of Brighton, Northglenn and Federal Heights have prioritized projects in their jurisdictions and will oversee projects within their communities.

HOME projects include the creation of two new affordable housing rental projects.

CDBG-CV Amendment

CDBG-CV funds are to prepare for, prevent, and response to the COVID-19 pandemic. The projects outlined below the begin with "CV" are projects funded with CDBG-CV.

#	Project Name
1	CDBG: Housing
2	CDBG: Infrastructure
3	CDBG: Administration
4	CDBG: Economic Development
5	CDBG: Public Service
6	HOME: Adams County
7	HOME: CHDO
8	HOME: Administration
9	HOME: Westminster
10	HOME: TBRA
14	CV-Economic Development
15	CV-Administration
16	CV-Mortgage and Rent Assistance

Table 4 – Project Information

Describe the reasons for allocation priorities and any obstacles to addressing underserved needs

Community input from the Urban County members, community organizations, and non-profits determined how the County will allocate priorities described in the Con Plan. Urban County members participate in the Urban County through a formula basis and after receiving their allocation, the County works with each to identify a project that addresses the Con Plan goals and meets the needs of their respective residents. While the current housing market creates barriers to addressing many of the issues contributing to the increase in need for affordable housing, the County continues to improve its working

relationships with developers, housing authorities and others to overcome this obstacle. In addition, the County dedicated part of its 2016 CDBG administration costs to the development of the County's 2017 Housing Needs Assessment and 2018 Balanced Housing Plan to address the issues that were raised in the 2015 Analysis of Impediments to Fair Housing Choice.

AP-38 Project Summary
Project Summary Information

1	Project Name	CDBG: Housing
	Target Area	
	Goals Supported	Preservation of Existing Housing Stock
	Needs Addressed	Housing Needs Seniors and other Prioritized Populations
	Funding	CDBG: \$564,613
	Description	The Minor Home Repair (MHR) Program will serve low-to-moderate income homeowners throughout the cities of Federal Heights, Northglenn, Brighton, and unincorporated Adams County. The program will address essential home repairs to promote decent, safe and sanitary conditions as well as accessibility issues. County staff will administer the MHR program. City of Federal Heights will utilize its remaining CDBG allocation to continue operating its Rental Housing Inspection Program. The Rental Housing Inspection Program promotes affordable, safe rental housing for its residents by administering a city-wide program to bring rental properties into code compliance.
	Target Date	12/31/2021

	Estimate the number and type of families that will benefit from the proposed activities	<p>CDBGThe MHR Program will serve low-to-moderate income homeowners throughout the cities of Federal Heights, Brighton, Northglenn, and unincorporated Adams County. The program will address essential home repairs to promote decent, safe and sanitary conditions as well as accessibility issues. County staff will administer the MHR program. The MHR program meets the matrix code 14A, Rehab: Single-Unit Residential and meets the national objective benefiting low and moderate-income persons. Each jurisdiction allocated the funding as follows:</p> <ul style="list-style-type: none"> • Federal Heights: \$24,548.39 • Brighton: \$65,000.00 • Northglenn: \$233,590 • Unincorporated Adams County: \$151,535.05 <p>City of Federal Heights will utilize its remaining CDBG allocation (\$82,030) to continue operating its Rental Housing Inspection Program. The Rental Housing Inspection Program promotes affordable, safe rental housing for its residents by administering a city-wide program to bring rental properties into code compliance. The Rental Housing Inspection Program meets the matrix code 15, Code Enforcement and meets the national objective benefiting low and moderate-income persons (area benefit) and preventing or eliminating slums or blight.</p>
	Location Description	The MHR Program will serve the
	Planned Activities	
2	Project Name	CDBG: Infrastructure
	Target Area	County-Wide City of Northglenn City of Brighton
	Goals Supported	Infrastructure Improvements
	Needs Addressed	Seniors and other Prioritized Populations Community and Economic Development Needs
	Funding	CDBG: \$820,091
	Description	CDBG funding will be utilized for infrastructure projects in the cities of Brighton and Northglenn, and unincorporated Adams County.
	Target Date	6/30/2020

	Estimate the number and type of families that will benefit from the proposed activities	The proposed activities will benefit approximately 13,480 low-to-moderate income families.
	Location Description	The proposed activities will be undertaken in the City of Federal Heights, the City of Brighton, and the Sherrelwood neighborhood of unincorporated Adams County.
	Planned Activities	<p>In 2018, the City of Northglenn proposed to install new infrastructure for a bicycle/pedestrian plan in its low to moderate income neighborhoods to improve overall mobility and accessibility for residents to other residential areas as well as connections to neighborhood services in commercial areas and public facilities. The City has requested its 2019 allocation (\$233,590) to be used for the same project, however, it will be used in different low-to-moderate income areas. This projects meets the matrix code 03K, Street Improvements and meets the national objective benefiting low and moderate-income persons (area benefit).</p> <p>City of Brighton is proposing to utilize its CDBG allocation (\$186,501) to improve Southern Street for pedestrian and multi-modal connectivity. The project will improve overall mobility and accessibility to the community. The surrounding areas meet the low-to-moderate income requirement. This projects meets the matrix code 03K, Street Improvements and meets the national objective benefiting low and moderate-income persons (area benefit).</p> <p>Adams County Public Works is proposing to use a portion of Adams County's CDBG allocation (\$400,000) to provide safe and adequate public improvements in a low-to-moderate income neighborhood, Sherrelwood. Improvements will focus on ADA compliant sidewalks and overall safe connectivity. This projects meets the matrix code 03K, Street Improvements and meets the national objective benefiting low and moderate-income persons (area benefit).</p>
3	Project Name	CDBG: Administration
	Target Area	County-Wide
	Goals Supported	Preservation of Existing Housing Stock Infrastructure Improvements

	Needs Addressed	Housing Needs Seniors and other Prioritized Populations Community and Economic Development Needs
	Funding	CDBG: \$272,995
	Description	Adams County will retain the allowable twenty percent (20%) of 2019 CDBG funding for Adams County Community Development staff to administer the program.
	Target Date	6/30/2020
	Estimate the number and type of families that will benefit from the proposed activities	
	Location Description	
	Planned Activities	CDBG administration costs meet the matrix code 20, Planning. The use of the funds are presumed to meet the national objective benefiting low and moderate-income persons since 100% of Adams County CDBG funds are used to benefit for low-to-moderate income persons or areas.
4	Project Name	CDBG: Economic Development
	Target Area	County-Wide
	Goals Supported	Increase Job Services and Job Creation
	Needs Addressed	Community and Economic Development Needs
	Funding	:
	Description	In response to COVID-19, Adams County is launching a small business stabilization program to fund small businesses that have been impacted by public health orders.
	Target Date	8/31/2022
	Estimate the number and type of families that will benefit from the proposed activities	This program will assist a minimum of 40 low to moderate-income individuals (80% AMI or below) by creating & retaining jobs.
	Location Description	County-wide.

	Planned Activities	Grants of up to \$35,000 will be offered to eligible businesses for Special Economic Development to create/retain jobs for 80% AMI and below individuals.
5	Project Name	CDBG: Public Service
	Target Area	County-Wide
	Goals Supported	Emergency Housing and Shelter for the Homeless
	Needs Addressed	Homelessness
	Funding	:
	Description	Adams County will support the “Aurora Emergency Respite Center” at 1101 S. Abilene Street, Aurora, Colorado 80012, for the purpose of housing the homelessness and individuals in vulnerable housing situations for short-term stays in the non-congregant Aurora Emergency Respite Center shelter during the emergency declared by Governor Polis due to the coronavirus COVID-19 outbreak.
	Target Date	7/31/2020
	Estimate the number and type of families that will benefit from the proposed activities	This project will provide 48 beds for homeless individuals and families affected by the COVID-19 pandemic at the Aurora Emergency Respite Center.
	Location Description	1101 S. Abilene Street, Aurora, Colorado 80012
	Planned Activities	Adams County will support the “Aurora Emergency Respite Center” at 1101 S. Abilene Street, Aurora, Colorado 80012, for the purpose of housing the homelessness and individuals in vulnerable housing situations for short-term stays in the non-congregant Aurora Emergency Respite Center shelter during the emergency declared by Governor Polis due to the coronavirus COVID-19 outbreak.
6	Project Name	HOME: Adams County
	Target Area	County-Wide
	Goals Supported	Construction of New Rental Housing Preservation of Existing Housing Stock
	Needs Addressed	Housing Needs
	Funding	HOME: \$309,557

	Description	7401 Broadway is the County's first land contribution for affordable housing. The existing building is the former Adams County Child and Family Service Center donated to Unison Housing Partners. The office building will be an adaptive reuse into residential units and new walkup units will be constructed. The project will result in 116 units of affordable housing, all serving 70% or less AMI.
	Target Date	6/30/2021
	Estimate the number and type of families that will benefit from the proposed activities	Brighton Housing Authority will improve site accessibility and energy efficiency to ten (10) units benefiting persons of under 80% AMI. 7401 Broadway will result in 116 units of affordable housing, all serving 70% or less AMI.
	Location Description	Brighton Housing Authority will improve two sites in the City of Brighton: North 5th Avenue and South 18th Avenue. Maiker Housing Partners will be rehabilitating and creating new rental housing at 7401 Broadway, Denver, CO.
	Planned Activities	7401 Broadway is the County's first land contribution for affordable housing. The existing building is the former Adams County Child and Family Service Center donated to Unison Housing Partners. The office building will be an adaptive reuse into residential units and new walkup units will be constructed. The project will result in 116 units of affordable housing, all serving 70% or less AMI.
7	Project Name	HOME: CHDO
	Target Area	City of Westminster
	Goals Supported	Construction of New Rental Housing
	Needs Addressed	Housing Needs Seniors and other Prioritized Populations
	Funding	HOME: \$347,495
	Description	Harris Park Apartments is a twenty four (24) units of senior housing. The development will offer community space and will be located at 73rd and Lowell Blvd. The project will serve households at or below 80% AMI. Additionally, CRHDC will be receiving CHDO Operating funds.
	Target Date	12/31/2020

	Estimate the number and type of families that will benefit from the proposed activities	Harris Park Apartments is a twenty four (24) units of senior housing for households at or below 80% AMI.
	Location Description	Harris Park will be located at 73rd and Lowell Blvd. in Westminster, CO.
	Planned Activities	<p>Harris Park Apartments is a twenty four (24) units of senior housing. The development will offer community space and will be located at 73rd and Lowell Blvd. The project will serve households at or below 80% AMI.</p> <p>Additionally, Community Resources & Housing Development Corporation will be receiving CHDO Operating funds.</p>
8	Project Name	HOME: Administration
	Target Area	County-Wide
	Goals Supported	<p>Construction of New Rental Housing</p> <p>Preservation of Existing Housing Stock</p>
	Needs Addressed	<p>Housing Needs</p> <p>Seniors and other Prioritized Populations</p> <p>Community and Economic Development Needs</p>
	Funding	HOME: \$94,990
	Description	Adams County will retain ten percent (10%) of 2019 HOME funding for Adams County Community Development staff for HOME program administration. Further, ten percent (10%) of applicable Program Income (PI) from prior year(s) activities will also be used for administration.
	Target Date	6/30/2020
	Estimate the number and type of families that will benefit from the proposed activities	
	Location Description	
	Planned Activities	
9	Project Name	HOME: Westminster
	Target Area	City of Westminster

	Goals Supported	Construction of New Rental Housing
	Needs Addressed	Housing Needs
	Funding	CDBG: \$548,635
	Description	St. Mark Village is a 216 unit, six (6) building LIHTC project located at the NW corner of 97th Avenue and Federal Boulevard. The project will be financed with non-competitive private activity bonds issued by CHFA. One hundred percent of the units in the community will serve families earning at or below sixty percent (60%) AMI.
	Target Date	12/31/2020
	Estimate the number and type of families that will benefit from the proposed activities	St. Mark Village will consist of 216 units of housing for families at or below 60% AMI.
	Location Description	St. Mark Village will be located at the NW corner of 97th Avenue and Federal Boulevard.
	Planned Activities	St. Mark Village is a 216 unit, six (6) building LIHTC project located at the NW corner of 97th Avenue and Federal Boulevard. The project will be financed with non-competitive private activity bonds issued by CHFA. One hundred percent of the units in the community will serve families earning at or below sixty percent (60%) AMI.
10	Project Name	HOME: TBRA
	Target Area	County-Wide City of Thornton City of Federal Heights City of Northglenn Town of Bennett City of Brighton City of Westminster
	Goals Supported	Preservation of Existing Housing Stock Emergency Housing and Shelter for the Homeless
	Needs Addressed	Housing Needs Seniors and other Prioritized Populations
	Funding	HOME: \$800,000
	Description	Adams County will provide rental housing assistance through its Tenant Based Rental Assistance Program.

	Target Date	6/30/2022
	Estimate the number and type of families that will benefit from the proposed activities	It is estimated that over 400 individuals will benefit from this program, approximately 100 households.
	Location Description	Cities of Thornton, Westminster, Northglenn, Federal Heights, Town of Bennett, and unincorporated Adams County.
	Planned Activities	<p style="color: #000000; text-transform: none; text-indent: 0px; letter-spacing: normal; font-family: 'Times New Roman'; font-size: medium; font-style: normal; font-weight: 400; word-spacing: 0px; white-space: normal; orphans: 2; widows: 2; font-variant-ligatures: normal; font-variant-caps: normal; -webkit-text-stroke-width: 0px; text-decoration-style: initial; text-decoration-color: initial;">HOME funds will be provided to Maiker Housing Partners and Brighton Housing Authority to operate the program. The program provides rental assistance to tenants if the household is 60% area median income (AMI) or less, and the landlord agrees to the program parameters. The program will serve rental units located in unincorporated Adams County, Town of Bennett, and the cities of Northglenn, Brighton, Federal Heights, Thornton, and Westminster.</p> <p style="color: #000000; text-transform: none; text-indent: 0px; letter-spacing: normal; font-family: 'Times New Roman'; font-size: medium; font-style: normal; font-weight: 400; word-spacing: 0px; white-space: normal; orphans: 2; widows: 2; font-variant-ligatures: normal; font-variant-caps: normal; -webkit-text-stroke-width: 0px; text-decoration-style: initial; text-decoration-color: initial;">The program will be structured to set-aside \$300,000 to individuals and/or families currently in need of housing, \$500,000 for individuals and/or families currently renting, and \$65,000 for Maiker Housing Partners and Brighton Housing Authority staff administration costs from HOME administration. Brighton Housing Authority will administer the portion of the program for individuals and/or families in need of housing. Maiker Housing Partners will administer the portion of program for individuals and/or families currently in housing. The administration costs will be proportionately shared to Brighton Housing Authority and Maiker Housing Partners.</p>
11	Project Name	CV-Economic Development

	Target Area	County-Wide City of Federal Heights City of Northglenn Town of Bennett City of Brighton
	Goals Supported	Increase Job Services and Job Creation
	Needs Addressed	Community and Economic Development Needs
	Funding	CDBG-CV: \$360,000
	Description	Supplemental funding to the COVID-19 response Small Business Stabilization Program that provides grants to local businesses affected by public health
	Target Date	12/31/2020
	Estimate the number and type of families that will benefit from the proposed activities	The supplemental funding to the COVID response Small Business Stabilization Program will serve a minimum of ten (10) businesses.
	Location Description	Urban County areas: Northglenn, Federal Heights, Brighton, Bennett, and unincorporated Adams County
	Planned Activities	Grants of up to \$35,000 will be offered to eligible businesses for Special Economic Development to create/retain jobs for 80% AMI and below individuals.
12	Project Name	CV-Administration
	Target Area	County-Wide City of Federal Heights City of Northglenn Town of Bennett City of Brighton
	Goals Supported	
	Needs Addressed	Community and Economic Development Needs
	Funding	CDBG-CV: \$166,026
	Description	20% of the allowable administration costs will be utilized to conduct an Infectious Disease Impact Study on Adams County's low-to-moderate income neighborhoods.

	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	
	Location Description	Urban County areas: Northglenn, Brighton, Federal Heights, Bennett, and unincorporated Adams County.
	Planned Activities	In lieu of using the allowable 20% of administration costs, an infection disease impact study would focus on the impacts of COVID-19 to low-to-moderate income neighborhoods/areas in the Adams County Urban County areas. The study would assist with strategizing how future CDBG funding could focus on COVID-19 recovery. CDBG
13	Project Name	CV-Mortgage and Rent Assistance
	Target Area	County-Wide City of Federal Heights City of Northglenn Town of Bennett City of Brighton
	Goals Supported	Preservation of Existing Housing Stock
	Needs Addressed	Housing Needs
	Funding	CDBG-CV: \$519,508
	Description	Offer interim mortgage, rent, or utility assistance for households affected by the COVID-19 pandemic.
	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	CRHDC will provide services for up to an estimated 60 families, 45 under 80% AMI and 15 between 81-120% AMI. Almost home will provide services for up to 10 households under 80% AMI. Intervention, Inc. will provide services for up to 75 households that have been affected by domestic violence. There With Care will provide services for up to 280 households under 80% AMI.

	Location Description	Urban County areas: Northglenn, Brighton, Federal Heights, Bennett, and unincorporated Adams County.
	Planned Activities	<p>Provide Community Resources & Housing Development Corp. (CRHDC) with funding to operate a short-term mortgage assistance program. Program would allow for up to 3 months of mortgage assistance. Funding would be broken out as follows:</p> <ul style="list-style-type: none"> • 0-80% AMI households: \$221,092 • 81-120% AMI households (urgent need National Objective): \$83,013 <p>\$90,403 will fund the Almost Home Mortgage & Utility assistance program, providing 10 households with up to three months of mortgage and utility assistance.</p> <p>\$75,000 will be allocated to Intervention, Inc. to fund a mortgage/rent/utility assistance program with a focus on survivors of domestic violence.</p> <p>\$50,000 will fund There With Care's mortgage/rent/utility assistance program with a focus on critically ill children.</p>

AP-50 Geographic Distribution - 91.420, 91.220(f)

Description of the geographic areas of the entitlement (including areas of low-income and minority concentration) where assistance will be directed

Adams County encompasses approximately 1,183.6 square miles. It extends 72 miles west to east, and 18 miles north to south. It is adjacent to Denver and is one of the five counties that make up the Denver metropolitan area. All of Colorado's interstate highways (I-25, I-70, and I-76) and their associated loops (I-225, I-270) converge in Adams County. In addition, US Highways 36, 287, 6 and 85 also run through the County. E-470 completes the connection from C-470 in the south, through Denver International Airport and finally to I-25.

Adams County, which historically has been agricultural in nature, has undergone a development typical to counties in close proximity to a major metropolitan city. Urbanization has occurred most rapidly in the western part of the County as a result of the continued growth in the Denver Metro region. The eastern section of the County, with the exception of the Towns of Bennett and Strasburg, are comprised mainly of farms and rangeland. The Town of Bennett has experienced historic growth throughout the last year and has developed a strategic plan for growth largely due to its proximity to Front Range Airport and downtown Denver.

Cities within the geographic county include Arvada, Aurora, Brighton, Commerce City, Federal Heights, Northglenn, Strasburg, Thornton and Westminster and the Town of Bennett. Adams County has a diverse mix of large, suburban communities, smaller towns, and rural farming communities that have an extensive range and mix of housing, commercial enterprises and public services.

Adams County does not plan to target funds to "geographic priority" areas, however, allocations have been made to specific communities throughout Adams County for projects that are local priorities. The following communities receive allocations of CDBG funds based upon their total populations and low income populations, and apply to Adams County to use the funds within their own communities based on local priorities and needs: Town of Bennett, Unincorporated Adams County, and the Cities of Brighton, Federal Heights, and Northglenn.

The communities of Thornton and Westminster receive direct CDBG allocations from HUD, and are part of the Adams County HOME consortia. Consortia members are allocated a set-aside of HOME funds for projects within their communities. The remaining HOME funds are allocated by Adams County.

Geographic Distribution

Target Area	Percentage of Funds
County-Wide	55
City of Thornton	6
City of Federal Heights	4
City of Northglenn	8
City of Commerce City	0
Town of Bennett	1
City of Brighton	7
City of Westminster	19

Table 5 - Geographic Distribution

Rationale for the priorities for allocating investments geographically

In 2019, the Urban County IGA will be recertified for another three (3) year requalification period. CDBG funding allocations can be made up to the amounts in the agreement, if the local governments have eligible projects each year. Applications for funding are made to Adams County, and reviewed for eligibility within the CDBG and HOME program guidelines. Public improvements are made in jurisdictions mentioned throughout the AAP, and must serve low-to-moderate income census tracts.

Discussion

Not required - NA

Affordable Housing

AP-55 Affordable Housing - 91.420, 91.220(g)

Introduction

Adams County will fund many affordable housing projects, including homeowner rehabilitation and new construction of affordable rental.

One Year Goals for the Number of Households to be Supported	
Homeless	0
Non-Homeless	388
Special-Needs	0
Total	388

Table 6 - One Year Goals for Affordable Housing by Support Requirement

One Year Goals for the Number of Households Supported Through	
Rental Assistance	0
The Production of New Units	356
Rehab of Existing Units	32
Acquisition of Existing Units	0
Total	388

Table 7 - One Year Goals for Affordable Housing by Support Type

Discussion

AP-60 Public Housing - 91.420, 91.220(h)

Introduction

Actions planned during the next year to address the needs to public housing

The housing authorities have not determined any needs to address at this time.

Actions to encourage public housing residents to become more involved in management and participate in homeownership

Unison Housing Partners (UHP) values the input of its residents. UHP's Resident Advisory Board, made up of residents who reside at UHP properties, meets quarterly to discuss UHP's priorities and property improvements. The UHP Board is responsible for establishing the policies of the Authority and for oversight of the fiscal and practical implementation of those policies. Members of the Board are appointed by the Adams County Commissioners and serve staggered terms. UHP's Board includes a seat for an Adams County resident of low-income housing; currently this seat is held by a resident of an UHP property. Annually, UHP surveys all residents of its properties to get feedback across a wide array of topics pertaining to resident housing. Additionally, during the planning stage of any future developments, UHP will solicit input from residents of its existing properties and area residents for design and programming.

If the PHA is designated as troubled, describe the manner in which financial assistance will be provided or other assistance

Not applicable, PHA is not designated as troubled.

Discussion

Not required - NA

AP-65 Homeless and Other Special Needs Activities - 91.420, 91.220(i)

Introduction

The County works with local homeless providers and municipalities to reduce homelessness throughout Adams County and the region. Additionally, the Burnes Center on Poverty and Homelessness in Denver, Colorado conducted a homelessness study in 2016 and provided recommendations for the County to consider in proactively addressing homelessness. In response to the study, Adams County hired a Homelessness Outreach Liaison to convene and coordinate homelessness efforts with community partners and municipalities. The Liaison is actively a) coordinating the Adams County Coalition for the Homeless, b) researching initiatives such as tiny home villages and a workforce program for people currently homeless, and c) working with partners to address homeless encampments, support current services, expand outreach efforts, create a resource navigation network and a coordinated entry system.

Describe the jurisdictions one-year goals and actions for reducing and ending homelessness including

Reaching out to homeless persons (especially unsheltered persons) and assessing their individual needs

The Board has identified homelessness and reducing poverty as priority needs for the County. The County has laid out homeless assistance, homeless prevention goals and is working on implementing its Community Enrichment Plan developed by Human Services. The County administers a variety of housing and non-housing community development resources which are used to support the efforts of a broad based community network of service providers which provide homeless assistance in the County and the municipalities. Service providers supported by the County provide outreach and case management which assess individual needs and links them with the continuum of services available in the County.

Addressing the emergency shelter and transitional housing needs of homeless persons

There is a shortage of emergency and transitional housing in the County. Three of the four current shelters serve families with minor aged children, one shelter serves individuals but is a cold weather shelter and is closed in the summer months (April to October). There is little public support for creation of mass shelters. The County and most shelter providers have resorted to a housing first model and a rapid re-housing approach to find shelter for those with no shelter options. Because of the lack of affordable rental units, service providers often have to refer households needing emergency shelter or transitional housing to housing providers in surrounding jurisdictions. The County is aligning partnerships and resources to address the shortage of affordable units by working with non-profit and private developers, encouraging new developments that would add to the affordable housing inventory. The Homelessness Outreach Liaison is working with existing homeless providers to increase the number

of beds and transitional housing opportunities available through existing homeless providers. The Liaison is also meeting and coordinating with municipal governments to identify development opportunities in their jurisdictions and will be supportive of new affordable developments that municipalities bring forth.

Helping homeless persons (especially chronically homeless individuals and families, families with children, veterans and their families, and unaccompanied youth) make the transition to permanent housing and independent living, including shortening the period of time that individuals and families experience homelessness, facilitating access for homeless individuals and families to affordable housing units, and preventing individuals and families who were recently homeless from becoming homeless again

While some shelters adopted a housing focused approach, it is often difficult to move people experiencing homelessness into permanent housing because of the shortage of transitional units in the County. If shelter and service providers are unable to place a household in permanently affordable housing in Adams County, they work with housing providers in surrounding jurisdictions to find suitable housing. In addition to looking for housing in surrounding jurisdictions, some shelters and service providers have the ability and funds to provide the necessary financial assistance to keep them in their current housing. If the household obtains stable housing, the service providers funded by the County will provide the necessary supportive services to assist that family in maintaining stability and moving toward independence. The supportive services continue so that the formerly homeless households have less chance of experiencing another episode of homelessness.

Helping low-income individuals and families avoid becoming homeless, especially extremely low-income individuals and families and those who are: being discharged from publicly funded institutions and systems of care (such as health care facilities, mental health facilities, foster care and other youth facilities, and corrections programs and institutions); or, receiving assistance from public or private agencies that address housing, health, social services, employment, education, or youth needs.

The County funds and supports the local network of service providers which provide homelessness prevention services to households in danger of homelessness. By using a prevention strategy, service providers are better able to help households maintain stability in their housing. In order to maintain stability, financial assistance for rent, mortgage, utility and other household necessities is provided by partner agencies. The programs also provide case management and referral services to assist that family in overcoming the challenges that brought them to the brink of homelessness. The County is partnering with and supporting Colorado Legal Services to target individuals and families on the brink of losing their current housing due to an eviction. Services are provided by appointment at a Westminster Public Library (Irving St.) as well as a walk-in basis at the County Courthouse. Service providers are also working to coordinate and implement a diversion or rapid resolution program for people who may

resolve their housing crisis before entering the homelessness service system. The County is also proactively looking at zoning and code to preserve and prevent displacement of current mobile home communities.

Discussion

Adams County will use CDBG-CV funding to help address issues around individuals experiencing homelessness and COVID-19.

AP-75 Barriers to affordable housing -91.420, 91.220(j)

Introduction

Over the last decade Adams County has experienced a wide range of economic and demographic transitions. These transitions have led to a county that can pride itself on becoming a desirable destination for those looking to live in a community that is inclusive and that provides lifestyle opportunities that fail to exist in other areas in the seven (7) county Denver Metro region (Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas and Jefferson). The County's current housing climate and geographic location have contributed to the County's growing population – fifth largest and second fastest in the region. In addition, a diversity of land uses from dense cities to suburbs and open range-land, gives the County a unique identity aiding in its growth. The resulting pressures of this growth and housing stock demands have pushed housing prices to a point where many residents struggle to either find attainable housing or maintain their housing.

In a proactive effort to create solutions to the County's housing challenges, the County commissioned the 2017 Housing Needs Assessment (HNA). The HNA created a thorough economic and demographic description of the County, including its strengths and challenges as they relate to housing. The HNA identified findings that were then presented to various stakeholders who provided valuable input and possible solutions. This input also helped build the framework for developing the County's 2018 Balanced Housing Plan (BHP). The BHP's purpose is to take the information collected from the HNA and stakeholder input, and present defined goals and outcomes through a multifaceted and collaborative approach. This plan is truly a balanced housing plan as it seeks to build a platform that allows all areas of the County to achieve housing of all types, and meets the needs of the County's diverse and growing population.

BHP provides recommendations on how to address the following findings:

- Finding 1: Housing is less affordable
- Finding 2: Increasing affordability gap at all income levels
- Finding 3: Housing supply is not meeting demand
- Finding 4: Adams County has distinct socioeconomics

Actions it planned to remove or ameliorate the negative effects of public policies that serve as barriers to affordable housing such as land use controls, tax policies affecting land, zoning ordinances, building codes, fees and charges, growth limitations, and policies affecting the return on residential investment

Adams County has identified affordable housing as a high priority and has moved to address this

through several planning efforts including the Adams County 2015-2019 Con Plan. Through the development of the HNA and BHP, the county focused on creating a plan that provides a roadmap to addressing some of the County's housing barriers by focusing on a balance of the housing.

Balanced Housing is achieved by a community's ability to provide a variety of housing choices that reflect an individual's financial and lifestyle needs. By recognizing that housing needs are shaped by access to jobs, education, and amenities, the BHP is designed as a guide for the County as it strives to provide its residents with housing opportunities that meet their needs and achieving a greater quality of life. The BHP was the next step in county-wide recommendations and set forth the following goals and policies:

Goals

1. Utilize New and Existing Tools
2. Reduce constraints to development
3. Expand Opportunities

Policies

1. Improve and support housing opportunities for all residents in Adams County
2. Foster an environment the promotes "balanced housing"
3. Encourage connection and access between schools and housing
4. Promote the preservation of the County's current housing stock
5. Integrate development practices the increase diversity in housing options

Discussion

Not required - NA

AP-85 Other Actions - 91.420, 91.220(k)

Introduction

Actions planned to address obstacles to meeting underserved needs

Adams County is a large county making it difficult to adequately deliver services to both urban and rural constituencies. The mixture of urban and rural land throughout the county poses both service delivery and service recipient challenges. Many of the core agencies are located in the more urban portions of the County which makes service delivery in the eastern and northern rural portions of the county difficult. The lack of adequate transportation and service providers in the rural areas are a hindrance to meeting the needs of the underserved throughout the County.

One of the major problems associated with meeting the needs of the underserved is the levels of funding. In today's economy, more and more county residents are requesting services, which places strains on the County's capacity to adequately provide appropriate care.

One of the areas of weakness that Adams County continues to face is a fully functional referral system. This can be attributed to the recent funding uncertainties within all federally-funded areas (TANF, Food Stamps, Medicaid, etc.) and the vast geographic parameters of service-delivery agencies. The County is working to increase the availability of information for both service-providers and residents. The County and local service-delivery agencies strive to increase the availability of information online, to minimize the number of unassisted referrals. With additional collaboration with the County's public information office, Communications, the County hopes to increase its outreach at community meetings hosted by other departments, public input gained through public hearings, working with senior centers, non-profits who work directly with citizens, and County Poverty Symposiums with regional non-profits addressing the reduction of poverty.

Actions planned to foster and maintain affordable housing

Adams County has made new construction of affordable rental housing and preservation of existing affordable housing priorities for receiving HOME and CDBG funds. Adams County works with the local housing authorities, nonprofit housing agencies and private developers to expand and preserve the affordable housing stock throughout the county.

Actions planned to reduce lead-based paint hazards

The local Housing Authorities, the Minor Home Repair Program, and other Section 8 provider agencies strictly adhere to the Uniform Property Condition Standards (UPCS) for public housing and Section 8 tenants, and the Lead Safe Housing Rule. Housing Authorities will not allow Section 8 tenants to rent units with lead hazards that are not mitigated by the landlord. In addition, all units owned and purchased and rehabilitated by the housing authorities are mitigated for lead.

Grantees receiving HOME or CDBG funds to purchase and renovate properties which contain lead-based paint are responsible for paying for and coordinating detection and mitigation of lead hazards within the property.

The Adams County Minor Home Repair program requires lead hazard testing when conducting rehabilitation that could involve lead-based paint, and achieve clearance from certified inspectors when the rehabilitation is required per 24 CFR Part 58. All work is completed in accordance with the Lead Safe Housing Rule.

Actions planned to reduce the number of poverty-level families

The Adams County Workforce and Business Center, the County's Community Enrichment Committee, local municipalities, and community agencies work together to identify the emergent employment needs of the low income population and develop appropriate responses to these needs. The Workforce and Business Center provides routine classes and training to enhance the skills of the emerging labor force. The County can also identify qualified and interested business owners, potential business owners and small business owners, as well as those interested in learning a new trade, all of which will foster a comprehensive Section 3 list for future projects. Housing authorities and housing providers are engaged to identify those residents in need of training and/or interested in participating with the Section 3 initiative.

The UHP provides self-sufficiency services to residents of their housing units and clients of the Section 8 voucher program. The FSS program has a proven track record of helping residents gain the skills necessary to move themselves out of poverty.

Actions planned to develop institutional structure

The County is the lead agency in both the CDBG Urban County and the HOME Consortia. Adams County's Urban County consists of:

- Town of Bennett
 - City of Brighton
 - City of Federal Heights
 - City of Northglenn
- Every three years, these jurisdictions are re-invited to renew their Intergovernmental Agreement (IGA) with the County. Each of them receives a percentage of the County's CDBG allocation based on a formula allocation (total and low-income populations). As the lead agency, the County monitors each jurisdiction's projects to ensure they meet national objectives, eligibility, and compliance issues such as environmental review clearances. All projects are assessed through an application process for eligibility and feasibility. In addition to the Urban County, Adams County leads a HOME Consortia with the cities of Westminster and Thornton. A percentage of the county's annual HOME allocation is reserved to each of these municipalities based on a formula determined and posted annually by HUD. The County recertified the HOME Consortia and Urban County IGAs for an additional three (3) year period in 2019. The County also provides portions of its HOME allocation to: Community Development Housing Organizations (CHDO's) (15% requirement) Local Housing Authorities Non-profit housing developers For-profit developers Adams County has increased CHDO qualification strategies to align with the 2013 HOME Final Rule amendments and HUD best practices. Adams County will continue to seek and certifying new CHDOs throughout the County for the purposes of expanding the County's capacity to undertake projects. The County also provides operating expenses to certified CHDOs to help increase capacity and administer HOME projects.

Actions planned to enhance coordination between public and private housing and social service agencies

Adams County will continue efforts to provide technical assistance to community partners as part of its coordination between public and private housing and social service agencies, as well as encouraging sub-recipients to work together to leverage resources and knowledge. The County fosters collaboration between departments to determine the highest and best use of all funding received by the division. These departments include, but not limited to, Public Works, Human Services, Workforce Business Center, and the County Manager's Office and other partners to strengthen the delivery of services to all areas of the County.

Discussion

Not required - NA

Program Specific Requirements

AP-90 Program Specific Requirements - 91.420, 91.220(I)(1,2,4)

Introduction

Community Development Block Grant Program (CDBG)

Reference 24 CFR 91.220(I)(1)

Projects planned with all CDBG funds expected to be available during the year are identified in the Projects Table. The following identifies program income that is available for use that is included in projects to be carried out.

1. The total amount of program income that will have been received before the start of the next program year and that has not yet been reprogrammed	0
2. The amount of proceeds from section 108 loan guarantees that will be used during the year to address the priority needs and specific objectives identified in the grantee's strategic plan.	0
3. The amount of surplus funds from urban renewal settlements	0
4. The amount of any grant funds returned to the line of credit for which the planned use has not been included in a prior statement or plan	0
5. The amount of income from float-funded activities	0
Total Program Income:	0

Other CDBG Requirements

1. The amount of urgent need activities	0
2. The estimated percentage of CDBG funds that will be used for activities that benefit persons of low and moderate income. Overall Benefit - A consecutive period of one, two or three years may be used to determine that a minimum overall benefit of 70% of CDBG funds is used to benefit persons of low and moderate income. Specify the years covered that include this Annual Action Plan.	80.00%

HOME Investment Partnership Program (HOME)
Reference 24 CFR 91.220(l)(2)

1. A description of other forms of investment being used beyond those identified in Section 92.205 is as follows:

Adams County is not utilizing other forms of investment outside as outlined in CFR 92.205.

2. A description of the guidelines that will be used for resale or recapture of HOME funds when used for homebuyer activities as required in 92.254, is as follows:

In regard to activities carried out during the 2019 program year (identified in the 2017 AAP), recapture provisions are relevant to the Community Resources and Housing Development Corporation's (CRHDC) proposed HOME activities for low-to-moderate income homebuyers.

CRHDC will acquire and rehabilitate affordable homes and sell to eligible homebuyers. Through this program, the homebuyer will also receive HOME assistance by the reduction of the purchase price of the home through the utilization of HOME funds for acquisition and rehabilitation. Proceeds from the sale of the property to an eligible homebuyer will be returned to the County as program income and revolved back into another home for acquisition and rehabilitation – similar to NSP. The HOME assistance provided to the homebuyer will follow Recapture Provisions as set forth in a Deed of Trust and Promissory Note to reduce/forgive the direct subsidy of the HOME investment on a pro-rata basis for the amount of time the homeowner owned and occupied the housing measured against the affordability period. The recaptured amount is not based on net-proceeds of the sale of the home, it is based solely on the amount that has not been forgiven. The period of affordability will be set by the applicable period in the HOME rule based on the direct subsidy amount. Resale provisions will not apply to this activity.

The County will not be participating in the First Time Homebuyer Program (FTHB) program in the 2019 program year; however, it is expected that there will be recapture from FTHB participants who did not meet the affordability period. UHP operated the FTHB program, and adhered to the affordability requirements as set forth in 24 CFR Part 92.254(a)(4) based on the per unit direct HOME subsidy on a pro-rata basis per the recapture provision. The recaptured amount is not based on net-proceeds of the sale of the home, it is based solely on the amount that has not been forgiven.

3. A description of the guidelines for resale or recapture that ensures the affordability of units acquired with HOME funds? See 24 CFR 92.254(a)(4) are as follows:

The period of affordability is set by the applicable period in the HOME rule based on the

direct subsidy amount to the homebuyer, which will be as outlined in the Deed of Trust and Promissory Note. The direct subsidy amount is determined by the difference in reduced purchase price and market value. The recorded Deed of Trust secures the HOME direct subsidy for the term of the affordability period and references the Promissory Note which outlines the recapture provisions.

Recapture provisions reduce/forgive the HOME investment on a pro-rata basis for the amount of time the homebuyer owned and occupied the housing measured against the affordability period. For example, if \$10,000 in direct subsidy was provided with a five (5) year affordability period and the homeowner sells the home after two (2) years, the affordability period would not be met. The homeowner would then be required to pay 60% of the direct subsidy or \$6,000 in recapture, while \$4,000 is forgiven. If the homeowner refinances and stays in the home, the affordability period is still being met and no payments are due to the County. If the homeowner refinances to take cash out or takes out a home equity loan, the affordability period is not met and the homeowner is obligated to pay the remaining balance of the loan as outlined above. The County will never recapture more than the unforgiven amount of the direct subsidy.

As part of the County's annual monitoring process, CRHDC will be required to submit annual monitoring documents to ensure continued occupancy.

4. Plans for using HOME funds to refinance existing debt secured by multifamily housing that is rehabilitated with HOME funds along with a description of the refinancing guidelines required that will be used under 24 CFR 92.206(b), are as follows:

24 CFR 92.206 does not apply as the County does not utilize HOME funds to refinance existing debt of multi-family housing.

Emergency Solutions Grant (ESG)

1. Include written standards for providing ESG assistance (may include as attachment)

NA

2. If the Continuum of Care has established centralized or coordinated assessment system that meets HUD requirements, describe that centralized or coordinated assessment system.

NA

3. Identify the process for making sub-awards and describe how the ESG allocation available to private nonprofit organizations (including community and faith-based organizations).

NA

4. If the jurisdiction is unable to meet the homeless participation requirement in 24 CFR 576.405(a), the jurisdiction must specify its plan for reaching out to and consulting with homeless or formerly homeless individuals in considering policies and funding decisions regarding facilities and services funded under ESG.

NA

5. Describe performance standards for evaluating ESG.

NA

NA



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Resolution approving right-of-way agreement between Adams County and 100 th Way, LLC, for property necessary for the Pecos Street Roadway and Drainage Improvements Project from West 52 nd Avenue to West 58 th Avenue
FROM: Brian Staley, P.E., PTOE, RSP, Director of Public Works
AGENCY/DEPARTMENT: Public Works
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves the right-of-way agreement for acquisition of property interests needed for the Pecos Street Improvements Project.

BACKGROUND:

Adams County is in the process of acquiring property interests along the Pecos Street corridor from West 52nd Avenue to West 58th Avenue for the Pecos Street Roadway Improvement Project. The intention of this Project is to identify and improve the overall roadway and drainage of Pecos Street. Attached is a copy of the right-of-way agreement between Adams County and 100th Way, LLC, for acquisition of property interests in the amount of \$23,156.00. The attached resolution allows the County to acquire ownership of the property interests needed for the use of the public and provide the necessary documents to close on the property.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Adams County Public Works, Office of the County Attorney and Adams County Board of County Commissioners.

ATTACHED DOCUMENTS:

Draft resolution
Right-of-way agreement

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 13**Cost Center: 3056**

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:			
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:	9135	30562101	\$15,000,000
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			\$15,000,000

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☒ NO

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING RIGHT-OF-WAY AGREEMENT BETWEEN ADAMS
COUNTY AND 100TH WAY, LLC, FOR PROPERTY NECESSARY FOR THE PECOS
STREET ROADWAY AND DRAINAGE IMPROVEMENTS PROJECT FROM
WEST 52ND AVENUE TO WEST 58TH AVENUE

WHEREAS, Adams County is in the process of acquiring right-of-way and easements along Pecos Street corridor from West 52nd Avenue to West 58th Avenue for the Pecos Street Roadway and Drainage Improvements Project (“Project”); and,

WHEREAS, the intention of this Project is to identify and improve the overall roadway and drainage (“Improvements”); and,

WHEREAS, this right-of-way acquisition is for property with an address of 5241 Pecos Street located in the Northwest Quarter of Section 16, Township 3 South, Range 68 West of the 6th Principal Meridian, County of Adams, State of Colorado, and owned by 100th Way, LLC (“Parcel RW-4”); and,

WHEREAS, Adams County requires ownership of Parcel RW-4 for construction of the Improvements; and,

WHEREAS, 100th Way, LLC, is willing to sell Parcel RW-4 to Adams County under the terms and conditions of the attached Right-of-Way Agreement.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners, County of Adams, State of Colorado, that the attached Right-of-Way Agreement between Adams County and 100th Way, LLC, a copy of which is attached hereto and incorporated herein by this reference, be and hereby is approved.

BE IT FURTHER RESOLVED that the Chair of the Board of County Commissioners is hereby authorized to execute said Right-of-Way Agreement on behalf of Adams County.

6. The County will remove approximately 411 square feet of asphalt/gravel, 3 linear feet of chain link fence, and business sign. But the County has agreed to reimburse the owner the expense of the lost asphalt/gravel, chain link fence, and business sign and made a part of this Agreement.
7. The Owner has entered into this Agreement acknowledging that the County has the power of eminent domain and required the Property for a public purpose.
8. If the Owner fails to consummate this agreement for any reason, except the County's default, the County may at its option, enforce this agreement by bringing an action against the Owner for specific performance.
9. This Agreement contains all agreements, understandings and promises between the Owner and the County, relating to the Project and shall be deemed a contract binding upon the Owner and County and extending to the successors, heirs and assigns.
10. The Owner shall be responsible for reporting proceeds of the sale to taxing authorities, including the submittal of Form 1099-S with the Internal Revenue Service, if applicable.
11. This Agreement has been entered into in the State of Colorado and shall be governed according to the laws thereof.

Owner:

100th Way, LLC

By: RAMI K. MERHED

Name: RAMI K. MERHED

Date: 7/1/2021

Approved:

BOARD OF COUNTY COMMISSIONERS-COUNTY OF ADAMS, STATE OF COLORADO

Chair

Date

Approved as to Form:

County Attorney

EXHIBIT A
SHEET 1 OF 2

LAND DESCRIPTION

A PARCEL OF LAND BEING A PORTION OF THE NORTH 15.9 FEET OF LOT 9 AND ALL OF LOTS 10 & 11 OF BLOCK 1 AND THE EAST PART OF VACATED ALLEY ON THE WEST AND ALL ALLEY ON THE NORTH, ALPHONSE BRODHAGS OF BLOCK 1 GREENWOOD PER ADAMS COUNTY PARCEL NUMBER 0182516225011, LOCATED IN THE NORTHWEST QUARTER OF SECTION 16, TOWNSHIP 3 SOUTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF ADAMS, STATE OF COLORADO BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE CENTER QUARTER CORNER OF SAID SECTION 16; THENCE ALONG THE EASTERLY LINE OF SAID NORTHWEST QUARTER OF SECTION 16, N00°13'10"W A DISTANCE OF 239.12 FEET; THENCE S89°46'50"W A DISTANCE OF 30.00 FEET TO A POINT ON THE WESTERLY RIGHT-OF-WAY LINE OF NORTH PECOS STREET AND THE POINT OF BEGINNING; THENCE S89°52'40"W A DISTANCE OF 3.16 FEET;

THENCE N01°40'22"E A DISTANCE OF 68.53 FEET;

THENCE N45°07'20"W A DISTANCE OF 31.75 FEET TO A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF WEST 52ND PLACE; THENCE ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE OF WEST 52ND PLACE, N89°52'40"E A DISTANCE OF 23.31 TO A POINT ON THE WESTERLY RIGHT-OF-WAY LINE OF NORTH PECOS STREET;

THENCE ALONG SAID WESTERLY RIGHT-OF-WAY LINE OF NORTH PECOS STREET, S00°13'10"E A DISTANCE OF 90.95 FEET TO THE POINT OF BEGINNING.

SAID PARCEL CONTAINS 0.009 ACRES OR 411 SQUARE FEET MORE OR LESS.

ALL LINEAL DIMENSIONS ARE U.S. SURVEY FEET.

BASIS OF BEARING

BEARINGS ARE BASED ON THE ADAMS COUNTY HORIZONTAL CONTROL NETWORK ALONG THE EASTERLY LINE OF THE NORTHWEST QUARTER OF SECTION 16, TOWNSHIP 3 SOUTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN BEARING S00°13'10"W AND BEING MONUMENTED BY A FOUND 2-1/2" ALUMINUM CAP IN RANGE BOX PLS #37601 (5' W.C.) AT THE NORTH QUARTER CORNER AND A FOUND 3-1/4" ALUMINUM CAP IN RANGE BOX ILLEGIBLE AT THE CENTER QUARTER CORNER.

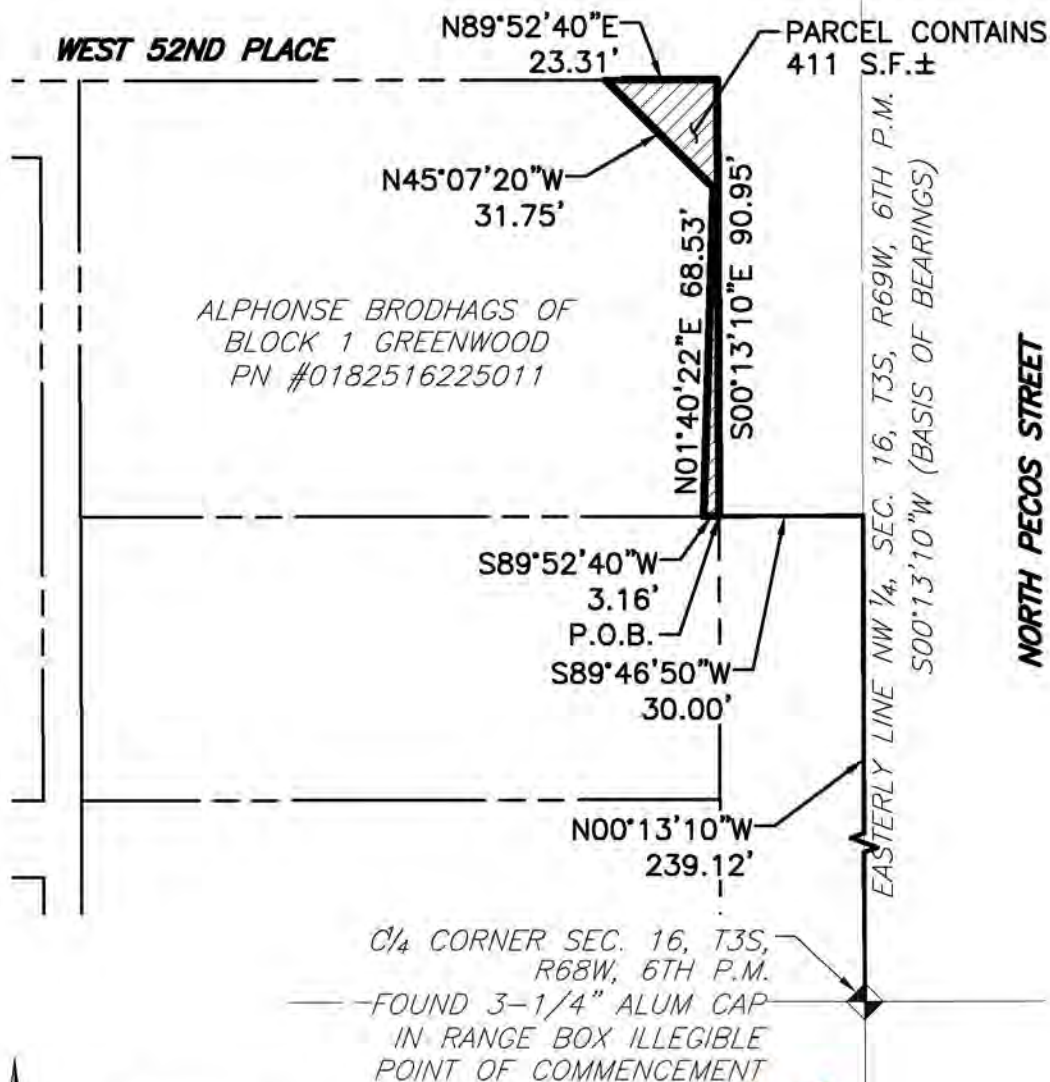
PREPARED BY ESTRELLA V. BERNAL
REVIEWED BY SCOTT A. AREHART, PLS
FOR AND ON BEHALF OF MARTIN/MARTIN, INC.
12499 WEST COLFAX AVENUE
LAKEWOOD, COLORADO 80215
PROJECT NO. 19.0102
AUGUST 21, 2020
303-431-6100



EXHIBIT A

SHEET 2 OF 2

N¹/₄ CORNER SEC. 16, T3S, R68W, 6TH P.M.
FOUND 2-1/2" ALUM CAP
IN RANGE BOX PLS #37601
5' W.C.



0 20 40
SCALE: 1"=40'
ALL LINEAL
DIMENSIONS ARE IN
U.S. SURVEY FEET



AUGUST 21, 2020

THIS EXHIBIT DOES NOT REPRESENT A
MONUMENTED LAND SURVEY. IT IS ONLY
TO DEPICT THE ATTACHED DESCRIPTION.

MARTIN/MARTIN
CONSULTING ENGINEERS

12499 WEST COLFAX AVENUE, LAKEWOOD, COLORADO 80215
303.431.6100 MARTINMARTIN.COM



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: 2021 Annual Action Plan
FROM: Jennifer Grafton, Community & Economic Development Director
AGENCY/DEPARTMENT: Community & Economic Development
HEARD AT STUDY SESSION ON: June 22, 2021
AUTHORIZATION TO MOVE FORWARD: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: Board of County Commissioners approve the 2021 Annual Action Plan and authorize the Chair to execute related agreements and forms.

BACKGROUND:

Adams County is the participating jurisdiction for the Adams County Urban County and HOME Consortium which annually receives and allocates Community Development Block Grant (CDBG) and HOME Investment Partnerships Program (HOME) funds from U.S. Department of Housing and Urban Development (HUD) to the respective communities during each program year, October 1 – September 30. To qualify for HOME and CDBG funds, HUD requires grantees to submit an Annual Action Plan (AAP) each year.

The final draft plan was presented to the Board at the June 22, 2021 Study Session.

2021 Annual Action Plan

The AAP is an annual planning document that encompasses the following objectives:

1. Adopts specific projects that meet the goals identified in the 2020-2024 Con Plan;
2. Sets CDBG and HOME program milestones;
3. Identifies projects to address community and housing needs;
4. Allows for the opportunity to reallocate and reprogram funds from previous years; and
5. Allows an opportunity for the public to provide input on the use of funds.

CDBG funding is allocated to the County's Urban County members, which include the cities of Brighton, Federal Heights, and Northglenn, Town of Bennett, and unincorporated Adams County.

The CDBG allocation for program year 2021 is \$1,473,412, plus an additional \$218,227 in prior year resources, gives a total amount of \$1,691,640 in project funding.

CDBG projects identified in the 2021 AAP are as follows:

Urban County Member*	Project	Funding Amount
Adams County	City View Park (Parks & Open Space)	\$600,000
Adams County	Minor Home Repair Program	\$174,601
City of Federal Heights	Minor Home Repair Program	\$32,445
	Rental Inspection Program	\$78,836
City of Northglenn	Minor Home Repair Program	\$252,156
City of Brighton	Water Line Replacement	\$151,325
	GRID Alternatives	\$50,000
Town of Bennett	Mortgage/Utility Assistance	\$57,594
Adams County	Administration (20%)	\$294,682
Total CDBG Projects		\$1,691,640

HOME funds are allocated to the HOME Consortium members, which include the Urban County areas, and additionally the cities of Thornton and Westminster. Adams County's 2021 HOME allocation is \$1,061,747, plus \$892,056 in program income and prior year resources, gives a total amount of \$1,953,803 in project funding.

HOME projects identified in the 2021 AAP are as follows:

HOME Consortia Member*	Project	Funding Amount
Adams County	Crossing Pointe South	\$500,000
City of Thornton		\$747,628
Adams County	Brighton Housing Authority – Acquisition	\$600,000
Administrative	Community Development Administration (10%)	\$106,175
Total HOME Projects		\$1,953,803

To move forward with carrying out the 2021 program funds, the plan must be approved by the Board of County Commissioners and subsequently submitted to HUD. The plans were open for public comment period June 25, 2021 through July 27, 2021 in accordance to the County's Citizen Participation Plan. No comments were received.

Further, staff is seeking authorization for the Chair to execute the final, County Attorney approved agreements for projects identified in the 2021 AAP and HUD required forms. HUD required forms

include grant agreements and Environmental Review Records as the Certifying Officer for projects identified in the 2021 AAP.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

County Attorney Office

ATTACHED DOCUMENTS:

Resolution

Draft 2021 Annual Action Plan

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 30**Cost Center:** 941018 & 961018

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	8810	Various	\$6,710,658
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			<u>\$6,710,658</u>

New FTEs requested: ☐ **YES** ☐ **NO**

Future Amendment Needed: ☐ **YES** ☐ **NO**

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING THE 2021 ANNUAL ACTION PLAN

Resolution 2021-

WHEREAS, the U.S. Department of Housing and Urban Development (HUD) has designated Adams County as Urban Entitlement County under the Community Development Block Grant (CDBG) Program; and,

WHEREAS, HUD has designated the County as a Participating Jurisdiction under the HOME Investment Partnerships (HOME) Program; and,

WHEREAS, Adams County has entered into an Urban County cooperative agreement with municipal governments in the County for the purpose to carry out CDBG projects which benefit residents of the within the Urban County areas; and,

WHEREAS, Adams County has entered into a HOME Consortium cooperative agreement with municipal governments in the County for the purpose to carry out HOME projects which benefit residents of the Urban County areas and HOME Consortium areas; and,

WHEREAS, To qualify for HOME and CDBG funds, Adams County submitted to HUD a five-year strategic plan, known as a Consolidated Plan, and analysis of impediments to fair housing choice in December 2020; and,

WHEREAS, Adams County completed the 2021 Annual Action Plan that identifies Urban County and HOME Consortium housing and community development needs, set priorities, and describe how CDBG and HOME funds will be used for activities designed to meet the needs; and,

WHEREAS, Adams County has made the 2021 Annual Action Plan available to the public for comment for 30-days pursuant to County's Citizen Participation Plan.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the 2021 Annual Action Plan be approved.

BE IT FURTHER RESOLVED, that the Chair is authorized to sign the final agreement identified in the 2021 Annual Action Plan, upon approval from the County Attorney's Office.

BE IT FURTHER RESOLVED, that the Chair is authorized to sign HUD required forms and grant agreements to receive CDBG and HOME funds, upon approval from the County Attorney's Office.

BE IT FURTHER RESOLVED, that the Chair is authorized to sign HUD required Environmental Review Records for the projects identified in the 2021 Annual Action Plan as the County's Certifying Officer for the CDBG and HOME program, upon approval from the County Attorney's Office.

BE IT FURTHER RESOLVED, that the Director of the Community & Economic Development Department and the Community Development Manager are hereby authorized to sign necessary non-contractual documents to carry out the ongoing activities of the 2021 Annual Action Plan.

2021 Annual Action Plan (AAP)



Adams County Community & Economic Development

Community Development Division

Executive Summary

AP-05 Executive Summary - 91.200(c), 91.220(b)

1. Introduction

Adams County is eligible to receive an annual allocation of HOME Investment Partnerships Program (HOME) and Community Development Block Grant (CDBG) from the U.S. Department of Housing and Urban Development (HUD). This document is the Adams County 2021 Annual Action Plan (AAP) for the Adams County HOME Consortium (Consortium) and Urban County. The AAP is a one-year plan that addresses strategic goals and program objectives for the future use of HOME and CDBG as outlined by the 2020-2024 Consolidated Plan (Con Plan).

The goals and objectives of the Con Plan were developed based on stakeholder and community feedback. HOME is a federal housing grant that assists communities in addressing residents' housing needs. The HOME Consortium includes the Urban County, as defined below, as well as the cities of Thornton and Westminster. Adams County is the lead agency for the Consortium's HOME funds. CDBG funds are used to address community development and housing needs of the residents of the Urban County, which includes the cities of Northglenn, Federal Heights, Brighton, the Town of Bennett, and unincorporated Adams County. The Cities of Westminster and Thornton receive CDBG directly and, as such, do not receive CDBG funds from the County.

In 2021, Adams County is eligible to receive \$1,452,015 in CDBG funds and \$1,061,747 in HOME funds. Future funding is determined on an annual basis.

2. Summarize the objectives and outcomes identified in the Plan

This could be a restatement of items or a table listed elsewhere in the plan or a reference to another location. It may also contain any essential items from the housing and homeless needs assessment, the housing market analysis or the strategic plan.

3. Evaluation of past performance

This is an evaluation of past performance that helped lead the grantee to choose its goals or projects.

Adams County has successfully focused its use of CDBG and HOME to meet housing and community development needs, targeted to low-to-moderate income residents, neighborhoods, and developments. Adams County plans to continue to focus federal resources on meeting the needs of the community.

Additionally, Adams County maintains positive relationships with organizational partners, including the Urban County and HOME Consortium members, local housing authorities, and non-profit organizations. Past project and program successes with these partners helped shape the County's goals for the 2020-2024 program years. Adams County is committed to responsibility managing HOME and CDBG. Adams County has improved processes from the application through the required monitoring phases for each project. As such, Adams County works closely with the Subgrantees and Subrecipients to ensure that realistic and feasible projects are selected for funding. All projects must meet the goals and objectives defined in the Con Plan but must also be considered feasible and meet all federal regulations. The County is committed to ensuring compliance with all federal regulations.

4. Summary of Citizen Participation Process and consultation process

Summary from citizen participation section of plan.

5. Summary of public comments

This could be a brief narrative summary or reference an attached document from the Citizen Participation section of the Con Plan.

This section will be completed when the public comment period is complete.

6. Summary of comments or views not accepted and the reasons for not accepting them

All comments and views were accepted.

7. Summary

In conclusion, CDBG and HOME funded projects for the 2021 AAP will meet the County's priorities, goals, and objectives. Residents and community organizations will continue to be informed and invited to participate in the CDBG and HOME process to ensure projects meet the needs of the community.

PR-05 Lead & Responsible Agencies - 91.200(b)

1. Agency/entity responsible for preparing/administering the Consolidated Plan

The following are the agencies/entities responsible for preparing the Consolidated Plan and those responsible for administration of each grant program and funding source.

Agency Role	Name	Department/Agency
Lead Agency	ADAMS COUNTY	
CDBG Administrator	ADAMS COUNTY	Adams County Community Development
HOME Administrator	ADAMS COUNTY	Adams County Community Development
ESG Administrator		

Table 1 – Responsible Agencies

Narrative

Adams County Community and Economic Development Department, through the Community Development Division (Community Development), administers Adams County's annual CDBG and HOME awards. Adams County is the lead entity for preparing the Con Plan for the HOME Consortium and Urban County. The Urban County and HOME Consortium members participated in development of the Con Plan. Thornton and Westminster completed its own Consolidated Plan for CDBG funds for its respective community.

Lead Agency (CDBG Administrator)

Adams County works in partnership with the cities of Brighton, Northglenn, and Federal Heights, Town of Bennett, and unincorporated Adams County to make up the Adams County Urban County. Each year, the Urban County members are awarded a proportionate share of CDBG funds that are to be utilized to meet the community and housing needs of each community. At minimum, 70% of CDBG funds benefit low-to-moderate income residents within the Urban County areas. As the lead agency of the Urban County, Adams County assumes the responsibility of administering the CDBG funds and completes all required CDBG reporting. Adams County retains the allowable 20% cap of CDBG for program administration. Each year the Urban County members submit a CDBG application for projects. Applications are reviewed for eligibility with CDBG by Community Development staff. Upon review, Community Development presents eligible applications to the Board of County Commissioners for final approval.

Lead Agency (HOME Administrator)

Adams County works in partnership with the cities of Thornton and Westminster to make up the Adams County HOME Consortium. Each year, the HOME Consortium and Urban County areas are awarded a proportionate share of HOME funds that are to be utilized to meet housing needs of each community. A minimum, 90% of HOME funds benefit low-to-moderate income residents within the Urban County and HOME Consortium areas. As the lead agency of the HOME Consortium, Adams County assumes the responsibility of administering the HOME funds and completes all required HOME reporting. Adams County retains the allowable 10% cap of HOME funds for administration expenses. Twice a year Adams County opens a Notice of Funding Availability (NOFA) to announce the HOME application cycle. Affordable housing developers apply for HOME funds directly from the County. Applications are reviewed for eligibility with HOME by Community Development staff and presented to the HOME Consortium members. Upon review, Community Development presents eligible applications to the Board of County Commissioners for final approval.

Consolidated Plan Public Contact Information

Melissa Scheere, Community Development Manager,
Community and Economic Development Department

Adams County Government Center
4430 S. Adams County Pkwy
Brighton, CO 80601

mscheere@adcogov.org

AP-10 Consultation - 91.100, 91.200(b), 91.215(l)

1. Introduction

The County included a variety of outreach efforts to have optimal public input that would inform the AAP. These efforts included service provider/key partner meetings, newspaper notifications, Urban County and HOME Consortia meetings, the County's webpage, and public hearings. Information regarding the proposed 2021 activities was available on the County's website for public comment for more than 30 days. Outreach efforts varied to reach diverse populations and ensure that the input received was insightful and representative of all County residents. It also encouraged the participation of those in specialized populations such as non-English speaking, persons with disabilities, residents of public housing, low-income residents and seniors. Adams County published the draft AAP, solicited input from providers and the public, and held a public hearing to approve the final plan for submittal to HUD.

Provide a concise summary of the jurisdiction's activities to enhance coordination between public and assisted housing providers and private and governmental health, mental health and service agencies (91.215(l)).

Adams County works in collaboration with the cities of Westminster and Thornton through the HOME Consortium to distribute HOME funds for eligible projects that create or preserve housing. Adams County also works with local certified Community Housing Development Organizations (CHDOs) and local housing authorities to provide essential services. These organizations include Community Resources and Housing Development Corporation (CRHDC), Maiker Housing Partners, and the Brighton Housing Authority (BHA).

During development of the AAP, Adams County staff in Community & Economic Development and Community Safety & Well-Being were actively involved in several regional task forces to address regional challenges of homelessness; facilitate coordinated service provision; and deploy funds to mitigate economic losses and homelessness stemming from the COVID-19 pandemic. Adams County staff also led countywide outreach efforts to encourage residents to participate in the 2020 Census. These regional groups met weekly or monthly and included: Tri-County Health; Maiker Housing Partners; Growing Home; Rocky Mountain Cradle to Career Partnership; the Early Childhood Partnership of Adams County; Adams County School Districts; Colorado 9 to 5; Mile High Connects; Enterprise Community Partners; and the Colorado Center on Law and Policy.

Describe coordination with the Continuum of Care and efforts to address the needs of homeless persons (particularly chronically homeless individuals and families, families with children, veterans, and unaccompanied youth) and persons at risk of homelessness.

The Metro Denver Homeless Initiative (MDHI) works closely with each county in the continuum (Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson) to build a homeless crisis response

system that gets people back into housing as quickly as possible. MDHI is a member of the Adams County task force overseeing development of a countywide plan to address homelessness. Adams County has coordinated with homeless providers working in Adams County to fund programs serving homeless individuals, families, families with children, veterans, youth, and persons at risk of becoming homeless. The Continuum of Care system in the greater Denver area would benefit from a stronger network of community navigators and satellite sites outside of the City of Denver to connect persons experiencing homelessness more readily with resources.

Describe consultation with the Continuum(s) of Care that serves the jurisdiction's area in determining how to allocate ESG funds, develop performance standards for and evaluate outcomes of projects and activities assisted by ESG funds, and develop funding, policies and procedures for the operation and administration of HMIS

N/A; Adams County no longer receives ESG directly.

2. Agencies, groups, organizations and others who participated in the process and consultations

Table 2 – Agencies, groups, organizations who participated

1	Agency/Group/Organization	City of Westminster
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Public Housing Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed HOME activities.
2	Agency/Group/Organization	CITY OF THORNTON
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Public Housing Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed HOME activities.
3	Agency/Group/Organization	Maiker Housing Partners (Adams County Housing Authority)
	Agency/Group/Organization Type	Housing Services - Housing
	What section of the Plan was addressed by Consultation?	Public Housing Needs Affordable Housing
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed HOME activities.

4	Agency/Group/Organization	BRIGHTON HOUSING AUTHORITY
	Agency/Group/Organization Type	Housing Services - Housing
	What section of the Plan was addressed by Consultation?	Public Housing Needs Affordable Housing
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed CHDO activities.
5	Agency/Group/Organization	CITY OF FEDERAL HEIGHTS
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Non-Homeless Special Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed CDBG activities.
6	Agency/Group/Organization	City of Brighton
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Non-Homeless Special Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed CDBG activities.
7	Agency/Group/Organization	CITY OF NORTHGLENN
	Agency/Group/Organization Type	Other government - Local

	What section of the Plan was addressed by Consultation?	Non-Homeless Special Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed CDBG activities.
8	Agency/Group/Organization	BENNETT
	Agency/Group/Organization Type	Other government - Local
	What section of the Plan was addressed by Consultation?	Non-Homeless Special Needs Economic Development
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Agency participated in the development of the AAP by discussing proposed CDBG activities.
9	Agency/Group/Organization	ADAMS COUNTY
	Agency/Group/Organization Type	Other government - County Grantee Department
	What section of the Plan was addressed by Consultation?	Non-Homeless Special Needs Economic Development Anti-poverty Strategy Affordable Housing
	Briefly describe how the Agency/Group/Organization was consulted. What are the anticipated outcomes of the consultation or areas for improved coordination?	Adams County Community and Economic Development Department and the Board of County Commissioners participated in the development of the 2021 AAP by discussing proposed CDBG and HOME activities.

Identify any Agency Types not consulted and provide rationale for not consulting

Other local/regional/state/federal planning efforts considered when preparing the Plan

Name of Plan	Lead Organization	How do the goals of your Strategic Plan overlap with the goals of each plan?
Continuum of Care	Metro Denver Homeless Initiative (MDHI)	Adams County uses the MDHI Point in Time annual homeless count, and other research and coordination efforts to develop plans for serving homeless persons in Adams County.

Table 3 – Other local / regional / federal planning efforts

Narrative

AP-12 Participation - 91.401, 91.105, 91.200(c)

1. Summary of citizen participation process/Efforts made to broaden citizen participation Summarize citizen participation process and how it impacted goal-setting

The County included a variety of outreach efforts to have optimal public input that would inform the AAP. These efforts included service provider/key partner meetings, newspaper notifications, Urban County and HOME Consortia meetings, the County's webpage, and public hearings. Information regarding the proposed 2021 activities was available on the County's website for public comment for more than 30 days. Outreach efforts varied to reach diverse populations and ensure that the input received was insightful and representative of all County residents. It also encouraged the participation of those in specialized populations such as non-English speaking, persons with disabilities, residents of public housing, low-income residents and seniors. Adams County published the draft AAP, solicited input from providers and the public, and held a public hearing to approve the final plan for submittal to HUD.

Citizen Participation Outreach

Sort Order	Mode of Outreach	Target of Outreach	Summary of response/attendance	Summary of comments received	Summary of comments not accepted and reasons	URL (If applicable)
1	Newspaper Ad	Non-targeted/broad community	The County published a Notice of Public Hearing and Request for Public Comments in multiple local newspapers.			
2	Public Hearing	Non-targeted/broad community	The AAP Public Hearing on July 27, 2021.			http://adcogov.legistar.com/calendar.aspx

Sort Order	Mode of Outreach	Target of Outreach	Summary of response/attendance	Summary of comments received	Summary of comments not accepted and reasons	URL (If applicable)
3	Internet Outreach	Non-targeted/broad community	The County utilized its website to continually updates the public on upcoming public hearings, funding allocations, and reports, including the AAP.			www.adcogov.org/community-development
4	Urban County Public Hearings	Non-targeted/broad community Urban County Members	Urban County members had public hearings for the proposed 2021 CDBG activities.			

Table 4 – Citizen Participation Outreach

Expected Resources

AP-15 Expected Resources - 91.420(b), 91.220(c)(1,2)

Introduction

Adams County is eligible to receive an annual allocation of HOME Investment Partnerships Program (HOME) and Community Development Block Grant (CDBG) from the U.S. Department of Housing and Urban Development (HUD). The Annual Action Plan (AAP) addresses the annual goals, projects, and objectives for the HOME Consortium and Urban County. The identified projects meet the goals and objectives related to the 2020-2024 Consolidated Plan (Con Plan), which were developed based on stakeholder and resident feedback.

HOME is a federal housing grant that assists communities in addressing residents' housing needs. The HOME Consortium includes the Urban County, as defined below, as well as the cities of Thornton and Westminster. Adams County is the lead agency for the Consortium's HOME funds.

CDBG funds are used to address community development and housing needs of the residents of the Urban County, which includes the cities of Northglenn, Federal Heights, Brighton, the Town of Bennett, and unincorporated Adams County. The Cities of Westminster and Thornton receive CDBG directly and, as such, do not receive CDBG funds from the County.

In 2021, Adams County is eligible to receive \$1,452,015 in CDBG funds and \$1,061,747 in HOME funds.

Anticipated Resources

Program	Source of Funds	Uses of Funds	Expected Amount Available Year 1				Expected Amount Available Remainder of ConPlan	Narrative Description
			Annual Allocation:	Program Income:	Prior Year Resources:	Total:		
			\$	\$	\$	\$	\$	

Program	Source of Funds	Uses of Funds	Expected Amount Available Year 1				Expected Amount Available Remainder of ConPlan \$	Narrative Description
			Annual Allocation: \$	Program Income: \$	Prior Year Resources: \$	Total: \$		
CDBG	public - federal	Acquisition Admin and Planning Economic Development Housing Public Improvements Public Services	1,452,015	0	0	1,452,015	410,000	Adams County will allocate CDBG funds to its Urban County members (four local jurisdictions) for their proposed projects.
HOME	public - federal	Acquisition Homebuyer assistance Homeowner rehab Multifamily rental new construction Multifamily rental rehab New construction for ownership TBRA	1,061,747	44,201	891,560	1,997,508	3,100,000	HOME funds are allocated in Thornton, Westminster (HOME Consortium), and throughout the county. Adams County uses 10% of HOME funds for administration of programs.

Program	Source of Funds	Uses of Funds	Expected Amount Available Year 1				Expected Amount Available Remainder of ConPlan \$	Narrative Description
			Annual Allocation: \$	Program Income: \$	Prior Year Resources: \$	Total: \$		
ESG	public - federal	Conversion and rehab for transitional housing Financial Assistance Overnight shelter Rapid re-housing (rental assistance) Rental Assistance Services Transitional housing	0	0	0	0	0	

Table 2 - Expected Resources – Priority Table

Explain how federal funds will leverage those additional resources (private, state and local funds), including a description of how matching requirements will be satisfied

County funded projects use a variety of other leveraged funds to cover the total cost of projects. HOME funded projects use Low Income Housing Tax Credit (LIHTC) equity, State of Colorado funds, private equity, and other resources to cover the cost of the development. CDBG typically leverage locally funded projects and/or help support gaps in funding that meet the goals of the Con Plan. Activities funded by HOME will have the required twenty-five (25%) match from previous program years and from fee reductions by local jurisdictions. To be considered HOME match, the funding must be a non-federal permanent contribution to affordable housing contributed in an eligible manner and properly documented. Adams County encourages all HOME funded projects to have program funding match.

If appropriate, describe publically owned land or property located within the jurisdiction that may be used to address the needs identified in the plan

Adams County and local jurisdictions may choose to provide publicly held land for housing, community facility, and other eligible HOME and CDBG projects.

In recent years, Adams County has donated land to Maiker Housing Partners and Brighton Housing Authority. Maiker Housing Partners is currently developing Caraway, an affordable housing development. Brighton Housing Authority has yet to develop the donated land.

Discussion

Annual Goals and Objectives

AP-20 Annual Goals and Objectives - 91.420, 91.220(c)(3)&(e)

Goals Summary Information

Sort Order	Goal Name	Start Year	End Year	Category	Geographic Area	Needs Addressed	Funding	Goal Outcome Indicator
1	Preservation of Existing Housing Stock	2020	2024	Affordable Housing	County-Wide City of Federal Heights City of Northglenn City of Brighton	Housing Needs Special Needs Populations	CDBG: \$588,039 HOME: \$600,000	Rental units rehabilitated: 12 Household Housing Unit Homeowner Housing Rehabilitated: 29 Household Housing Unit Housing Code Enforcement/Foreclosed Property Care: 625 Household Housing Unit
2	Public Facility Improvements	2020	2024	Non-Housing Community Development	County-Wide City of Brighton	Community and Economic Development Needs	CDBG: \$751,325	Public Facility or Infrastructure Activities other than Low/Moderate Income Housing Benefit: 8525 Persons Assisted
3	Construction of New Rental Housing	2020	2024	Affordable Housing	County-Wide City of Thornton	Housing Needs	HOME: \$1,247,628	Rental units constructed: 142 Household Housing Unit

Table 3 – Goals Summary

Goal Descriptions

1	Goal Name	Preservation of Existing Housing Stock
	Goal Description	<p>The Minor Home Repair (MHR) Program will serve low-to-moderate income homeowners throughout the cities of Federal Heights, Brighton, Northglenn, and unincorporated Adams County. The program will address essential home repairs to promote decent, safe and sanitary conditions as well as accessibility issues. County staff will administer the MHR program.</p> <p>City of Federal Heights will utilize its remaining CDBG allocation to continue operating its Rental Inspection Program. The Rental Inspection Program promotes affordable, safe rental housing for its residents by administering a city-wide program to bring rental properties into code compliance.</p> <p>Brighton Housing Authority will utilize HOME funding to acquire 12 units of naturally occurring affordable housing.</p>
2	Goal Name	Public Facility Improvements
	Goal Description	CDBG funding will be utilized for infrastructure projects in the cities of Brighton and unincorporated Adams County.
3	Goal Name	Construction of New Rental Housing
	Goal Description	Adams County will provide funding and support to encourage the development of new affordable rental housing that is constructed for low and very low income residents of Adams County, especially in areas adjacent to services, including transit. New rental housing should serve families, prioritized special needs populations, especially those at 40% AMI or less.

AP-35 Projects - 91.420, 91.220(d)

Introduction

Adams County has allocated CDBG and HOME funds to projects in 2021 that meet the County's 2020-2024 Con Plan's Priority Needs and Annual Goals.

#	Project Name
1	CDBG: Administration
2	HOME: Administration
3	CDBG: Housing
4	CDBG: Public Facilities
5	HOME: Thornton
6	HOME: Adams County
7	HOME: CHDO
8	HOME: Westminster

Table 4 – Project Information

Describe the reasons for allocation priorities and any obstacles to addressing underserved needs

Community input from the development of the Annual Action Plan, Con Plan and AI, Urban County and HOME Consortium members, community organizations, and non-profits determined how the County will allocate priorities described in the Con Plan. Urban County members participate in the Urban County through a formula basis and after receiving their allocation, the County works with each to identify a project that addresses the Con Plan goals and meets the needs of their respective residents. While the current housing market creates barriers to addressing many of the issues contributing to the increase in need for affordable housing, the County continues to improve its working relationships with developers, housing authorities and others to overcome this obstacle.

AP-38 Project Summary
Project Summary Information

1	Project Name	CDBG: Administration
	Target Area	County-Wide
	Goals Supported	
	Needs Addressed	
	Funding	CDBG: \$294,682
	Description	Adams County will retain the allowable twenty percent (20%) of 2021 CDBG funding for Adams County Community Development staff to administer the program.
	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	N/A.
	Location Description	N/A.
	Planned Activities	CDBG administration costs meet the matrix code 20, Planning. The use of the funds is presumed to meet the national objective benefiting low and moderate-income persons since 100% of Adams County CDBG funds are used to benefit for low-to-moderate income persons or areas.
2	Project Name	HOME: Administration
	Target Area	County-Wide
	Goals Supported	
	Needs Addressed	
	Funding	HOME: \$106,174
	Description	Adams County will retain ten percent (10%) of HOME funding for county staff for HOME program administration. Further, ten percent (10%) of applicable Program Income (PI) from prior year(s) activities will also be used for administration.
	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	N/A.
	Location Description	N/A.

	Planned Activities	Adams County will retain ten percent (10%) of HOME funding for county staff for HOME program administration. Further, ten percent (10%) of applicable Program Income (PI) from prior year(s) activities will also be used for administration.
3	Project Name	CDBG: Housing
	Target Area	County-Wide City of Federal Heights City of Northglenn City of Brighton
	Goals Supported	Preservation of Existing Housing Stock
	Needs Addressed	Housing Needs Special Needs Populations
	Funding	CDBG: \$588,038
	Description	The Minor Home Repair (MHR) Program will serve low-to-moderate income homeowners throughout the cities of Federal Heights, Northglenn, Brighton, and unincorporated Adams County. The program will address essential home repairs to promote decent, safe and sanitary conditions as well as accessibility issues. County staff will administer the MHR program. The GRID Alternatives Solar For All Program will provide photovoltaic energy systems to households under 80% AMI in the City of Brighton. City of Federal Heights will utilize its remaining CDBG allocation to continue operating its Rental Housing Inspection Program. The Rental Housing Inspection Program promotes affordable, safe rental housing for its residents by administering a city-wide program to bring rental properties into code compliance.
	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	
	Location Description	The MHR Program will serve the cities of Brighton, Northglenn, and unincorporated Adams County. The Rental Housing Inspection Program will serve Federal Heights. GRID Alternatives Solar For All Program will serve the City of Brighton.
	Planned Activities	See above.
4	Project Name	CDBG: Public Facilities

	Target Area	County-Wide City of Brighton
	Goals Supported	Public Facility Improvements
	Needs Addressed	Special Needs Populations Community and Economic Development Needs
	Funding	CDBG: \$751,321
	Description	CDBG funding will be utilized for infrastructure projects in the cities of Brighton and unincorporated Adams County.
	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	The proposed activities will benefit approximately 8,525 low-to-moderate income households, 1,530 in Brighton, and 6,995 in unincorporated Adams County.
	Location Description	The outlined activities will be undertaken in the City of Brighton and the Welby neighborhood of unincorporated Adams County.
	Planned Activities	<p>The City of Brighton is using a portion of its CDBG allocation (\$151,324.69) to address the replacement of lead water pipes in LMA neighborhoods in the city. The City plans to tear out the 60 year old, failing pipes and replace them with plastic piping, which does not rust or corrode over time. Also, the City will extend the service lines to the homes to properly connect the homes to the new main lines. This meets matrix code 03J.</p> <p>Adams County's Department of Parks, Open Space & Cultural Arts (POSCA) is proposing to use a portion of Adams County's CDBG allocation (\$600,000) to renovate City View Park in unincorporated Adams County. Grant funds will be used to pay for construction of improvements such as new shelters, restrooms, and parking, which will make City View Park more accessible to local residents. This activity meets matrix code 03F.</p>
5	Project Name	HOME: Thornton
	Target Area	City of Thornton
	Goals Supported	Construction of New Rental Housing
	Needs Addressed	Housing Needs
	Funding	HOME: \$747,627
	Description	The second phase of a two phased construction project in the City of Thornton, known as Crossing Pointe South Apartments.

	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	
	Location Description	The outlined activities will be undertaken in the City of Thornton at 4220 E. 104th Avenue, Buildings 2 and 3, Thornton, CO 80233.
	Planned Activities	Crossing Pointe South is the second and final phase of a multigenerational community created by the Housing Authority of Adams County, Maiker Housing Partners (formerly Unison Housing Partners), in Thornton. After the successful creation of 64 apartment homes for elderly families at Crossing Pointe North, Crossing Pointe South will complete the vision of an exceptional, inviting place for low and moderate-income families to be a part of a “cooperative” community. The 142 apartment homes will serve families earning between 30% and 70% of Area Median Income. Through the use of 34 previously-awarded project based vouchers, Maiker will be able to provide very low-income families an affordable place to call home.
6	Project Name	HOME: Adams County
	Target Area	County-Wide City of Thornton
	Goals Supported	Preservation of Existing Housing Stock Construction of New Rental Housing
	Needs Addressed	Housing Needs
	Funding	HOME: \$1,100,000
	Description	Adams County intends to use HOME funds to subsidize the second phase of a two phased construction project in the City of Thornton, known as Crossing Pointe South Apartments. Additionally, Adams County will work with Brighton Housing Authority to acquire and rehabilitate 12 units of affordable housing in Brighton.
	Target Date	

	Estimate the number and type of families that will benefit from the proposed activities	<p>Crossing Pointe South will benefit 142 low-to-moderate income households, 17 households under 30% AMI, 17 households under 40% AMI, 43 households under 50% AMI, 8 households under 60% AMI, and 57 households under 80% AMI.</p> <p>Brighton Housing Authority's 460 Voiles Street acquisition will benefit 12 households under 60% AMI.</p>
	Location Description	The outlined activities will be undertaken in the City of Thornton at 4220 E. 104th Avenue, Buildings 2 and 3, Thornton, CO 80233 and 460 Voiles Street, Brighton, CO 80601.
	Planned Activities	<p>Crossing Pointe South is the second and final phase of a multigenerational community created by the Housing Authority of Adams County, Maiker Housing Partners (formerly Unison Housing Partners), in Thornton. After the successful creation of 64 apartment homes for elderly families at Crossing Pointe North, Crossing Pointe South will complete the vision of an exceptional, inviting place for low and moderate-income families to be a part of a “cooperative” community. The 142 apartment homes will serve families earning between 30% and 70% of Area Median Income. Through the use of 34 previously-awarded project based vouchers, Maiker will be able to provide very low-income families an affordable place to call home. Goal Outcome Indicators will be reported under project "HOME: Thornton".</p> <p>Brighton Housing Authority's 460 Voiles Street acquisition project will preserve 12 units of affordable housing in the City of Brighton.</p>
7	Project Name	HOME: CHDO
	Target Area	County-Wide
	Goals Supported	
	Needs Addressed	
	Funding	:
	Description	This project is the required 15% of the HOME allocation is set aside for a certified CHDO in Adams County and 5% allowable CHDO operating.
	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	TBD
	Location Description	TBD

	Planned Activities	This project is the required 15% of the HOME allocation is set aside for a certified CHDO in Adams County and 5% allowable CHDO operating.
8	Project Name	HOME: Westminster
	Target Area	City of Westminster
	Goals Supported	
	Needs Addressed	
	Funding	:
	Description	This project sets aside Westminster's HOME allocation for a project that is to be determined later.
	Target Date	
	Estimate the number and type of families that will benefit from the proposed activities	TBD
	Location Description	TBD
	Planned Activities	This project sets aside Westminster's HOME allocation for a project that is to be determined later.

AP-50 Geographic Distribution - 91.420, 91.220(f)

Description of the geographic areas of the entitlement (including areas of low-income and minority concentration) where assistance will be directed

Adams County encompasses approximately 1,183.6 square miles. It extends 72 miles west to east, and 18 miles north to south. It is adjacent to Denver and is one of the five counties that make up the Denver metropolitan area. All of Colorado's interstate highways (I-25, I-70, and I76) and their associated loops (I-225, I-270) converge in Adams County. In addition, US Highways 36, 287, 6 and 85 also run through the County. E-470 completes the connection from C-470 in the south, through Denver International Airport and finally to I-25.

Adams County, which historically has been agricultural in nature, has undergone a development typical to counties near a major metropolitan city. Urbanization has occurred most rapidly in the western part of the County because of the continued growth in the Denver Metro region. The eastern section of the County, except for the Towns of Bennett and Strasburg, are comprised mainly of farms and rangeland. The Town of Bennett has experienced historic growth throughout the last year and has developed a strategic plan for growth largely due to its proximity to Front Range Airport and downtown Denver.

Cities within the geographic county include Arvada, Aurora, Brighton, Commerce City, Federal Heights, Northglenn, Strasburg, Thornton and Westminster and the Town of Bennett. Adams County has a diverse mix of large, suburban communities, smaller towns, and rural farming communities that have an extensive range and mix of housing, commercial enterprises and public services.

Adams County does not plan to target funds to "geographic priority" areas, however, allocations have been made to specific communities throughout Adams County for projects that are local priorities. The following communities receive allocations of CDBG funds based upon their total populations and low income populations, and apply to Adams County to use the funds within their own communities based on local priorities and needs: Town of Bennett, Unincorporated Adams County, and the Cities of Brighton, Federal Heights, and Northglenn.

The communities of Thornton and Westminster receive direct CDBG allocations from HUD and are part of the Adams County HOME consortia. Consortia members are allocated a set-aside of HOME funds for projects within their communities. The remaining HOME funds are allocated by Adams County.

Adams County 2021 CDBG allocation is \$1,473,412, and is allocated to the Urban County members as follows:

- Administration: \$294,682
- Bennett: \$15,265
- Brighton: \$201,325

- Federal Heights: \$111,281
- Northglenn: \$252,156
- Unincorporated Adams County: \$598,702

Adams County 2020 HOME Allocation is \$1,061,747 and is allocated to the HOME Consortium areas as follows:

- Administration: \$106,174
- CHDO Reserve: \$159,262
- CHDO Operating: N/A
- Thornton: \$213,968
- Westminster: \$203,457
- Adams County: \$378,884

Geographic Distribution

Target Area	Percentage of Funds
County-Wide	45
City of Thornton	23
City of Westminster	8
City of Federal Heights	5
Town of Bennett	1
City of Northglenn	10
City of Brighton	8

Table 5 - Geographic Distribution

Rationale for the priorities for allocating investments geographically

In 2019, the Urban County IGA was recertified for another three (3) year requalification period. CDBG funding allocations can be made up to the amounts in the agreement if the local governments have eligible projects each year. Applications for funding are made to Adams County, and reviewed for eligibility within the CDBG and HOME program guidelines. Public improvements are made in jurisdictions mentioned throughout the AAP and must serve low-to-moderate income census tracts.

Discussion

See above.

Affordable Housing

AP-55 Affordable Housing - 91.420, 91.220(g)

Introduction

Adams County will fund many affordable housing projects, including homeowner-occupied rehabilitation and new construction of affordable rental housing.

One Year Goals for the Number of Households to be Supported	
Homeless	0
Non-Homeless	183
Special-Needs	0
Total	183

Table 6 - One Year Goals for Affordable Housing by Support Requirement

One Year Goals for the Number of Households Supported Through	
Rental Assistance	0
The Production of New Units	142
Rehab of Existing Units	29
Acquisition of Existing Units	12
Total	183

Table 7 - One Year Goals for Affordable Housing by Support Type

Discussion

N/A

AP-60 Public Housing - 91.420, 91.220(h)

Introduction

This section covers public housing needs in Adams County and actions to address those needs.

Actions planned during the next year to address the needs to public housing

The programs coordinated by Maiker Housing Partners and Brighton Housing Authority remain the primary providers of affordable housing in the county for households in the lowest income categories. The only other alternative is federally subsidized housing. Maiker Housing Partners and Brighton Housing Authority manage and maintain conventional public housing developments throughout the county and several scattered site developments. Both Maiker Housing Partners and Brighton Housing Authority own and operate public housing units, senior and disabled affordable units, and administer tenant and project-based Section 8 vouchers. The county supports these agencies by providing HOME funds to obtain and maintain affordable properties.

Actions to encourage public housing residents to become more involved in management and participate in homeownership

Maiker Housing Partners values the input of its residents. The Resident Advisory Board, made up of residents of Maiker properties, meets quarterly to discuss Maiker Housing Partners' priorities and property improvements. Maiker Housing Partners' Board of Commissioners includes a seat for an Adams County resident of low-income housing; currently this seat is held by a resident of an Maiker property. Annually, Maiker Housing Partners surveys all residents of its properties to get feedback across a wide array of topics pertaining to resident housing. Additionally, during the planning stage of any future developments, Maiker Housing Partners will solicit input from residents of its existing properties and area residents for design and programming.

Brighton Housing Authority maintains an active webpage regarding its public housing and wait lists, if any. The organization works closely with Colorado Housing and Finance Authority (CHFA) to direct those that are interested in home ownership to attend one of CHFA's housing counseling workshops.

If the PHA is designated as troubled, describe the manner in which financial assistance will be provided or other assistance

N/A

Discussion

See above.

AP-65 Homeless and Other Special Needs Activities - 91.420, 91.220(i)

Introduction

The County works with local homeless providers and municipalities to reduce homelessness throughout Adams County and the region. Additionally, the Burnes Center on Poverty and Homelessness in Denver, Colorado conducted a homelessness study in 2016 and provided recommendations for the County to consider in proactively addressing homelessness. In response to the study, Adams County hired a Homelessness Outreach Liaison to convene and coordinate homelessness efforts with community partners and municipalities. The Liaison is actively a) coordinating the Adams County Coalition for the Homeless, b) researching initiatives such as tiny home villages and a workforce program for people currently homeless, and c) working with partners to address homeless encampments, support current services, expand outreach efforts, create a resource navigation network and a coordinated entry system.

Describe the jurisdictions one-year goals and actions for reducing and ending homelessness including

Reaching out to homeless persons (especially unsheltered persons) and assessing their individual needs

The Board has identified homelessness and reducing poverty as priority needs for the County. The County has laid out homeless assistance, homeless prevention goals and is working on implementing its Community Enrichment Plan developed by Human Services. The County administers a variety of housing and non-housing community development resources which are used to support the efforts of a broad-based community network of service providers which provide homeless assistance in the County and the municipalities. Service providers supported by the County provide outreach and case management which assess individual needs and links them with the continuum of services available in the County.

There are four (4) primary service providers in Adams County who have strong presence in the community and provide services specifically for people experiencing homelessness. These agencies include Almost Home, ACCESS Housing, Cold Weather Care (CWC), and Growing Home, which are located in various areas of the county and provide numerous services, including shelter, housing navigation, case management, employment services, as well as homelessness prevention and life skill classes reduce and end homelessness.

Almost Home has thirty (30) beds and can accommodate up to six (6) families. During their stay, each family attends weekly classes, receives case management and must show progress in reestablishing their self-sufficiency. In 2019, Almost Home was awarded ESG Rapid Rehousing from the region's Continuum of Care (CoC). The pilot program can accommodate two (2) families at a time.

ACCESS Housing has sixteen (16) beds for families and provides rental assistance, case management, housing navigation, and street outreach.

Cold Weather Care provides shelter through October to April with a group of rotating churches. Twenty (20) beds are available for single adults and families with children experiencing homelessness.

Growing Home is a leading anti-poverty organization in the county, offering a rich pipeline of programs for children and families. Growing Home's wrap-around approach serves the whole family with intensive support to overcome immediate and long-term obstacles. It strengthens families during times of crisis by offering food, healthcare, and homeless prevention assistance. Their early childhood interventions nurture children from birth through age 8 with evidence-based programs that help prepare young kids for kindergarten and keep older kids on the path to school success. Its Blocks of Hope neighborhood initiative is enlisting an entire community to join forces toward its common goal to transform lives. Growing Home's Canopy Program, which sheltered 3-4 families, will close by the end of 2019 and the organization is in the process of bolstering their homelessness prevention efforts through flexible, short-term financial assistance, eviction prevention, housing navigation, service navigation, and follow-up services.

Addressing the emergency shelter and transitional housing needs of homeless persons

The number of people experiencing homelessness in Adams County, especially those in camps along the Clear Creek and the South Platte River, has grown over the past several years, prompting the county to re-examine its approach to addressing this issue. As a result of increasing public concern, the county Manager's Office and members of the Board of County Commissioners reached out to the Burnes Center on Poverty and Homelessness (BC) to assist in this re-examination. In February 2017, BC presented An Assessment of Adams County's Efforts to Address Homelessness. In response to the Assessment, the county has created the Homelessness Outreach Liaison Division.

The Homelessness Outreach Liaison is responsible for assisting in the coordination, creation, implementation, and oversight of services and programs for citizens dealing with homelessness. Currently under development, the Adams County Homelessness Action Plan has identified the priorities and goals for addressing homelessness and is currently developing the objectives, strategies and action steps needed to implement the plan. The goals and strategies will be measurable and subject to evaluation and modification at a minimum of annual reviews. The results of the Plan will be a coordinated effort, with minimal duplication and a continuum of services that reflects the demographics and needs of those experiencing homelessness in Adams County. The taskforce is actively seeking feedback, input, and innovative ideas from all stakeholders in the community including those with lived experience, service providers, first responders, local government and city planners, county commissioners, mayors and representatives of local government and community members. The agenda of these engagements is not only to hear about the need perspective but also to inventory current services available, to create an action plan that is in alignment with the stakeholders and to gain support for the Action Plan.

Helping homeless persons (especially chronically homeless individuals and families, families

with children, veterans and their families, and unaccompanied youth) make the transition to permanent housing and independent living, including shortening the period of time that individuals and families experience homelessness, facilitating access for homeless individuals and families to affordable housing units, and preventing individuals and families who were recently homeless from becoming homeless again

Many individuals and families who experienced homelessness remain in a vulnerable state and case management services play a critical role at this stage. Case management services include:

- Housing and service navigation;
- Rental, utility, and deposit assistance, as well as homelessness and eviction prevention services;
- Job development programs focusing on a client's employment objectives and long-term goals;
- Plans and/or enrollment in furthering education or training;
- Budgeting classes;
- Strategy for self-sufficiency; and
- Twelve-step recovery programs and other support groups in the community for maintaining sobriety.

While individuals and families who experiencing homelessness access mainstream resources on an individual basis, local providers and advocates work in varying capacities to influence program implementation, funding priorities, and the coordination of service delivery through system wide collaboration. Programs in place to assist people experiencing homelessness are:

- **Medicaid:** Homeless service providers screen clients for Medicaid eligibility and refer for enrollment when appropriate;
- **Children's Health Insurance Program:** For children not eligible for Medicaid, the State administers the Children's Health Insurance Program, which provides low-cost health, dental, and vision coverage to children in low wage families;
- **Temporary Aid for Needy Families (TANF):** Administered by the Adams County Community Support Service Division provides funding to eligible families while enrolled into a self-sufficiency program;
- **Food Assistance Program:** Administered by the Adams County Community Support Service Division, this program is a supplement to the household's nutritional needs for the month. Eligibility is based upon the household's income, resources, household size, and shelter costs. Benefits are given to eligible households through the Colorado Quest Card. Certain food assistance recipients will be referred to the Employment First Program for assistance in employment and training needs; and
- **Workforce Investment Act:** The Adams County Workforce & Business Center receives funding to provide training and job placements. The Workforce & Business Center also works with the County's housing authority to provide a job development program for homeless clients. The housing authority administers the distribution of vouchers to clients referred by Workforce &

Business Center counselors.

Helping low-income individuals and families avoid becoming homeless, especially extremely low-income individuals and families and those who are: being discharged from publicly funded institutions and systems of care (such as health care facilities, mental health facilities, foster care and other youth facilities, and corrections programs and institutions); or, receiving assistance from public or private agencies that address housing, health, social services, employment, education, or youth needs.

The County funds and supports the local network of service providers which provide homelessness prevention services to households in danger of homelessness. By using a prevention strategy, service providers are better able to help households maintain stability in their housing. To maintain stability, financial assistance for rent, mortgage, utility and other household necessities is provided by partner agencies. The programs also provide case management and referral services to assist that family in overcoming the challenges that brought them to the brink of homelessness.

The County is partnering with and supporting Colorado Legal Services to target individuals and families on the brink of losing their current housing due to an eviction. Services are provided by appointment at a Westminster Public Library (Irving St.) as well as a walk-in basis at the County Courthouse. Service providers are also working to coordinate and implement a diversion or rapid resolution program for people who may resolve their housing crisis before entering the homelessness service system. The County is also proactively looking at zoning and code to preserve and prevent displacement of current mobile home communities.

Adams County currently is not funding programs that focus on ensuring that persons returning from mental and physical health institutions receive appropriate supportive housing, and no such coordinated effort currently exists in the county. However, Adams County offers extensive homelessness outreach which connects services with people experiencing homelessness, understand their needs in services, and provide resource navigation. Outreach efforts received funding from the Colorado Department of Local Affairs' (DOLA) Emergency Solutions Grant (ESG). Adams County works with its municipal partners to collaborate and align outreach efforts. Case workers refer residents exiting systems of care to the county's homelessness coordinator and community safety and well being manager to access services.

Discussion

See above.

AP-75 Barriers to affordable housing -91.420, 91.220(j)

Introduction

Over the last decade Adams County has experienced a wide range of economic and demographic transitions. These transitions have led to a county that can pride itself on becoming a desirable destination for those looking to live in a community that is inclusive and that provides lifestyle opportunities that fail to exist in other areas in the seven (7) county Denver Metro region (Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas and Jefferson).

The County's current housing climate and geographic location have contributed to the County's growing population – fifth largest and second fastest in the region. In addition, a diversity of land uses from dense cities to suburbs and open rangeland, gives the County a unique identity aiding in its growth. The resulting pressures of this growth and housing stock demands have pushed housing prices to a point where many residents struggle to either find attainable housing or maintain their housing.

In a proactive effort to create solutions to the County's housing challenges, the County commissioned the 2017 Housing Needs Assessment (HNA). The HNA created a thorough economic and demographic description of the County, including its strengths and challenges as they relate to housing. The HNA identified findings that were then presented to various stakeholders who provided valuable input and possible solutions. This input also helped build the framework for developing the County's 2018 Balanced Housing Plan (BHP). The BHP's purpose is to take the information collected from the HNA and stakeholder input, and present defined goals and outcomes through a multifaceted and collaborative approach. This plan is truly a balanced housing plan as it seeks to build a platform that allows all areas of the County to achieve housing of all types and meets the needs of the County's diverse and growing population.

BHP provides recommendations on how to address the following findings:

- Finding 1: Housing is less affordable
- Finding 2: Increasing affordability gap at all income levels
- Finding 3: Housing supply is not meeting demand
- Finding 4: Adams County has distinct socioeconomics

Actions it planned to remove or ameliorate the negative effects of public policies that serve as barriers to affordable housing such as land use controls, tax policies affecting land, zoning ordinances, building codes, fees and charges, growth limitations, and policies affecting the return on residential investment

Adams County has identified affordable housing as a high priority and has moved to address this through several planning efforts including the Adams County 2020-2024 Con Plan. Through the

development of the HNA and BHP, the county focused on creating a plan that provides a roadmap to addressing some of the County's housing barriers by focusing on a balance of the housing.

Balanced Housing is achieved by a community's ability to provide a variety of housing choices that reflect an individual's financial and lifestyle needs. By recognizing that housing needs are shaped by access to jobs, education, and amenities, the BHP is designed as a guide for the County as it strives to provide its residents with housing opportunities that meet their needs and achieving a greater quality of life. The BHP was the next step in county-wide recommendations and set forth the following goals and policies:

Goals

- Utilize New and Existing Tools
- Reduce constraints to development
- Expand Opportunities

Policies

- Improve and support housing opportunities for all residents in Adams County
- Foster an environment the promotes "balanced housing"
- Encourage connection and access between schools and housing
- Promote the preservation of the County's current housing stock
- Integrate development practices the increase diversity in housing options

Discussion

Please see above.

AP-85 Other Actions - 91.420, 91.220(k)

Introduction

This section covers other actions to meet underserved needs, foster and maintain affordable housing, reduce lead-based paint hazards, reduce the number of poverty-level families, and develop institutional structure including improved coordination.

Actions planned to address obstacles to meeting underserved needs

Adams County is a large county and is difficult to adequately deliver services to both urban and rural constituencies. The mixture of urban and rural land throughout the county poses both service delivery and service recipient challenges. Many of the core agencies are in the more urban portions of the county which makes service delivery in the eastern and northern rural portions of the county difficult. The lack of adequate transportation and service providers in the rural areas are a hindrance to meeting the needs of the underserved throughout the county.

One of the major problems associated with meeting the needs of the underserved is the levels of funding. In today's economy, more and more Adams County residents are requesting services, which places strains on the county's capacity to adequately provide appropriate care. One of the areas of weakness that the county continues to face is a fully functional referral system. This can be attributed to the recent funding uncertainties within all federally funded areas (TANF, Food Stamps, Medicaid, etc.) and the vast geographic parameters of service-delivery agencies. The county continues to increase the availability of information for service-providers to be carried on to residents.

In late 2017, the county opened its new Human Services building which creates a centralized location for residents in need. It is accessible via public transportation and is fully ADA accessible. The county has a mission to end poverty by bringing together like-minded organizations to meet this goal. Services provided at the Human Services Center includes TANF, Children & Family Services, Community Support Services, Domestic Violence Services & Shelter, Child Support Services, Foster Care, and the Workforce & Business Center. The county also funded \$1,000,000 to the Adams County Foundation, which is a grant program for local non-profit organizations serving worst-case residents in need. The county is also actively pursuing other funding options to add more affordable housing units.

Actions planned to foster and maintain affordable housing

Adams County has made new construction of affordable rental housing, home buyer assistance, and preservation of existing affordable housing priorities for HOME and CDBG funds. HOME and CDBG funds may be used to construct new rental housing, preserve existing affordable rental housing, provide TBRA, purchase and rehabilitate older rental units, and aid low- and moderate-income homebuyers. Adams County works with the local housing authorities, nonprofit housing agencies and private developers to expand and preserve the affordable housing stock throughout the County.

Actions planned to reduce lead-based paint hazards

The MHR program has implemented stringent policies to ensure lead-based paint hazards are addressed proactively and in compliance with Federal regulations. In compliance with HUD's Lead Safe Housing Rule (24 CFR Part 35) and EPA's Lead Renovation, Repair, and Painting Program Rule (40 CFR Part 745), lead-safe practices are administered for any eligible home constructed prior to 1978. Only lead-certified contractors are solicited to bid for these homes. Lead-safe practices include providing the family with the Lead Safe Information pamphlet, a "Notice of Presumption" or "Notice of Evaluation" (as applicable), a copy of the final clearance completed by a licensed examiner, and a "Notice of Lead Hazard Reduction"—the required documents for projects receiving rehabilitation assistance between \$0-\$25,000 per unit. A lead hazard screen and/or full risk assessment will also be performed, as necessary, for projects receiving rehabilitation assistance.

Actions planned to reduce the number of poverty-level families

Adams County Community & Economic Development worked with the Adams County Homelessness Liaison, Adams County Workforce Business Center, local municipalities, and community agencies to identify the emergent employment needs of the low-income population and help develop appropriate responses to these needs. The Workforce and Business Center provides routine classes and training to enhance the skills of the emerging labor force. Housing authorities and housing providers are engaged to identify those residents in need of training and/or interested in participating with the Section 3 initiative.

The Maiker Housing Partners provides self-sufficiency services to residents of their housing units and clients of the Section 8 voucher program. The FSS program has a proven track record of helping residents gain the skills necessary to move themselves out of poverty.

Homeless providers funded through the statewide ESG program also provide clients with self-sufficiency case management services and referrals so that households can earn higher incomes and reduce their chances of re-entering the cycle of homelessness.

Actions planned to develop institutional structure

Adams County is the lead agency in both the CDBG Urban County and the HOME Consortia. Adams County's Urban County consists of:

- Town of Bennett
- City of Brighton
- City of Federal Heights
- City of Northglenn
- Unincorporated Adams County

Every three years, these jurisdictions are re-invited to renew their Intergovernmental Agreement with the county. Each of them receives a percentage of the county's CDBG allocation. As the lead agency Adams County monitors each jurisdiction's projects to ensure they meet national objectives, eligibility, and compliance. In addition to the Urban County jurisdictional proportional allocation, Adams County targets a percentage of its CDBG funding to community agencies. All projects are assessed through an application process for appropriateness and eligibility. During Program Year 2017, the Urban County and HOME Consortia renewed the Intergovernmental Agreements to continue receiving CDBG and HOME funds for the 2019, 2020, and 2021 PYs.

Adams County leads a HOME Consortia with the City of Westminster and the City of Thornton. A percentage of the county's annual HOME allocation is reserved to each of these municipalities based on a formula determined and posted annually by HUD (Annual Share Percentage Report). The county also provided portions of its HOME application to:

- Community Development Housing Organizations (CHDO's) (15% requirement);
- Local housing authorities;
- Non-profit housing developers; and
- For-profit developers.

Adams County has increased CHDO qualification strategies to align with the 2013 HOME Final Rule amendments and HUD best practices. Adams County is also in the process of seeking and certifying new CHDOs throughout the county for the purposes of expanding the county's capacity to undertake projects. Housing development agencies operating within the county are small and perform minimal development activities.

Actions planned to enhance coordination between public and private housing and social service agencies

Adams County continues its efforts to provide technical assistance to community partners as part of its coordination between public and private housing and social service agencies, as well as encouraging subgrantees to collaborate in leveraging resources and knowledge. The county is working with other county departments to determine the highest priority projects and best use of all funding received by the division. The county continues to work with Planning and Development, Public Works, Human Services, Regional Affairs, Long Range Planning, and various other partners to strengthen the delivery of services to all areas of the county.

Discussion

See above.

Program Specific Requirements

AP-90 Program Specific Requirements - 91.420, 91.220(I)(1,2,4)

Introduction

This section covers program specific requirements in Adams County.

Community Development Block Grant Program (CDBG)

Reference 24 CFR 91.220(I)(1)

Projects planned with all CDBG funds expected to be available during the year are identified in the Projects Table. The following identifies program income that is available for use that is included in projects to be carried out.

1. The total amount of program income that will have been received before the start of the next program year and that has not yet been reprogrammed	0
2. The amount of proceeds from section 108 loan guarantees that will be used during the year to address the priority needs and specific objectives identified in the grantee's strategic plan.	0
3. The amount of surplus funds from urban renewal settlements	0
4. The amount of any grant funds returned to the line of credit for which the planned use has not been included in a prior statement or plan	0
5. The amount of income from float-funded activities	0
Total Program Income:	0

Other CDBG Requirements

1. The amount of urgent need activities	0
2. The estimated percentage of CDBG funds that will be used for activities that benefit persons of low and moderate income. Overall Benefit - A consecutive period of one, two or three years may be used to determine that a minimum overall benefit of 70% of CDBG funds is used to benefit persons of low and moderate income. Specify the years covered that include this Annual Action Plan.	80.00%

HOME Investment Partnership Program (HOME)

Reference 24 CFR 91.220(I)(2)

1. A description of other forms of investment being used beyond those identified in Section 92.205 is as follows:

Adams County does not plan to use any other forms of investment beyond those identified in

Section 92.205.

2. A description of the guidelines that will be used for resale or recapture of HOME funds when used for homebuyer activities as required in 92.254, is as follows:

There are no activities identified in the 2021 program year that require resale or recapture provisions.

3. A description of the guidelines for resale or recapture that ensures the affordability of units acquired with HOME funds? See 24 CFR 92.254(a)(4) are as follows:

There are no activities identified in the 2021 program year that require resale or recapture provisions.

4. Plans for using HOME funds to refinance existing debt secured by multifamily housing that is rehabilitated with HOME funds along with a description of the refinancing guidelines required that will be used under 24 CFR 92.206(b), are as follows:

Adams County does not utilize HOME funds to refinance existing debt of multi-family housing so 24 CFR 92.206 (b) does not apply.

Emergency Solutions Grant (ESG)

1. Include written standards for providing ESG assistance (may include as attachment)

N/A

2. If the Continuum of Care has established centralized or coordinated assessment system that meets HUD requirements, describe that centralized or coordinated assessment system.

N/A

3. Identify the process for making sub-awards and describe how the ESG allocation available to private nonprofit organizations (including community and faith-based organizations).

N/A

4. If the jurisdiction is unable to meet the homeless participation requirement in 24 CFR 576.405(a), the jurisdiction must specify its plan for reaching out to and consulting with

homeless or formerly homeless individuals in considering policies and funding decisions regarding facilities and services funded under ESG.

N/A

5. Describe performance standards for evaluating ESG.

N/A

See above.



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Development Agreement with 6300 Broadway Associates LLC
FROM: Jenni Grafton, Director, Community and Economic Development Department
AGENCY/DEPARTMENT: Community and Economic Development
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves the Development Agreement with 6300 Broadway Associates LLC, which places responsibility for certain public improvements to be constructed by the Developer as described in Exhibit "B" and to provide payment to the County for certain public improvements as described in Exhibit "C". These public improvements consist of new roadway asphalt, storm sewer pipe, curb, gutter and sidewalk as described in Exhibits "B" and "C".

BACKGROUND:

The Developer is the owner of the property located on the northwest corner of 62nd Avenue and Broadway in Adams County. The developer shall be responsible for the design and installation of the public improvements to include street widening, curb, gutter, and sidewalk along Broadway Street, and provide the County a cash-in-lieu rather than construct curb, gutter, sidewalk, ADA curb ramps, and roadway improvements on 62nd Avenue which runs along the southern edge of the site.

The subject request is consistent with the requirement for approval of a Development Agreement for new development within Adams County. In addition, staff reviewed the Development Agreement and determined that the proposed improvements conform to the requirements outlined in the County's Development Standard and Regulations.

The Department of Community and Economic Development also reviewed construction documents associated with the development. Final acceptance of the project is contingent upon approval of the Development Agreement.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

County Attorneys Office
Public Works

ATTACHED DOCUMENTS:

Development Agreement with 6300 Broadway Associates LLC

Revised 06/2016

FISCAL IMPACT:

Please check if there is no fiscal impact ☒. If there is fiscal impact, please fully complete the section below.

Fund:**Cost Center:**

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:			
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☒ NO

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING DEVELOPMENT AGREEMENT BETWEEN
ADAMS COUNTY AND
6300 BROADWAY ASSOCIATES LLC

Resolution 2021-XXX

WHEREAS, the Adams County Development Standards and Regulations of the County of Adams, State of Colorado, require a developer to enter into a Development Agreement for the construction of certain public and private improvements; and,

WHEREAS, 6300 Broadway Associates LLC (“Developer”), is the owner of certain real property located at 6300 Broadway Street, Denver, CO, Parcel Numbers; 0182510100019 and 0182510100022 and,

WHEREAS, it is provided by resolution of the Board of County Commissioners, County of Adams, that the Developer shall enter into a written agreement with the County prior to the final acceptance of public and/or private improvements; and,

WHEREAS, the County and the Developer desire to enter into a Development Agreement for the public improvements at 6300 Broadway Street in Case No. EGR2019-00049; and,

WHEREAS, the Adams County Community and Economic Development Department recommends approval of the attached Development Agreement for Case No. EGR2019-00049.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the Development Agreement between Adams County and 6300 Broadway Associates LLC, a copy of which is attached hereto and incorporated herein by this reference, be approved.

BE IT FURTHER RESOLVED that the Chair of the Board of County Commissioners be authorized to execute said Agreement on behalf of the County of Adams, State of Colorado.

DEVELOPMENT AGREEMENT

THIS AGREEMENT is made and entered into this 25th day of JUN, 2021, between 6300 BROADWAY ASSOCIATES LLC, , a limited liability company eligible to conduct business in the State of Colorado ("Developer"), whose address is c/o Prologis, Inc., 1800 Wazee Street, Suite 500, Denver, CO 80202, and the Board of County Commissioners of the County of Adams, State of Colorado ("County"), whose address is 4430 S. Adams County Parkway, Brighton, CO 80601.

The purpose of this Development Agreement is to specify certain public improvements to be constructed by Developer pursuant to the terms and conditions of this Agreement.

WITNESSETH:

WHEREAS, Developer is the owner of real property in the County of Adams, State of Colorado, as described in Exhibit "A" attached hereto, and by this reference made a part hereof (the "Property").

WHEREAS, it is provided by resolution of the Board of County Commissioners, County of Adams, State of Colorado, that where designated the Developer shall have entered into a written agreement with the County to install certain public improvements.

WHEREAS, The Developer shall provide cash-in-lieu rather than construct the improvements on 62nd avenue adjacent to the Property.

NOW, THEREFORE, in consideration of the foregoing, the parties hereto promise, covenant, and agree as follows:

1. **Engineering Services.** Developer shall furnish, at its own expense, all engineering and other services in connection with the design and construction of the improvements described and detailed on Exhibit "B" attached hereto, and by this reference made a part hereof that are along Broadway ("Improvements"). These Improvements are estimated to cost \$155,313.84 as described in Exhibit "B".
2. **Drawings and Estimates.** The Developer shall furnish drawings and cost estimates for all Improvements described and detailed on Exhibit "B" for approval by the County. Upon request, the Developer shall furnish one set of reproducible "as built" drawings and a final statement of construction costs to the County.
3. **Construction.** Developer shall furnish and construct, at its own expense and in accordance with drawings and materials approved by the County, the Improvements described and detailed on Exhibit "B".
4. **Cash-in-Lieu.** Developer shall furnish to the County a cash escrow deposit with sufficient funds to make all cash-in-lieu payments required pursuant to this agreement and Developer will furnish evidence of such cash escrow deposit to the County. Said cash escrow deposit shall be sufficient to satisfy the cost of the improvements described in Exhibit "C" in the amount of \$159,540.00.
5. **Time for Completion.** Improvements shall be completed according to the terms of this agreement within "construction completion date" appearing in Exhibit "B". The Director of Community and Economic Development Department may for good cause grant extension of time for completion of any part or all of Improvements appearing on said Exhibit "B". Any extension greater than 180 days may be approved only by the Board of County Commissioners. All extensions of time shall be in written form only.
6. **Warranties of Developer.** Developer warrants that the Improvements shall be installed in good workmanlike manner and in substantial compliance with the plans and requirements of this Agreement and shall be substantially free of defects in materials and workmanship. These warranties of Developer shall remain in effect until Final Acceptance of the improvements by the County.

7. **Guarantee of Compliance.** Developer shall furnish to the County a cash escrow deposit or other acceptable collateral, releasable only by the County, to guarantee compliance with this agreement with respect to the Improvements. Said collateral shall be in the amount of \$155,313.84, including twenty percent (20%) to cover administration and five percent (5 %) per year for the term of the Agreement to cover inflation. Upon approval of the final plat, completion of said Improvements constructed according to the terms of this Agreement, and Preliminary Acceptance by the Director of Public Works in accordance with section 5-02-05-01 of the County's Development Standards and Regulations, the collateral shall be released. Completion of said Improvements shall be determined solely by the County and a reasonable part of said collateral, up to 20%, may be retained to guarantee maintenance of public Improvements for a period of one year from the date of Preliminary Acceptance.
8. **Acceptance and Maintenance of Public Improvements.** All Improvements designated "public" on Exhibit "B" shall be public facilities and become the property of the County or other public agencies upon acceptance. During the period of one year from and after the acceptance of public improvements, the Developer shall, at its own expense, make all needed repairs or replacement due to defective materials or workmanship which, in the opinion of the County, becomes necessary.
9. **Successors and Assigns.** This agreement shall be binding upon the heirs, executors, personal representatives, successors, and assigns of the Developer, and shall be deemed a covenant running with the real property as described in Exhibit "A" attached hereto.
10. **Improvements.** The undersigned developer hereby agrees to provide the following improvements, and to dedicate described property.
 - A. **Improvements.**

Proposed public improvements include asphalt, curb and gutter, and water utilities. See Exhibit "B" for description, estimated quantities, and estimated construction costs.
 - B. **Public dedication of land for right-of-way purposes or other public purpose.** As time is of the essence to complete the current construction activity on 62nd and Broadway, the rights-of-way required pursuant to this Agreement will be dedicated by special warranty deed, in a form reasonably acceptable to the County and Developer, subject to all matters of record, prior to Final Plat approval.
11. **Default by Developer.** A default by the Developer shall exist if : (a) Developer fails to construct the Improvements in substantial compliance with the Plans and the other requirements of this Agreement; (b) Developer fails to complete construction of the Improvements by the Completion Date provided herein as the same may be extended; (c) Developer fails to cure any noncompliance specified in any written notice of noncompliance within a reasonable time after receipt of the notice of noncompliance; or (d) Developer otherwise breaches or fails to comply with any obligation of Developer under this Agreement.
 - A. **Remedies of County.** If the County, after written notice, determines that a default by Developer exists and if Developer fails to cure such default within the time specified by the County the County shall be entitled to: (a) make a draw on the collateral for the amount reasonably determined by the County to be necessary to cure the default in a manner consistent with the approved Plans up to the face amount of the Collateral; and (b) sue the Developer for recovery of any amount necessary to cure the default over and above the amount available in the Collateral provided.
 - B. **County Right to Completion of Improvements.** The right of the County to complete or cause completion of the Improvements as herein provided shall include the following rights:
 - a. The County shall have the right to complete the Improvements, in substantial accordance with the plans, the estimated costs, and other requirements of this Agreement, either itself or by contract with a third

party or by assignment of its rights to a successor developer who has acquired the Property by purchase, foreclosure, or otherwise.

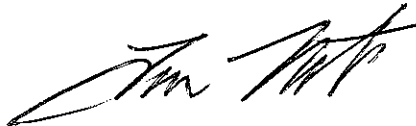
- b. The County, any contractor under the County, or any such successor developer, their agents, subcontractors and employees shall have the non-exclusive right to enter upon the streets and easements shown on the final plat of the Subdivision and upon any part of the Subdivision owned by Developer for the purpose of completing the Improvements.

- C. **Use of Funds by County.** Any funds obtained by the County through Collateral, or recovered by the County from Developer by suit or otherwise, shall be used by the County to pay the costs of completion of the Improvements substantially in accordance with the Plans and the other requirements of this Agreement and to pay the reasonable costs and expenses of the County in connection with the default by Developer, including reasonable attorneys' fees.

Name/s
Developer

6300 BROADWAY ASSOCIATES LLC,
a Delaware limited liability company

By:
Name: TOM MARTIN
Title: VICE PRESIDENT

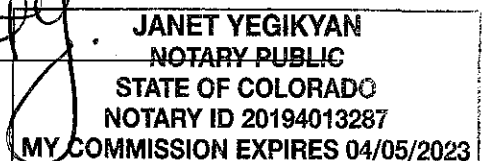


The foregoing instrument was acknowledged before me this 25th day of June, 2021, by Tom Martin as Vice President of 6300 Broadway Associates LLC

My commission expires: 04/05/2023

Address: 8600 E. Arapahoe Rd
Centennial, CO 80112


Notary Public



APPROVED BY resolution at the meeting of _____, 20__.

Collateral to guarantee compliance with this agreement and construction of public improvements shall be required in the amount of _____. No building permits shall be issued until said collateral is furnished in the amount required and in a form acceptable to the Board of County Commissioners.

ATTEST:

BOARD OF COUNTY COMMISSIONERS
ADAMS COUNTY, COLORADO

Clerk of the Board

Chair

Approved as to form

County Attorney

EXHIBIT A

Legal Description:

PARCELS A & B COMBINED:

That part of the Southwest one-quarter Northwest one-quarter Northeast one-quarter Section 10, Township 3 South, Range 68 West of the 6th Principal Meridian, Adams County, Colorado described as: Beginning at the Northwest corner said Southwest one-quarter Northwest one-quarter Northeast one-quarter; thence N89°47'00"E on an assumed bearing along the North line of said Southwest one-quarter Northwest one-quarter Northeast one-quarter a distance of 30.00 feet to the true point of beginning; thence continuing N89°47'00"E along said North line a distance of 383.00 feet to a point; thence S00°00'00"W parallel with the West line said Southwest one-quarter Northwest one-quarter Northeast one-quarter a distance of 627.19 feet to a point 30.00 feet North of the South line said Southwest one-quarter Northwest one-quarter Northeast one-quarter; thence S89°44'55"W parallel with said South line a distance of 383.00 feet to a point 30.00 feet East of the West line said Southwest one-quarter Northwest one-quarter Northeast one-quarter; thence N00°00'00"E parallel with said West line a distance of 627.42 feet to the true point of beginning.

PARCEL C:

That part of the Southwest one-quarter Northwest one-quarter Northeast one-quarter Section 10, Township 3 South, Range 68 West of the 6th Principal Meridian, Adams County, Colorado described as: Beginning at the Northwest corner said Southwest one-quarter Northwest one-quarter Northeast one-quarter; thence N89°47'00" E on an assumed bearing along the North line of said Southwest one-quarter Northwest one-quarter Northeast one-quarter a distance of 413.00 feet to the true point of beginning; thence continuing N89°47'00" E along said North line a distance of 68.00 feet to a point; thence S00°00'00"W parallel with the West line of said Southwest one-quarter Northwest one-quarter Northeast one-quarter a distance of 627.15 feet to a point 30.00 feet North of the South line said Southwest one-quarter Northwest one-quarter Northeast one-quarter; thence S89°44'55"W parallel with said South line a distance of 68.00 feet to a point 413.00 feet East of the West line of said Southwest one-quarter Northwest one-quarter Northeast one-quarter; thence N00°00'00"E parallel with said West line a distance of 627.19 feet to the true point of beginning.

PARCEL D:

The N1/2 of the SW1/4 of the NW1/4 of the NE1/4; and the N1/2 of the W1/2 of the SE1/4 of the NW1/4 of the NE1/4 of Section 10, Township 3 South, Range 68 West of the 6th P.M.;

ALSO

The S1/2 of the SW1/4 of the NW1/4 of the NE1/4; and the SW1/4 of the SE1/4 of the NW1/4 of the NE1/4; and all that portion of the SE1/4 of the NW1/4 of the NE1/4 lying South of the right of way of the Denver, Laramie and Northwestern Railway all in Section 10, Township 3 South, Range 68 West of the 6th P.M.

All within the County of Adams, State of Colorado.

EXCEPTING from the above described Parcel D parcels those portions thereof described in deeds recorded September 2, 1949 in Book 380 at Page 69 and Page 84; April 19, 1960 in Book 840 at Page 115; February 18, 1975 in Book 1978 at Page 55; October 27, 1976 in Book 2099 at Page 618; and February 12, 1992 in Book 3866 at Page 185 and at Page 187.

EXHIBIT B

Description of Improvements:

The public improvements that will be constructed by Developer in along the public right of way commonly known as Broadway, are as described and shown on the approved PROLOGIS Green Thumb plans, also known as E. 62nd and Broadway.

Public Improvements: Broadway Improvements - Exhibit B

Description	Est Qty	Unit	Est Unit Cost	Est Cost
TRANSPORTATION				
Full-Depth Asphalt	1523	SY	\$ 30	\$ 45,690
Striping	3584	LF	\$ 10	\$ 35,840
Curb, Gutter, & Walk	667	LF	\$ 18	\$ 12,006
5-ft Walk	667	LF	\$ 28	\$ 18,676
ADA Curb Ramps	1	EA	\$ 2,000	\$ 2,000
			Total Transportation:	\$ 114,212
UTILITIES				
8" Water Line	30	LF	\$ 35	\$ 1,050
8" Gate Valve	2	EA	\$ 1,200	\$ 2,400
			Total Utilities:	\$ 3,450

Total Public Improvements:	\$ 117,662
10% Inflation Fee:	\$ 129,428
20% Contingency:	\$ 25,886
Total	\$ 155,313.84

Construction Completion Date: January 2023

Exhibit "C"
Cash in Lieu for 62nd Avenue

Public Improvements: 62nd Avenue Improvements Cash In Lieu

Description	Est Qty	Unit	Est Unit Cost	Est Cost
TRANSPORTATION				
Full-Depth Asphalt	2570	SY	\$ 30	\$ 77,100
Striping	1558	LF	\$ 10	\$ 15,580
ADA Curb Ramps	1	EA	\$ 2,000	\$ 2,000
Total Transportation:				\$ 94,680

UTILITIES				
8" Water Line	890	LF	\$ 35	\$ 31,150
6" DIP Water Line	32	LF	\$ 35	\$ 1,120
8" Gate Valve	4	EA	\$ 1,200	\$ 4,800
6" Gate Valve	1	EA	\$ 1,200	\$ 1,200
Total Utilities:				\$ 38,270

Total Public Improvements:	\$ 132,950
20% Contingency:	\$ 26,590
Total	\$ 159,540.00



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: 92 nd Avenue Resurfacing -Lowell Boulevard to Federal Boulevard Intergovernmental Agreement
FROM: Brian Staley, PE, PTOE, RSP, Director of Public Works
AGENCY/DEPARTMENT: Public Works
HEARD AT STUDY SESSION ON:
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approve an Intergovernmental Agreement with the City of Westminster for the resurfacing of 92 nd Avenue from Lowell Boulevard to Federal Boulevard

BACKGROUND:

Adams County and the City of Westminster desire to enter into an “Intergovernmental Agreement Regarding the Resurfacing of 92nd Avenue Between Lowell Boulevard and Federal Boulevard”. The City will be resurfacing 92nd Avenue from Lowell Boulevard to Federal Boulevard in 2022, and portions of the project are situated within the County’s right-of-way. The City will include the work in the County’s right-of-way within the same contract per the IGA, and has requested reimbursement for work completed within the County’s right-of-way. The IGA outlines the responsibilities of both the City and the County regarding the project and associated costs.

The estimated cost for the County is approximately \$73,782 and will be paid for from the cost center 3055.7820.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Adams County
City of Westminster

ATTACHED DOCUMENTS:

Agreement
Resolution

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 00013

Cost Center: 3055

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	7820		\$8,000,000
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☒ NO

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING INTERGOVERNMENTAL AGREEMENT REGARDING
COST-SHARING BETWEEN ADAMS COUNTY AND THE CITY OF WESTMINSTER FOR
THE RESURFACING OF 92ND AVENUE – LOWELL BOULEVARD TO FEDERAL
BOULEVARD PROJECT

WHEREAS, Adams County (the “County”) and the City of Westminster (the “City”) desire to enter into an Intergovernmental Agreement (“IGA”) regarding the cost-sharing for the Resurfacing of 92nd Avenue – Lowell Boulevard to Federal Boulevard Project (the “Project”); and,

WHEREAS, the City has a project to remove and replace deteriorated concrete along 92nd Avenue from Lowell Boulevard to Federal Boulevard; and,

WHEREAS, the City and County will be responsible for maintaining and repairing those portions of 92nd Avenue that fall within their respective jurisdictions; and,

WHEREAS, the City is willing to include the County’s portion of work in the same contract as the City will be entering into for the Project; and,

WHEREAS, the City has requested, and the County is agreeable, that the County reimburse the City on a proportionate share of basis the County’s portion of work within the Project; and,

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado that the Intergovernmental Agreement Regarding Cost-Sharing Between Adams County and the City of Westminster for the Resurfacing of 92nd Avenue – Lowell Boulevard to Federal Boulevard Project, two copies of which are attached hereto and incorporated herein by this reference, be and hereby is approved.

BE IT FURTHER RESOLVED, that the Chair of the Board of County Commissioners is authorized to execute said agreement on behalf of Adams County.

**INTERGOVERNMENTAL AGREEMENT BETWEEN
THE CITY OF WESTMINSTER AND ADAMS COUNTY
REGARDING RESURFACING OF
92ND AVENUE - LOWELL BOULEVARD TO FEDERAL BOULEVARD**

This INTERGOVERNMENTAL AGREEMENT REGARDING THE RESURFACING OF 92nd AVENUE (the "Agreement") is made and entered into effective this 23rd day of August, 2021, by and among the CITY OF WESTMINSTER, a Colorado home rule municipality whose principal business address is 4800 West 92nd Avenue, Westminster, Colorado 80031 ("Westminster"), and the COUNTY OF ADAMS, a body politic and corporate of the State of Colorado whose principal business address is 4430 South Adams County Parkway, Suite W5700, Brighton, Colorado 80601-8218 (the "County"). Both the City and the County are referred to herein as either the singular "Party" or the plural "Parties."

WHEREAS, Section 18(2)(a) of Article XIV of the Colorado Constitution, as well as Section 29-1-201, *et seq.*, and 29-20-105 of the Colorado Revised Statutes authorize and encourage governments to cooperate by contracting with one another for their mutual benefit; and

WHEREAS, Westminster desires to contract for the resurfacing of the asphalt pavement and the removing and replacing of deteriorated concrete along 92nd Avenue from Lowell Boulevard to Federal Boulevard; and

WHEREAS, Westminster is responsible for maintaining and repairing those portions of 92nd Avenue situated within Westminster; and

WHEREAS, the County is responsible for maintaining and repairing those portions of 92nd Avenue situated within Adams County; and

WHEREAS, Westminster is willing to include the County's portion of 92nd Avenue, from Lowell Boulevard to Grove Street, in the same contract as Westminster will be entering into for those street improvements located within Westminster; and

WHEREAS, Westminster has requested, and the County is agreeable, that the County reimburse the Westminster on a proportionate share basis the County's portion of the cost for that portion of 92nd Avenue, from Lowell Boulevard to Grove Street which is located within the County's jurisdiction; and

WHEREAS, estimates of the construction costs for the portion of the Project located within the County's jurisdiction are identified in EXHIBIT A, attached hereto and incorporated herein by this reference; and

WHEREAS, the proportionate cost share of the Project shall be based on the proportionate share areas within each respective jurisdiction, and

WHEREAS, the costs identified in EXHIBIT A are estimates for the total cost of the Project to be done within the County's jurisdiction, and each Party shall be responsible for its share of the actual, in-place costs of the Project (the "Actual Project Costs"); and

WHEREAS, a ten percent (10%) contingency has been applied to each item to accommodate the possibility of over-running estimated quantities, and a ten percent (10%) contingency has been added to the overall budget for use toward change orders or minor contract revisions to accommodate issues that arise during construction.

NOW, THEREFORE, in consideration for the making and performance of the mutual promises and covenants contained herein the parties agree as follows:

1.0 SCOPE OF WORK

1.1 Westminster shall perform "Work" (street resurfacing and deteriorated concrete removal and replacement) to 92nd Avenue from Lowell Boulevard, to Federal Boulevard. This Work will be performed on that portion of 92nd Avenue located in Westminster, and on seven thousand three hundred thirty-eight (7,338) square yards of pavement presently located within Unincorporated Adams County, as shown on attached EXHIBIT A. It is agreed that this Work shall include improvements to 92nd Avenue located in Adams County consisting of a 2 inch mill and overlay, restriping of the roadway, replacement of all traffic markings, and the removal and replacement of deteriorated concrete. The Work shall be secured by payment and performance bonds and warranted for a period of one year.

2.0 TERM. Adams County shall pay Westminster an amount of seventy-three thousand seven hundred eighty-one dollars and eighty-one cents (\$73,781.81). Westminster shall send an invoice to Adams County, with the quantities and unit prices, and Adams County shall pay Westminster within thirty (30) days of receipt of the invoice.

3.0 PROJECT MANAGER

3.1 Westminster's project manager for the project is Brock Hufford, Pavement Management Coordinator, Department of Public Works and Utilities, Street Operations Division.

3.2 Adams County's project manager for the Project is Jennifer Shi, Senior Transportation Engineer, Public Works Department.

3.3 The project managers from both Westminster and Adams County shall be the primary points of contact for questions and inquiries about the Project, and shall be responsible for reporting to their respective entities the progress of the Project, as well as any problems which might arise. Westminster and Adams County may change their designated project managers upon written notice to the other party. All notices given pursuant to this Agreement should be sent to the attention of the project manager of the party to whom the notice is being given.

4.0 COOPERATION. Westminster and Adams County hereby agree that, upon execution of this Agreement and commencement of the Project, they will cooperate with each other to the fullest extent in the scheduling of the work, supervision, and review when applicable to ensure the successful completion of the Project. Adams County may inspect the project but shall communicate to the Contractor through Westminster.

5.0 WARRANTY. The parties agree that any contracts awarded for the construction of the Project shall be warranted by the selected Contractor for a one (1) year period, and that surety be provided for enforcement of this warranty.

6.0 INSURANCE AND INDEMNIFICATION.

6.1 During the term of this Agreement, both parties shall maintain property and general liability insurance in commercially reasonable amounts, either or both parties may meet this obligation through their membership in the insurance pool provided by the Colorado Intergovernmental Risk Sharing Agency (CIRSA), to insure them from claims arising from the Project.

6.2 Westminster shall require that all contractors, subcontractors, and independent contractors employed by Westminster for the Project maintain property, general liability and statutory worker's compensation insurance in such amounts as to insure Westminster, and Adams County as an additional insured, to the statutory limits of their liability.

6.3 Westminster shall require that the selected Contractor for the Project and its subcontractors indemnify, defend and hold harmless Adams County and Westminster, and their respective Mayors, Councillors, Commissioners, officials, and employees from and against any and all claims, demands, suits, actions, proceedings, judgments, losses, damages, injuries, penalties, costs, expenses (including attorney's fees) and liabilities of, by or with respect to third parties to the extent they arise, or may be alleged to arise, directly or indirectly, in whole or in part, from the intentional misconduct or negligent acts or omissions of the selected Contractor, the selected Contractor's subcontractors, suppliers, and/or employees in connection with work on the Project.

7.0 ADDITIONAL DOCUMENTS OR ACTION. The parties agree to execute any additional action that is necessary to carry out this Agreement.

8.0 ASSIGNMENT. This Agreement shall not be assigned by either party without the prior written consent of the other party.

9.0 FORCE MAJEURE. Any delays in or failure of performance by any party of his or its obligations under this Agreement shall be excused if such delays or failure are a result of acts of God, fires, floods, strikes, labor disputes, accidents, regulations or orders of civil or military authorities, shortages of labor or materials, or other causes, similar or dissimilar, which are beyond the control and such party.

10.0 BINDING EFFECT. This Agreement shall inure to the benefit of, and be binding upon, the parties, their respective legal representative, successors, heirs, and assigns; provided, however, that nothing in this paragraph shall be construed to permit the assignment of this Agreement except as otherwise expressly authorized herein.

11.0 EXHIBITS. All EXHIBITS referred to in this Agreement are, by reference, incorporated herein for all purposes.

12.0 NOTICES. Any notice required or permitted by this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes if sent by certified mail or registered mail, postage and fees prepaid, addressed to the project manager as referenced in paragraph 3.0 above at the address set forth on the signature page below, or at such other address as has been previously furnished in writing, to the other party or parties. Such notice shall be deemed to have been given when deposited in the United States mail.

13.0 PARAGRAPH CAPTIONS. The captions of the paragraphs are set forth only for the convenience and reference of the parties and are not intended in any way to define, limit or describe the scope or intent of this Agreement.

14.0 INTEGRATION AND AMENDMENT. This Agreement represents the entire agreement between the parties and there are no oral or collateral agreements or understandings. This Agreement may be amended only by an instrument in writing signed by the parties. If any other provision of the Agreement is held invalid or unenforceable, no other provision shall be affected

by such holding, and all of the remaining provisions of this Agreement shall continue in full force and effect.

15.0 DEFAULT. Time is of the essence. If any payment or any other condition, obligation, or duty is not timely made, tendered or performed by either party, then this Agreement, at the option of the party who is not in default, maybe terminated by the nondefaulting party, in which case, the nondefaulting party may recover such damages as may be proper. If the nondefaulting party elects to treat this Agreement as being in full force and effect, the nondefaulting party shall have the right to an action for specific performance or damage or both.

16.0 WAIVER OF BREACH. A waiver by any party to the Agreement of the breach of any term or provision of this Agreement shall no operate or be construed as a waiver of any subsequent breach by either party.

17.0 ATTORNEY'S FEES. If any party breaches this Agreement, the breaching party shall pay all of the prevailing party's reasonable attorney's fees and costs in enforcing this Agreement.

18.0 GOVERNING LAW AND VENUE. This Agreement shall be governed by the laws of the State of Colorado. Venue for any action arising under this Agreement or for the enforcement of this Agreement shall be in the appropriate court for Adams County, Colorado.

19.0 GOVERNMENTAL IMMUNITIES.

19.1 The Parties hereto intend that nothing herein shall be deemed or construed as a waiver by either party of any rights or protections afforded to them under the Colorado Governmental Immunity Act (Section 24-10-101, C.R.S., *et seq.*)

19.2 Adams County and Westminster agree that in the event any claim or suit is brought against either or both parties by any third party as a result of the operation of this Agreement that both parties will cooperate with each other, and with the insuring entities of both parties, in defending such claim or suit.

ILLEGAL ALIENS-PUBLIC CONTRACTS FOR SERVICES. Westminster shall require that the selected Contractor for the Project and its subcontractors are in compliance with CRS §8-17.5-101 *et seq.*

SIGNATURE PAGE TO FOLLOW

In Witness Whereof, the parties hereto have caused this agreement to be executed on the day and year first above written.

CITY OF WESTMINSTER
A Colorado home rule municipality

By: _____	Title: _____
4800 W 92 nd Avenue	
Westminster, CO 80031	

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

BOARD OF COUNTY COMMISSIONERS
ADAMS COUNTY, COLORADO

By: _____	Title: _____
-----------	--------------

ATTEST:

Deputy Clerk

APPROVED AS TO FORM:

County Attorney

Date of Approval: _____

EXHIBIT A
FEE PAYMENT SCHEDULE AND LOCATION MAP

Total Project Work				
92nd Ave (Adams County IGA)	Grove Street to Lowell Blvd			18,216 SY
	Quantity	Unit	Unit Price	Extended \$
Cold Milling 0-2" Depth	3,200	Sq Yards	\$ 3.82	\$ 12,224.00
Hot Applied Chipseal (Over Existing Chip)	18,216	Sq Yards	\$ 6.86	\$ 124,961.76
Manhole Adjust	12	Each	\$ 220.34	\$ 2,644.08
Valve Adjust	17	Each	\$ 160.79	\$ 2,733.43
Communication Manhole Adjust	3	Each	\$ 398.99	\$ 1,196.97
Lane Lines (White & Yellow)	29	Gal	\$ 99.71	\$ 2,891.59
Thermoplastic Crosswalks (2' x 8')	272	Sq Feet	\$ 11.24	\$ 3,057.28
Preformed Thermoplastic Turn Arrows	9	Each	\$ 446.63	\$ 4,019.67
Total Project Asphalt				Total \$ 153,728.78
2'6" Vertical Curb & Gutter (remove & replace)	50	LF	\$ 27.00	\$ 1,350.00
6'6" Monolithic Vertical Curb & Gutter w/Sidewalk	530	LF	\$ 57.02	\$ 30,220.60
8" Thick Commercial Driveway (remove & replace)	230	SF	\$ 7.64	\$ 1,757.20
ADA Curb Ramp (remove & replace per spec)	11	Each	\$ 1,490.40	\$ 16,394.40
ADA Curb Ramp Retro-Fit (wet set)	9	Each	\$ 518.40	\$ 4,665.60
Total Project Concrete				\$ 54,387.80
20% Contingency				\$ 41,623.32
Total Project				\$249,739.90

Adams County's Portion				
92nd Ave (Adams County IGA)	Grove Street to Lowell Blvd			7,338 SY
	Quantity	Unit	Unit Price	Extended \$
Cold Milling 0-2" Depth	1,600	Sq Yards	\$ 3.82	\$ 6,112.00
Hot Applied Chipseal (Over Existing Chip)	7,338	Sq Yards	\$ 6.86	\$ 50,338.68
Manhole Adjust	2	Each	\$ 220.34	\$ 440.68
Valve Adjust	7	Each	\$ 160.79	\$ 1,125.53
Lane Lines (White & Yellow)	15	Gal	\$ 99.71	\$ 1,495.65
Thermoplastic Crosswalks (2' x 8')	96	Sq Feet	\$ 11.24	\$ 1,079.04
Preformed Thermoplastic Turn Arrows	2	Each	\$ 446.63	\$ 893.26
Asphalt Total				\$ 61,484.84
2'6" Vertical Curb & Gutter (remove & replace)		LF	\$ 27.00	\$ -
Sidewalk (6" thick) (remove & replace)		SF	\$ 8.64	\$ -
ADA Curb Ramp (remove & replace per spec)		Each	\$ 1,490.40	\$ -
ADA Curb Ramp Retro-Fit (wet set)		Each	\$ 518.40	\$ -
Concrete Total				\$ -
20% Contingency				\$ 12,296.97
Adams County Total Share				\$ 73,781.81

EXHIBIT A

SHADED AREA = Adams County

Entire project





PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Resolution approving right-of-way agreement between Adams County and Balboa Park Homes Association for property necessary for the York Street Roadway and Drainage Improvements Project from East 78 th Avenue to East 88 th Avenue
FROM: Brian Staley, P.E., PTOE, RSP, Director of Public Works
AGENCY/DEPARTMENT: Public Works
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves the right-of-way agreement for acquisition of property interests needed for the York Street Improvements Project.

BACKGROUND:

Adams County is in the process of acquiring property interests along the York Street corridor from East 78th Avenue to East 88th Avenue for the York Street Roadway Improvement Project. The intention of this Project is to identify and improve the overall roadway and drainage of York Street. Attached is a copy of the right-of-way agreement between Adams County and Balboa Park Homes Association, for acquisition of property interests in the amount of \$16,540.00. The attached resolution allows the County to acquire ownership of the property interests needed for the use of the public and provide the necessary documents to close on the property.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Adams County Public Works, Office of the County Attorney and Adams County Board of County Commissioners.

ATTACHED DOCUMENTS:

Draft resolution
Right-of-way agreement

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 13**Cost Center: 3056**

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:			
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:	9135	30562101	\$15,000,000
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			\$15,000,000

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☒ NO

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING RIGHT-OF-WAY AGREEMENT
BETWEEN ADAMS COUNTY AND BALBOA PARK HOMES ASSOCIATION
FOR PROPERTY NECESSARY FOR THE YORK STREET ROADWAY AND DRAINAGE
IMPROVEMENTS PROJECT FROM EAST 78TH AVENUE TO
EAST 88TH AVENUE

WHEREAS, Adams County is in the process of acquiring right-of-way and easements along York Street corridor from East 78th Avenue to East 88th Avenue for the York Street Roadway and Drainage Improvements Project (“Project”); and,

WHEREAS, the intention of this Project is to identify and improve the overall roadway and drainage (“Improvements”); and,

WHEREAS, this right-of-way acquisition is a portion of a property located in the Southeast Quarter of Section 26, Township 2 South, Range 68 West of the 6th Principal Meridian, County of Adams, State of Colorado, and owned by Balboa Park Homes Association (“Parcel RW-213”); and,

WHEREAS, Adams County requires ownership of Parcel RW-213 for construction of the Improvements; and,

WHEREAS, Balboa Park Homes Association is willing to sell Parcel RW-213 to Adams County under the terms and conditions of the attached Right-of-Way Agreement.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners, County of Adams, State of Colorado, that the attached Right-of-Way Agreement between Adams County and Balboa Park Homes Association, a copy of which is attached hereto and incorporated herein by this reference, be and hereby is approved.

BE IT FURTHER RESOLVED that the Chair of the Board of County Commissioners is hereby authorized to execute said Right-of-Way Agreement on behalf of Adams County.

Right-of-Way Agreement

This Agreement is made and entered into by and between **Balboa Park Homes Association, a Colorado corporation** whose address is **PO Box 370390, Denver, CO 80237** ("Owner"), and the County of Adams, State of Colorado, a body politic, who address is 4430 South Adams County Parkway, Brighton, Colorado, 80601 ("County") for the conveyance of rights-of-way on property located at address of property being conveyed hereinafter (the "Property") for the York Street Improvements Project – East 78th Avenue to East 88th Avenue (the "Project"). The legal description and conveyance documents for the interests on said Property are set forth in Exhibit A attached hereto and incorporated herein by this reference.

The compensation agreed to by the Owner and the County for the acquisition of the Property interests described herein is **SIXTEEN THOUSAND, FIVE HUNDRED FORTY AND NO/100 DOLLARS (\$16,540.00)**, including the performance of the terms of this Agreement, the sufficiency of which is hereby acknowledged. The parties further agree that the consideration shall consist of \$5,180.00 for the conveyance of road right-of-way, \$1,070 for the conveyance of a permanent easement, and \$10,290.00 for approximately 3,333 square feet of irrigated grass, sprinkler system, a medium deciduous bush, and a medium evergreen bush. This consideration has been agreed upon and between the parties as the total just compensation due to the Owner and the consideration shall be given and accepted in full satisfaction of this Agreement.

In consideration of the above premises and the mutual promise and covenants below, the Owner and the County agree to the following:

1. The large landscaping rocks in existing right-of-way will be moved by the contractor on to the Owner's property during construction.
2. The Owner hereby warrants that the Owner is the sole Owner of the Property, that the Owner owns the Property in fee simple subject only to matters of record and that the Owner has the power to enter into this Agreement.
3. The Owner agrees to execute and deliver to the County the attached conveyance documents on the property upon tender by the County of a warrant (check) for the compensation agreed upon as soon as possible following the execution of this agreement.
4. The Owner hereby irrevocably grants to the County possession and use of the property interests on the Property upon execution of this Agreement by the Owner and the County. This grant of possession shall remain in effect with respect to the Property until such time as the County obtains from the Owner the attached conveyance documents.
5. The Owner agrees to pay all 2020 taxes due in 2021 prior to tender by the County.

6. The County through its contractor shall assure that reasonable access shall be maintained to the Owner's property at all times for ingress and egress. If necessary, any full closure of access shall be coordinated between the contractor and the Owner and/or its agent.
7. The County will remove approximately 3,333 square feet of irrigated grass, sprinkler system, 1 medium deciduous bush, and 1 medium evergreen bush. But the County has agreed to reimburse the owner the expense of the lost irrigated grass, sprinkler system, deciduous bush, and evergreen bush and made a part of this Agreement.
8. The Owner has entered into this Agreement acknowledging that the County has the power of eminent domain and required the Property for a public purpose.
9. If the Owner fails to consummate this agreement for any reason, except the County's default, the County may at its option, enforce this agreement by bringing an action against the Owner for specific performance.
10. This Agreement contains all agreements, understandings and promises between the Owner and the County, relating to the Project and shall be deemed a contract binding upon the Owner and County and extending to the successors, heirs and assigns.
11. The Owner shall be responsible for reporting proceeds of the sale to taxing authorities, including the submittal of Form 1099-S with the Internal Revenue Service, if applicable.
12. This Agreement has been entered into in the State of Colorado and shall be governed according to the laws thereof.

Owner:

Balboa Park Homes Association, a Colorado corporation

Name: Julie Mahoney

Title: President Board of Directors Balboa Park Home Ho A

Signature: J Mahoney

Date: 6/29/2021

Approved:

BOARD OF COUNTY COMMISSIONERS-COUNTY OF ADAMS, STATE OF COLORADO

Chair

Date

Approved as to Form:

County Attorney

EXHIBIT "A"
RIGHT-OF-WAY NUMBER: RW-213
PROJECT NUMBER: IMP-3056-1603
SECTION 26, TOWNSHIP 2 SOUTH, RANGE 68 WEST
SIXTH PRINCIPAL MERIDIAN
ADAMS COUNTY

DESCRIPTION

A tract or parcel of land No. RW-213 of Adams County Project Number IMP-3056-1603, containing 2,113 square feet, more or less, being the Common Areas of Balboa Park Amended, a subdivision recorded on August 2, 1972, File 13 Map 77, of the records of the Adams County Clerk and Records Office, situated in the Southeast Quarter of Section 26 Township 2 South, Range 68 West of the 6th Principal Meridian, County of Adams, State of Colorado, being more particularly described as follows:

COMMENCING at the Southeast corner of Section 26 whence the East Line of the Southeast quarter of Section 26 bears N00°04'09"E a distance of 2628.81 feet;
Thence N08°29'23"W a distance of 296.62 feet to the Southeast corner of said Common Areas of Balboa Park and the

POINT OF BEGINNING PARCEL RW-213;

Thence S78°55'40"W along the southerly boundary of said Common Areas a distance of 5.48 feet;
Thence Northerly, a distance of 60.99 feet along a non-tangent curve to the right, said arc having a radius of 421.00 feet and a central angle of 08°18'01", and being subtended by a chord with a bearing of N10°17'12"E and a distance of 60.94 feet;
Thence N00°00'00"E, a distance of 63.65 feet;
Thence N74°58'35"W, a distance of 58.77 feet to a point on the northerly boundary of parcel;
Thence Easterly, a distance of 91.44 feet along a non-tangent curve to the right, said arc having a radius of 259.05 feet and a central angle of 20°13'25", and being subtended by a chord with a bearing of S80°17'20"E and a distance of 90.96 feet to a point on the easterly boundary of parcel;
Thence Southerly, a distance of 128.82 feet along a non-tangent curve to the left, said arc having a radius of 421.40 feet and a central angle of 17°30'55", and being subtended by a chord with a bearing of S17°24'53"W and a distance of 128.32 feet to the

POINT OF BEGINNING PARCEL RW-213.

Containing 2,113 sq. ft. +/-

I, Jerry R. Johnson, Colorado Professional Surveyor in the State of Colorado, do hereby certify that this easement description and the field survey on the ground upon which it is based were performed by me or under my direct supervision.

Jerry R. Johnson, PLS 29417
Date:
For and on Behalf of
Petroleum Field Services, LLC
d.b.a. Ascent Geomatics Solutions



E 1/4 COR. SEC. 26
3-1/4" ALUMINUM CAP
MARKED "PLS 20155 1990"

SE 1/4, SE 1/4
SEC 26
T2S, R68W 6TH P.M.

L=91.44'
R=259.05'
D=20°13'25"
CH=S80°17'20"E
90.96'

YORK ST.

N74°58'35"W 58.77'

RW-213
2,113 SQ FT +/-

L=60.99'
R=421.00'
D=8°18'01"
CH=N10°17'12"E
60.94'

S78°55'40"W 5.48'

N00°00'00"E
63.65'

L=128.82'
R=421.40'
D=17°30'55"
CH=S17°24'53"W
128.32'

P.O.B.
RW-213

N00°04'09"E 2628.81'
(BASIS OF BEARINGS)
E. LINE SE 1/4 SEC. 26

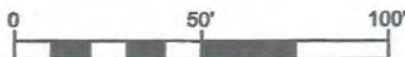
N08°29'23"E
296.62'

SE COR. SEC. 26
(CALCULATED POSITION)
P.O.C. RW-213

N89°26'42"E
30.00'

30.00' W.C. SE COR. SEC. 26
3-1/4" ALUMINUM CAP
MARKED "30.00' W.C. JR ENG
LS 25369 2000"

OWNER:
BALBOA PARK HOMES ASSOCIATION
C/O BRADFORD ST MANAGEMENT
PO BOX 18263
DENVER, CO 80218-0263



GRAPHIC SCALE: 1" = 50'



JERRY R JOHNSON
DATE:
PROJ: IMP-3056-1603
FOR AND ON BEHALF OF
PETROLEUM FIELD SERVICES, LLC
d.b.a. ASCENT GEOMATICS SOLUTIONS

NOTE: THIS IS NOT A MONUMENTED SURVEY.
IT IS INTENDED ONLY TO BE A GRAPHIC
DEPICTION OF THE ATTACHED DESCRIPTION.

EXHIBIT "B"

YORK ST - 78TH AVE TO 88TH AVE

RW-213

BALBOA PARK HOMES ASSOCIATION

File Name: RCG_B180001-RW-213

Project No. IMP-3056-1603

Print Date: 01-20-2020

Sheet: 2 of 2



Ascent Geomatics Solutions
8620 Wolff Court
Westminster, CO 80031
(303) 928-7128



RockSol
Consulting Group, Inc.

12076 Grant Street
Thornton, CO 80241
Ph: (303) 962-9300
Fax: (303) 962-9350



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Resolution authorizing the acquisition of property interests necessary for the construction of the improvements for the York Street Improvements Project – East 78 th Avenue to East 88 th Avenue
FROM: Brian Staley, P.E., PTOE, RSP, Public Works Director
AGENCY/DEPARTMENT: Public Works
HEARD AT STUDY SESSION ON:
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners authorizes the acquisition of property interests for the York Street Improvements Project by resolution.

BACKGROUND:

Adams County has submitted and received funding from the Adams County Board of County Commissioners for the York Street Capital Improvements Program Project – East 78th Avenue to East 88th Avenue (hereinafter “Project”). The County has prepared construction plans, right-of-way plans and legal descriptions that determined the need to acquire various property interests from seventy-five (75) property ownerships. Negotiations with one fee owner of record, Leger Investments, LLC, have not moved forward. Adams County sent a Notice of Intent to Acquire Property to Leger Investments, LLC, on September, 30, 2020, pursuant to C.R.S. § 38-1-121(1), and sent a Final Offer to Purchase to acquire Parcel FEE-274, Leger Investments, LLC, on July 9, 2021, based on an appraisal of such property, to which Adams County received no response. To assure that the acquisitions can be obtained in a timely manner and not jeopardize project deadlines, County staff needs to have authority to use the power of eminent domain to acquire the property interests necessary for the Project should good faith negotiations be unsuccessful. The resolution allows the Board of County Commissioners to authorize the use of eminent domain to acquire property interests for the York Street Project.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

ATTACHED DOCUMENTS:

Draft resolution
Legal Description of Parcel FEE-274

FISCAL IMPACT:

Please check if there is no fiscal impact ☒. If there is fiscal impact, please fully complete the section below.

Fund:
Cost Center:

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:			
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☒ NO

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION AUTHORIZING THE ACQUISITION OF PROPERTY INTERESTS
NECESSARY FOR THE CONSTRUCTION OF IMPROVEMENTS FOR THE
YORK STREET IMPROVEMENTS PROJECT – EAST 78TH AVENUE TO EAST 88TH
AVENUE

WHEREAS, Adams County has proposed the construction of York Street from East 78th Avenue to East 88th Avenue (the Project); and,

WHEREAS, Adams County, through engineering studies and design, has deemed it necessary to construct improvements as part of the Project consisting of the construction of a roadway and its appurtenances, including but not limited to roadway pavement; curb, gutter and sidewalk; pedestrian paths; drainage infrastructures; and streetscaping required for the Project; and,

WHEREAS, Adams County Public Works Department has submitted the Project to the Adams County Board of County Commissioners for the consideration of funds to construct the Project; and,

WHEREAS, Adams County Board of County Commissioners has approved funding for the Project; and,

WHEREAS, Adams County has also budgeted funds for the acquisition of the necessary property interests required for the Project; and,

WHEREAS, right-of-way and design plans for the Project are available upon request from the Adams County Public Works Department; and,

WHEREAS, to the best knowledge of Adams County, Leger Investments, LLC, is the fee owner of record of property necessary to be acquired for the Project identified as Parcel Fee-274 and described more specifically in the attached exhibit; and,

WHEREAS, Adams County sent a General Information Letter to Acquire Property to Leger Investments, LLC, on September 30, 2020, pursuant to C.R.S. § 38-1-121(1), and sent a Final Offer to Purchase to acquire Parcel Fee-274, to Leger Investments, LLC, on July 9, 2021, based on an appraisal of such property, but has been unable to acquire property through negotiation; and,

WHEREAS, the construction of the Project will serve the general public and is necessary for the health, safety and welfare of the citizens of Adams County; and,

WHEREAS, Adams County has the authority to use the power of eminent domain to condemn private property for county road purposes pursuant to C.R.S. § 43-2-112.

NOW, THEREFORE BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that it is in the interest of the general public's health, safety and welfare to acquire the property interests necessary for the Project and to construct the Project.

BE IT FURTHER RESOLVED, that the Public Works Department or its designee is hereby authorized and directed to acquire the property interests necessary for the Project as identified herein above based on good faith negotiations.

BE IT FURTHER RESOLVED, that the County Attorney's Office, or outside counsel hired by the County Attorney's Office, is authorized to acquire by means of eminent domain any of the property interests necessary for the construction of the Project, including Parcel Fee-274.

BE IT FURTHER RESOLVED, that immediate possession of the property interests necessary for the construction of the Project is necessary and required for the reasons and purposes described herein.

EXHIBIT "A"
RIGHT-OF-WAY NUMBER: FEE-274
PROJECT NUMBER: IMP-3056-1603
SECTION 25, TOWNSHIP 2 SOUTH, RANGE 68 WEST
SIXTH PRINCIPAL MERIDIAN
ADAMS COUNTY

DESCRIPTION

A tract or parcel of land No. FEE-274 of Adams County Project Number IMP-3056-1603, containing 39,329 square feet, more or less, being all of Tract E, Devonshire Square Second Filing, a subdivision recorded on November 20, 1980, at File 14, Map 699, of the records of the Adams County Clerk and Records Office, situated in the Northwest Quarter of Section 25 Township 2 South, Range 68 West of the 6th Principal Meridian, County of Adams, State of Colorado, being more particularly described as follows:

COMMENCING at the West Quarter Corner of Section 25 whence the West Line of the Northwest quarter of Section 25 bears N01°03'26"W a distance of 2637.47 feet;
Thence N34°59'02"E, a distance of 1625.63 feet to the Northwest corner of said Tract E, Devonshire Square Second Filing and the
POINT OF BEGINNING PARCEL FEE-274;

Thence S83°37'03"E along the northerly boundary of said Tract E, a distance of 140.61 feet to the Northeast corner of said Tract E;
Thence Southerly and along the easterly boundary of said Tract E, a distance of 258.10 feet along a non tangent curve to the left, said arc having a radius of 3,895.00 feet and a central angle of 03°47'48", and being subtended by a chord with a bearing of S08°11'57"E and a distance of 258.05 feet to the southeast corner of said Tract E;
Thence S77°23'57"W along the southerly boundary of said Tract E, a distance of 131.81 feet;
Thence Northwesterly and along the southwesterly boundary of said Tract E, a distance of 16.32 feet along a curve to the right, said arc having a radius of 10.00 feet and a central angle of 93°30'25", and being subtended by a chord with a bearing of N55°50'51"W and a distance of 14.57 feet;
Thence Northerly along the westerly boundary of said Tract E, a distance of 293.88 feet along a compound curve to the right having a radius of 4,035.00 feet and a central angle of 04°10'23" to the POINT OF BEGINNING.

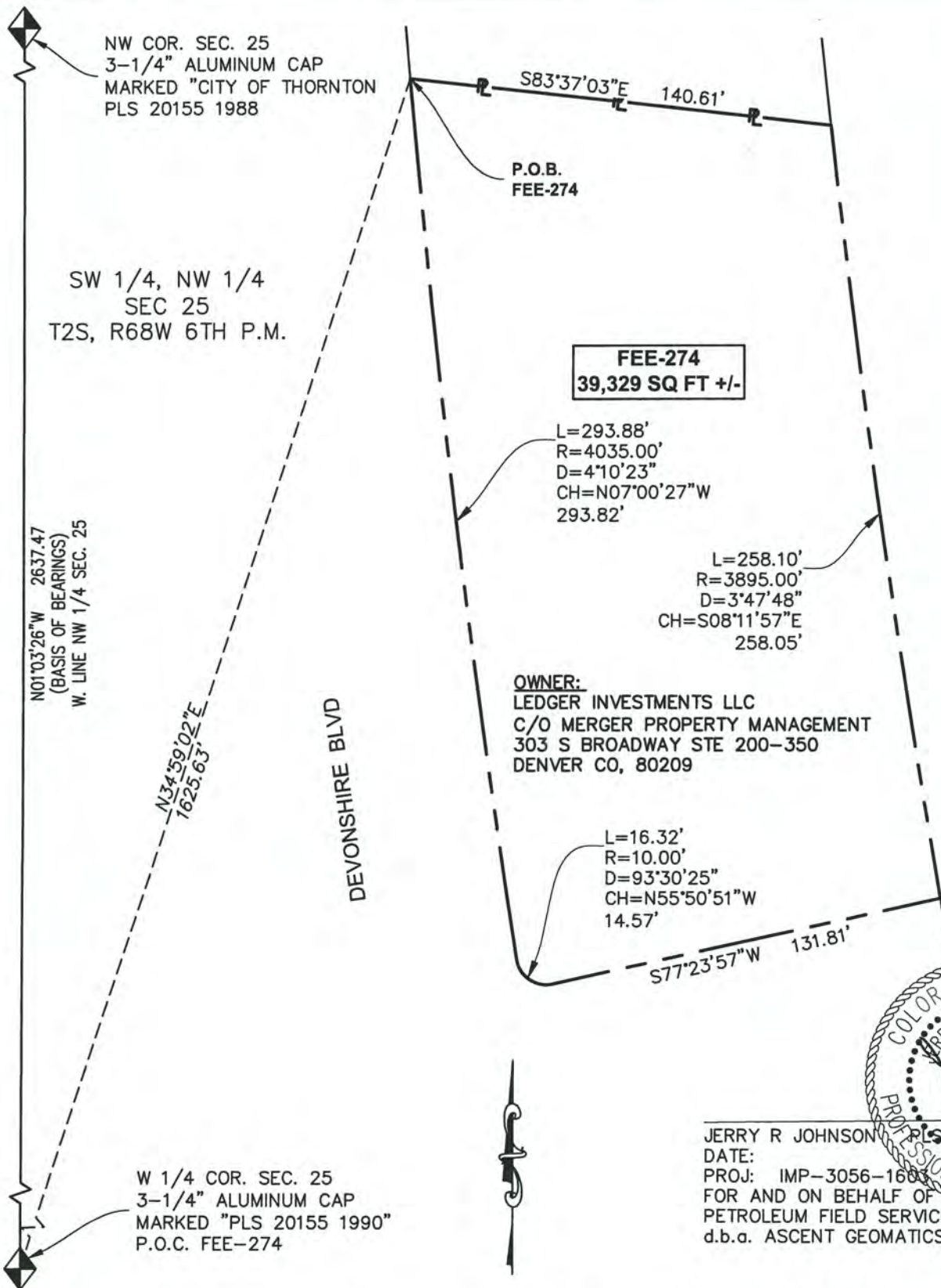
POINT OF BEGINNING PARCEL FEE-274.

Containing 39,329 sq. ft. +/-

I, Jerry R. Johnson, Colorado Professional Surveyor in the State of Colorado, do hereby certify that this easement description and the field survey on the ground upon which it is based were performed by me or under my direct supervision.

Jerry R. Johnson, PLS 29417
Date:
For and on Behalf of
Petroleum Field Services, LLC
d.b.a. Ascent Geomatics Solutions





OWNER:
 LEDGER INVESTMENTS LLC
 C/O MERGER PROPERTY MANAGEMENT
 303 S BROADWAY STE 200-350
 DENVER CO, 80209



JERRY R JOHNSON
 DATE:
 PROJ: IMP-3056-1603
 FOR AND ON BEHALF OF
 PETROLEUM FIELD SERVICES, LLC
 d.b.a. ASCENT GEOMATICS SOLUTIONS



NOTE: THIS IS NOT A MONUMENTED SURVEY.
 IT IS INTENDED ONLY TO BE A GRAPHIC
 DEPICTION OF THE ATTACHED DESCRIPTION.



Ascent Geomatics Solutions
 8620 Wolff Court
 Westminster, CO 80031
 (303) 928-7128



RockSol
 Consulting Group, Inc.

12076 Grant Street
 Thornton, CO 80241
 Ph: (303) 962-9300
 Fax: (303) 962-9350

EXHIBIT "B"
YORK ST - 78TH AVE TO 88TH AVE

FEE-274
 LEDGER INVESTMENTS LLC
 C/O MERGER PROPERTY MANAGEMENT
 File Name: RCG_B180001-FEE-274
 Project No. IMP-3056-1603
 Print Date: 01-20-2020

Sheet: 2 of 2



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Abatements
FROM: Meredith P. Van Horn, Assistant Adams County Attorney
AGENCY/DEPARTMENT: County Attorney
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves the recommendations of the Assessor's Office for the attached abatement petitions.

BACKGROUND:

The Assessor's Office reviewed the attached abatement petitions concerning tax years 2019 and 2020 and has agreed to the abated values for the respective accounts. The findings and recommendations of the Assessor's Office are attached hereto for approval and adoption.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Adams County Assessor's Office

ATTACHED DOCUMENTS:

Resolution
Summary Findings and Recommendations of the Assessor's Office

FISCAL IMPACT:

Please check if there is no fiscal impact ☒. If there is fiscal impact, please fully complete the section below.

Fund:**Cost Center:**

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:			
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			

New FTEs requested: ☐ YES ☐ NO

Future Amendment Needed: ☐ YES ☐ NO

Additional Note:

**RESOLUTION APPROVING ABATEMENT PETITIONS AND AUTHORIZING THE
REFUND OF TAXES FOR ACCOUNT NUMBERS P0038060, R0095464, R0094964,
R0094766, and R0103239**

WHEREAS, pursuant to C.R.S. § 39-1-113, the Board of County Commissioners may approve abatement petitions concerning property tax assessment and may refund taxes associated therewith; and,

WHEREAS, the attached petitions for account numbers P0038060, R0095464, R0094964, R0094766, and R0103239 have been processed, reviewed, and approved by the Adams County Assessor's Office; and,

WHEREAS, information regarding the initial assessed value and the justification for reduction in assessed value and refund of taxes is included for each property in the documentation attached; and,

WHEREAS, it is the recommendation of the Assessor's Office that these petitions be approved, and refunds be issued by the Board of County Commissioners; and,

WHEREAS, for account number P0038060, approval by the Board of County Commissioners shall be forwarded as a recommendation to the Colorado Property Tax Administrator for review and approval as required by C.R.S. §§ 39-1-113(3) and 39-2-116.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the abatement petitions for account numbers R0095464, R0094964, R0094766, and R0103239 are hereby approved.

BE IT FURTHER RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the resolution approving the petition for account number P0038060 be forwarded, for review, to the Colorado Property Tax Administrator to approve the abatement petition for the Property.

Ken Musso
Assessor



Assessor's Office
4430 South Adams County Parkway
2nd Floor, Suite C2100
Brighton, CO 80601-8201
Phone 720-523-6038
Fax 720-523-6037
www.adcogov.org

BOARD OF COUNTY COMMISSIONERS

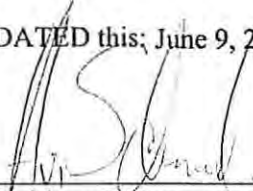
STIPULATION (As to Tax Year(s) 2019 & 2020 Actual Value(s))

1. The property subject to this Stipulation is:
Schedule No. (S): R0095464 Parcel NO.(S) 0182334417003
2. The subject property is classified as a Residential property.
3. The County Assessor originally assigned the following actual value to the subject property for tax year(s) 2019 & 2020 :

Land	\$44,196
Improvements	\$1,635,804
Total	\$1,680,000
4. The Adams County Assessor has reviewed this file and agrees to make the following adjustment to the valuation for the subject property for tax year(s) 2019 & 2020 :

Land	\$44,196
Improvements	\$1,325,804
Total	\$1,370,000
5. By entering into this agreement, the Petitioner understands that they are giving up rights to further appeal of the value of this property for tax year(s) 2019 & 2020 .

DATED this: June 9, 2021



Petitioner's Representative
1384 JAMAICA 1590 CLINTON
1676 HANOVER LLC
C/O AVI SCHWALB

Gregory J. Broderick

Assessor Representative
Adams County Assessor's Office

Digitally signed by Gregory J. Broderick
DN: cn=Gregory J. Broderick,
ou=Adams County, ou=Assessor's
Office,
email=gbroderick@adcogov.org, c=US
Date: 2021.06.09 16:45:57 -0600

**ASSESSOR'S RECOMMENDATION
BOARD OF COUNTY COMMISSIONERS**

Account No : R0095464 Parcel No : 0182334417003
 Petition Year : 2019 Date Filed : March 2, 2021
 Owner Entity : 1384 Jamaica 1590 Macon 1676 Hanover LLC. C/O Avi Schwalb
 Owner Address : 1575 Galena St. #C-105 State : Colorado
 Owner City : Aurora
 Property Location : 1676 Hanover St. Aurora, CO 80010

TYPE	OCC CODE	PETITIONER'S REQUESTED VALUES		ASSESSOR'S ASSIGNED VALUES		ORIGINAL TAX WARRANT	
		Actual Value	Assessed Value	Actual Value	Assessed Value		
REAL		L:	\$0	L: \$44,196	\$3,160	A. Ratio 7.15%	
		I:	\$0	I: \$1,635,804	\$116,960	Mill Levy 117.794	
TOTALS :			\$1,180,000	\$84,370	\$1,680,000	\$120,120	Original Tax \$14,149

Tax Exempt Portion
0%

Petitioner's Statement :

Assessor's Report

Situation :

Abatement petition filed based on value.

Action :

The market was researched for comparable sales similar to the subject property.

Recommendation :

Upon further review, a reduction in value appears warranted.

ASSESSOR'S RECOMMENDED ADJUSTMENT

TYPE	OCC CODE	ASSESSOR'S ASSIGNED VALUE		RECOMMENDED VALUE		REVISED TAX WARRANT
		Actual Value	Assessed Value	Actual Value	Assessed Value	Tax Refund
REAL		L: \$44,196	\$3,160	L: \$44,196	\$3,160	\$2,611.50
		I: \$1,635,804	\$116,960	I: \$1,325,804	\$94,790	Revised Tax
TOTALS :		\$1,680,000	\$120,120	\$1,370,000	\$97,950	\$11,537.92

Gregory J Broderick
Appraiser

June 15, 2021
Date

Certified General Appraiser

PETITION FOR ABATEMENT OR REFUND OF TAXES

County: Adams

Date Received _____
(Use Assessor's or Commissioners' Date Stamp)

RECEIVED

MAR 02 2021

Section I: Petitioner, please complete Section I only.

Date: 12/22/2020
Month Day Year

Petitioner's Name: Avi Schwalb
Petitioner's Mailing Address: 1575 Galena St. C105
Aurora CO 80010
City or Town State Zip Code

OFFICE OF THE
ADAMS COUNTY ASSESSOR

SCHEDULE OR PARCEL NUMBER(S)

PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY

1676 Hanover St.
Aurora CO 80010

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for property tax year(s) 2019 and 2020 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error or overvaluation. Attach additional sheets if necessary.)

Petitioner's estimate of value:

\$ 1,180,000 2019 and \$ _____
Value Year Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me, and to the best of my knowledge, information and belief, is true, correct, and complete.

[Signature]
Petitioner's Signature

Daytime Phone Number (303) 364 1310

Email _____

By _____
Agent's Signature*

Daytime Phone Number () _____

Printed Name: _____

Email _____

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-116, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision. § 39-10-114.5(1), C.R.S.

Section II:		Assessor's Recommendation (For Assessor's Use Only)					
		Tax Year _____			Tax Year _____		
		Actual	Assessed	Tax	Actual	Assessed	Tax
Original	_____	_____	_____	_____	_____	_____	_____
Corrected	_____	_____	_____	_____	_____	_____	_____
Abate/Refund	_____	_____	_____	_____	_____	_____	_____
<input type="checkbox"/> Assessor recommends approval as outlined above.							
If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer. § 39-10-114(1)(a)(i)(D), C.R.S.							
Tax year: _____ Protest?		<input type="checkbox"/> No		<input type="checkbox"/> Yes (If a protest was filed, please attach a copy of the NOD.)			
Tax year: _____ Protest?		<input type="checkbox"/> No		<input type="checkbox"/> Yes (If a protest was filed, please attach a copy of the NOD.)			
<input type="checkbox"/> Assessor recommends denial for the following reason(s):							
_____ Assessor's or Deputy Assessor's Signature							

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY

(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner

(Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	Actual	Assessed	Tax
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____

Date _____

Assessor's or Deputy Assessor's Signature _____

Date _____

Section IV:**Decision of the County Commissioners**

(Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said _____ Name

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (~~agrees--does not agree~~) with the recommendation of the Assessor, and that the petition be (~~approved--approved in part--denied~~) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
------	----------------	--------------------

Chairperson of the Board of County Commissioners' Signature _____

I, _____ County Clerk and Ex-Officio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County

this _____ day of _____, _____
Month Year

County Clerk's or Deputy County Clerk's Signature _____

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V:**Action of the Property Tax Administrator**

(For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s): _____

Secretary's Signature _____

Property Tax Administrator's Signature _____

Date _____

Ken Musso
Assessor



Assessor's Office
4430 South Adams County Parkway
2nd Floor, Suite C2100
Brighton, CO 80601-8201
Phone 720-523-6038
Fax 720-523-6037
www.adcogov.org

BOARD OF COUNTY COMMISSIONERS

STIPULATION (As to Tax Year(s) 2019 & 2020 Actual Value(s))

1. The property subject to this Stipulation is:
Schedule No. (S): R0095464 Parcel NO.(S) 0182334417003

2. The subject property is classified as a Residential property.

3. The County Assessor originally assigned the following actual value to the subject property for tax year(s) 2019 & 2020 :

Land	\$44,196
Improvements	\$1,635,804
Total	\$1,680,000

4. The Adams County Assessor has reviewed this file and agrees to make the following adjustment to the valuation for the subject property for tax year(s) 2019 & 2020 :

Land	\$44,196
Improvements	\$1,325,804
Total	\$1,370,000

5. By entering into this agreement, the Petitioner understands that they are giving up rights to further appeal of the value of this property for tax year(s) 2019 & 2020 .

DATED this: June 9, 2021

Petitioner's Representative
1384 JAMAICA 1590 CLINTON
1676 HANOVER LLC
C/O AVI SCHWALB

Gregory J.
Broderick

Digitally signed by Gregory J.
Broderick
DN: cn=Gregory J. Broderick,
o=Adams County, ou=Assessor's
Office,
email=gbroderick@adcogov.org, c=US
Date: 2021.06.09 16:45:57 -0600

Assessor Representative
Adams County Assessor's Office

**ASSESSOR'S RECOMMENDATION
BOARD OF COUNTY COMMISSIONERS**

Account No : R0095464 Parcel No : 0182334417003
 Petition Year : 2020 Date Filed : March 2, 2021
 Owner Entity : 1384 Jamaica 1590 Macon 1676 Hanover LLC. C/O Avi Schwalb
 Owner Address : 1575 Galena St. #C-105
 Owner City : Aurora State : Colorado
 Property Location : 1676 Hanover St. Aurora, CO 80010

TYPE	OCC CODE	PETITIONER'S REQUESTED VALUES		ASSESSOR'S ASSIGNED VALUES		ORIGINAL TAX WARRANT	
		Actual Value	Assessed Value	Actual Value	Assessed Value		
REAL		L:	\$0	L:	\$44,196	A. Ratio	7.15%
		I:	\$0	I:	\$1,635,804	Mill Levy	118.007
TOTALS :			\$1,180,000		\$84,370		
					\$1,680,000		\$120,120
						Original Tax	\$14,175

Tax Exempt Portion
0%

Petitioner's Statement :

Assessor's Report

Situation :

Abatement petition filed based on value.

Action :

The market was researched for comparable sales similar to the subject property.

Recommendation :

Upon further review, a reduction in value appears warranted.

ASSESSOR'S RECOMMENDED ADJUSTMENT

TYPE	OCC CODE	ASSESSOR'S ASSIGNED VALUE		RECOMMENDED VALUE		REVISED TAX WARRANT
		Actual Value	Assessed Value	Actual Value	Assessed Value	Tax Refund
REAL		L: \$44,196	\$3,160	L: \$44,196	\$3,160	\$2,616.21
		I: \$1,635,804	\$116,960	I: \$1,325,804	\$94,790	Revised Tax
TOTALS :		\$1,680,000	\$120,120	\$1,370,000	\$97,950	\$11,558.79

Gregory J Broderick June 15, 2021
 Appraiser Date

Certified General Appraiser

PETITION FOR ABATEMENT OR REFUND OF TAXES

County: Adams

Date Received _____
(Use Assessor's or Commissioners' Date Stamp)

Section I: Petitioner, please complete Section I only.

Date: 3/1/2021
Month Day Year

Petitioner's Name: Avi Schwalb

Petitioner's Mailing Address: 1575 Galena St. C105

Aurora
City or Town

CO
State

86010
Zip Code

SCHEDULE OR PARCEL NUMBER(S)

0182334417003

R0095464

PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY

1676 Hanover St.
Aurora CO 80010

OFFICE OF THE
ADAMS COUNTY ASSESSOR

MAR 02 2021

RECEIVED

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for the property tax year 2020 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error, or overvaluation. Attach additional sheets if necessary.)

Petitioner's estimate of value:

\$ 1,180,000 (2020)
Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me and to the best of my knowledge, information, and belief, is true, correct, and complete.

Avi Schwalb
Petitioner's Signature

Daytime Phone Number (303) 364 1310

Agent's Signature*

Daytime Phone Number ()

Email 1575galena@oabsdgroup.com

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-116, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision, § 39-10-114.5(1), C.R.S.

Section II:

Assessor's Recommendation (For Assessor's Use Only)

Tax Year _____

Actual

Assessed

Tax

Original _____

Corrected _____

Abate/Refund _____

☐ Assessor recommends approval as outlined above.

If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer, § 39-10-114(1)(a)(I)(D), C.R.S.

Tax year: _____ Protest? ☐ No ☐ Yes (If a protest was filed, please attach a copy of the NOD.)

☐ Assessor recommends denial for the following reason(s):

Assessor's or Deputy Assessor's Signature

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY

(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner
(Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	<u>Actual</u>	<u>Assessed</u>	<u>Tax</u>
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____	Date _____
Assessor's or Deputy Assessor's Signature _____	Date _____

Section IV: Decision of the County Commissioners
(Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (~~agrees--does not agree~~) with the recommendation of the Assessor, and that the petition be (~~approved--approved in part--denied~~) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
------	----------------	--------------------

Chairperson of the Board of County Commissioners' Signature

I, _____ County Clerk and Ex-Officio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County this _____ day of _____, _____

Month Year

County Clerk's or Deputy County Clerk's Signature

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V: Action of the Property Tax Administrator
(For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s): _____

Secretary's Signature

Property Tax Administrator's Signature

Date

Ken Musso
Assessor



Assessor's Office
4430 South Adams County Parkway
2nd Floor, Suite C2100
Brighton, CO 80601-8201
Phone 720-523-6038
Fax 720-523-6037
www.adcogov.org

BOARD OF COUNTY COMMISSIONERS

STIPULATION (As to Tax Year(s) 2019 & 2020 Actual Value(s))

1. The property subject to this Stipulation is:
Schedule No. (S): R0094964 Parcel NO.(S) 0182334322009

2. The subject property is classified as a Residential property.

3. The County Assessor originally assigned the following actual value to the subject property for tax year(s) 2019 & 2020 :

Land	\$57,150
Improvements	\$1,272,850
Total	\$1,330,000

4. The Adams County Assessor has reviewed this file and agrees to make the following adjustment to the valuation for the subject property for tax year(s) 2019 & 2020 :

Land	\$57,150
Improvements	\$942,850
Total	\$1,000,000

5. By entering into this agreement, the Petitioner understands that they are giving up rights to further appeal of the value of this property for tax year(s) 2019 & 2020 .

DATED this: June 9, 2021

Petitioner's Representative
AVI SCHWALB

Gregory J.
Broderick

Digitally signed by Gregory J. Broderick
DN: cn=Gregory J. Broderick,
ou=Adams County, ou=Assessor's
Office,
email=gbroderick@adcogov.org, c=US
Date: 2021.06.09 16:44:15 -0600

Assessor Representative
Adams County Assessor's Office

**ASSESSOR'S RECOMMENDATION
BOARD OF COUNTY COMMISSIONERS**

Account No : R0094964
Petition Year : 2019
Owner Entity : Avi Schwalb
Owner Address : 1575 Galena St. #C-105
Owner City : Aurora
Property Location :

Parcel No : 0182334322009
Date Filed : March 2, 2021
State : Colorado
1617 Alton St. Aurora, CO 80010

TYPE	OCC CODE	PETITIONER'S REQUESTED VALUES		ASSESSOR'S ASSIGNED VALUES		ORIGINAL TAX WARRANT	
		Actual Value	Assessed Value	Actual Value	Assessed Value		
REAL		L:	\$0	L:	\$57,150	A. Ratio	7.15%
		I:	\$0	I:	\$1,272,850	Mill Levy	117.794
TOTALS :		\$1,000,000	\$71,500	\$1,330,000	\$95,100	Original Tax	\$11,202

Tax Exempt Portion
0%

Petitioner's Statement :

Assessor's Report

Situation :

Abatement petition filed based on value.

Action :

The market was researched for comparable sales similar to the subject property.

Recommendation :

Upon further review, a reduction in value appears warranted.

ASSESSOR'S RECOMMENDED ADJUSTMENT

TYPE	OCC CODE	ASSESSOR'S ASSIGNED VALUE		RECOMMENDED VALUE		REVISED TAX WARRANT
		Actual Value	Assessed Value	Actual Value	Assessed Value	Tax Refund
REAL		L: \$57,150	\$4,090	L: \$57,150	\$4,090	\$2,779.94
		I: \$1,272,850	\$91,010	I: \$942,850	\$67,410	Revised Tax
TOTALS :		\$1,330,000	\$95,100	\$1,000,000	\$71,500	\$8,422.27

Gregory J Broderick
Appraiser

June 15, 2021
Date

Certified General Appraiser

PETITION FOR ABATEMENT OR REFUND OF TAXES

County: Adams

Date Received _____
(Use Assessor's or Commissioners' Date Stamp)

RECEIVED

Section I: Petitioner, please complete Section I only.

Date: 12/22/2020
Month Day Year

MAR 02 2021

Petitioner's Name: Avi Schwalb

Petitioner's Mailing Address: 1375 Galena St C105
Aurora CO 80010
City or Town State Zip Code

OFFICE OF THE
ADAMS COUNTY ASSESSOR

SCHEDULE OR PARCEL NUMBER(S)

PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY

R0094964

1617 Alton St
Aurora CO 80010

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for property tax year(s) 2019 and 2020 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error or overvaluation. Attach additional sheets if necessary.)

Petitioner's estimate of value:

\$1,000,000 2019 and \$ Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me, and to the best of my knowledge, information and belief, is true, correct, and complete.

Petitioner's Signature

Daytime Phone Number (303) 364 1310

Email _____

By _____
Agent's Signature

Daytime Phone Number () _____

Printed Name: _____

Email _____

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-116, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision, § 39-10-114.5(1), C.R.S.

Section II:

Assessor's Recommendation
(For Assessor's Use Only)

	Tax Year _____			Tax Year _____		
	Actual	Assessed	Tax	Actual	Assessed	Tax
Original	_____	_____	_____	_____	_____	_____
Corrected	_____	_____	_____	_____	_____	_____
Abate/Refund	_____	_____	_____	_____	_____	_____

☐ Assessor recommends approval as outlined above.

If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer, § 39-10-114(1)(a)(i)(D), C.R.S.

Tax year: _____ Protest?

☐ No

☐ Yes (If a protest was filed, please attach a copy of the NOD.)

Tax year: _____ Protest?

☐ No

☐ Yes (If a protest was filed, please attach a copy of the NOD.)

☐ Assessor recommends denial for the following reason(s):

Assessor's or Deputy Assessor's Signature

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY

(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner
 (Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	<u>Actual</u>	<u>Assessed</u>	<u>Tax</u>
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____

Date _____

Assessor's or Deputy Assessor's Signature _____

Date _____

Section IV: Decision of the County Commissioners

(Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (agrees--does not agree) with the recommendation of the Assessor, and that the petition be (approved--approved in part--denied) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
------	----------------	--------------------

Chairperson of the Board of County Commissioners' Signature _____

I, _____ County Clerk and Ex-Officio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County

this _____ day of _____, _____

Month Year

County Clerk's or Deputy County Clerk's Signature _____

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V: Action of the Property Tax Administrator

(For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s): _____

Secretary's Signature _____

Property Tax Administrator's Signature _____

Date _____

Ken Musso
Assessor



Assessor's Office
4430 South Adams County Parkway
2nd Floor, Suite C2100
Brighton, CO 80601-8201
Phone 720-523-6038
Fax 720-523-6037
www.adcogov.org

BOARD OF COUNTY COMMISSIONERS

STIPULATION (As to Tax Year(s) 2019 & 2020 Actual Value(s))

1. The property subject to this Stipulation is:
Schedule No. (S): R0094964 Parcel NO.(S) 0182334322009

2. The subject property is classified as a Residential property.

3. The County Assessor originally assigned the following actual value to the subject property for tax year(s) 2019 & 2020 :

Land	\$57,150
Improvements	\$1,272,850
Total	\$1,330,000

4. The Adams County Assessor has reviewed this file and agrees to make the following adjustment to the valuation for the subject property for tax year(s) 2019 & 2020 :

Land	\$57,150
Improvements	\$942,850
Total	\$1,000,000

5. By entering into this agreement, the Petitioner understands that they are giving up rights to further appeal of the value of this property for tax year(s) 2019 & 2020 .

DATED this: June 9, 2021

Petitioner's Representative
AVI SCHWALB

Gregory J.
Broderick

Digitally signed by Gregory J. Broderick
DN: cn=Gregory J. Broderick, o=Adams County, ou=Assessor's Office,
email=gbroderick@adcogov.org, c=US
Date: 2021.06.09 16:44:15 -0600

Assessor Representative
Adams County Assessor's Office

**ASSESSOR'S RECOMMENDATION
BOARD OF COUNTY COMMISSIONERS**

Account No : R0094964
Petition Year : 2020
Owner Entity : Avi Schwalb
Owner Address : 1575 Galena St. #C-105
Owner City : Aurora

Parcel No : 0182334322009
Date Filed : March 2, 2021

Property Location : State : Colorado
1617 Alton St. Aurora, CO 80010

TYPE	OCC CODE	PETITIONER'S REQUESTED VALUES		ASSESSOR'S ASSIGNED VALUES		ORIGINAL TAX WARRANT	
		Actual Value	Assessed Value	Actual Value	Assessed Value		
REAL		L:	\$0	L:	\$57,150	A. Ratio	7.15%
		I:	\$0	I:	\$1,272,850	Mill Levy	118.007
TOTALS :			\$1,000,000		\$71,500	Original Tax	\$11,222

Tax Exempt Portion
0%

Petitioner's Statement :

Assessor's Report

Situation :

Abatement petition filed based on value.

Action :

The market was researched for comparable sales similar to the subject property.

Recommendation :

Upon further review, a reduction in value appears warranted.

ASSESSOR'S RECOMMENDED ADJUSTMENT

TYPE	OCC CODE	ASSESSOR'S ASSIGNED VALUE		RECOMMENDED VALUE		REVISED TAX WARRANT
		Actual Value	Assessed Value	Actual Value	Assessed Value	Tax Refund
REAL		L: \$57,150	\$4,090	L: \$57,150	\$4,090	\$2,784.97
		I: \$1,272,850	\$91,010	I: \$942,850	\$67,410	Revised Tax
TOTALS :		\$1,330,000	\$95,100	\$1,000,000	\$71,500	\$8,437.50

Gregory J Broderick
Appraiser

June 15, 2021
Date

Certified General Appraiser

PETITION FOR ABATEMENT OR REFUND OF TAXES

County: Adams

Date Received MAR 02 2021
(Use Assessor's or Commissioners' Date Stamp)

Section I: Petitioner, please complete Section I only.

Date: 3/1/2021
Month Day Year

**OFFICE OF THE
ADAMS COUNTY ASSESSOR**

Petitioner's Name: Avi Schwalb
Petitioner's Mailing Address: 1575 Galena St. C105
Aurora CO 80010
City or Town State Zip Code

SCHEDULE OR PARCEL NUMBER(S)

0182334322009
R0094964

PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY

1617 Alton St.
Aurora CO 80010

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for the property tax year 2020 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error, or overvaluation. Attach additional sheets if necessary.)

Petitioner's estimate of value: \$ 1,000,000 (2020)
Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me, and to the best of my knowledge, information, and belief, is true, correct, and complete.

Avi Schwalb Daytime Phone Number (303) 341 1310
Petitioner's Signature

Agent's Signature* Daytime Phone Number ()
Email 1575galena@cabsgroup.com

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-118, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision, § 39-10-114.5(1), C.R.S.

Section II:

Assessor's Recommendation
(For Assessor's Use Only)

	Actual	Assessed	Tax
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

☐ Assessor recommends approval as outlined above.

If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer, § 39-10-114(1)(a)(I)(D), C.R.S.

Tax year: _____ Protest? ☐ No ☐ Yes (If a protest was filed, please attach a copy of the NOD.)

☐ Assessor recommends denial for the following reason(s):

Assessor's or Deputy Assessor's Signature

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY

(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner
 (Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	Actual	Assessed	Tax
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____ Date _____

Assessor's or Deputy Assessor's Signature _____ Date _____

Section IV: Decision of the County Commissioners
 (Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (~~agrees--does not agree~~) with the recommendation of the Assessor, and that the petition be (~~approved--approved in part--denied~~) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
------	----------------	--------------------

Chairperson of the Board of County Commissioners' Signature

I, _____ County Clerk and Ex-Officio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County this _____ day of _____, _____.

Month Year

County Clerk's or Deputy County Clerk's Signature

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V: Action of the Property Tax Administrator
 (For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s): _____

Secretary's Signature

Property Tax Administrator's Signature

Date

Ken Musso
Assessor



Assessor's Office
4430 South Adams County Parkway
2nd Floor, Suite C2100
Brighton, CO 80601-8201
Phone 720-523-6038
Fax 720-523-6037
www.adcogov.org

BOARD OF COUNTY COMMISSIONERS

STIPULATION (As to Tax Year(s) 2019 & 2020 Actual Value(s))

1. The property subject to this Stipulation is:
Schedule No. (S): R0094766 Parcel NO.(S) 0182334313006

2. The subject property is classified as a Residential property.

3. The County Assessor originally assigned the following actual value to the subject property for tax year(s) 2019 & 2020 :

Land	\$76,200
Improvements	\$1,332,222
Total	\$1,408,422

4. The Adams County Assessor has reviewed this file and agrees to make the following adjustment to the valuation for the subject property for tax year(s) 2019 & 2020 :

Land	\$76,200
Improvements	\$873,800
Total	\$950,000

5. By entering into this agreement, the Petitioner understands that they are giving up rights to further appeal of the value of this property for tax year(s) 2019 & 2020 .

DATED this: June 9, 2021

Petitioner's Representative
Avi Schwalb

Gregory J.
Broderick

Digitally signed by Gregory J.
Broderick
DN: cn=Gregory J. Broderick,
ou=Adams County, ou=Assessor's
Office,
email=gbroderick@adcogov.org, c=US
Date: 2021.06.09 16:49:54 -0600

Assessor Representative
Adams County Assessor's Office

**ASSESSOR'S RECOMMENDATION
BOARD OF COUNTY COMMISSIONERS**

Account No : R0094766
Petition Year : 2019
Owner Entity : Avi Schwalb
Owner Address : 1575 Galena St. #C-105
Owner City : Aurora
Property Location :

Parcel No : 0182334313006
Date Filed : March 2, 2021
State : Colorado
1720 Chester St. Aurora, CO 80010

TYPE	OCC CODE	PETITIONER'S REQUESTED VALUES		ASSESSOR'S ASSIGNED VALUES		ORIGINAL TAX WARRANT	
		Actual Value	Assessed Value	Actual Value	Assessed Value		
REAL		L: \$0	\$0	L: \$76,200	\$5,450	A. Ratio	7.15%
		I: \$0	\$0	I: \$1,332,222	\$95,250	Mill Levy	117.794
TOTALS :		\$785,000	\$56,130	\$1,408,422	\$100,700	Original Tax	\$11,862

Tax Exempt Portion
0%

Petitioner's Statement :

Assessor's Report

Situation :

Abatement petition filed based on value.

Action :

The market was researched for comparable sales similar to the subject property.

Recommendation :

Upon further review, a reduction in value appears warranted.

ASSESSOR'S RECOMMENDED ADJUSTMENT

TYPE	OCC CODE	ASSESSOR'S ASSIGNED VALUE		RECOMMENDED VALUE		REVISED TAX WARRANT
		Actual Value	Assessed Value	Actual Value	Assessed Value	Tax Refund
REAL		L: \$76,200	\$5,450	L: \$76,200	\$5,450	\$3,860.11
		I: \$1,332,222	\$95,250	I: \$873,800	\$62,480	Revised Tax
TOTALS :		\$1,408,422	\$100,700	\$950,000	\$67,930	\$8,001.75

Gregory J Broderick
Appraiser

June 15, 2021
Date

Certified General Appraiser

PETITION FOR ABATEMENT OR REFUND OF TAXES

RECEIVED

County: Adams

Date Received _____
(Use Assessor's or Commissioners' Date Stamp)

MAR 02 2021

OFFICE OF THE
ADAMS COUNTY ASSESSOR

Section I: Petitioner, please complete Section I only.

Date: 3/1/2021
Month Day Year

Petitioner's Name: Ali Schwalb
Petitioner's Mailing Address: 1575 Galena St C105
Aurora CO 80010
City or Town State Zip Code

SCHEDULE OR PARCEL NUMBER(S)

0182334313006

R0094766

PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY

1720 Chester St
Aurora CO 80010

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for the property tax year 2020 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error, or overvaluation. Attach additional sheets if necessary.)

Petitioner's estimate of value:

\$ 785,000 (2020)
Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me, and to the best of my knowledge, information, and belief, is true, correct, and complete.

for Schwalb Daytime Phone Number (303) 364 1310
Petitioner's Signature

Agent's Signature* Daytime Phone Number ()

Email 1575galena@cobsgroup.com

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-116, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision, § 39-10-114.5(1), C.R.S.

Section II:

Assessor's Recommendation (For Assessor's Use Only)

	Tax Year _____		
	Actual	Assessed	Tax
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

☐ Assessor recommends approval as outlined above.

If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer, § 39-10-114(1)(a)(I)(D), C.R.S.

Tax year: _____ Protest? ☐ No ☐ Yes (If a protest was filed, please attach a copy of the NOD.)

☐ Assessor recommends denial for the following reason(s):

Assessor's or Deputy Assessor's Signature _____

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY

(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner
(Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	<u>Actual</u>	<u>Assessed</u>	<u>Tax</u>
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____

Date _____

Assessor's or Deputy Assessor's Signature _____

Date _____

Section IV: Decision of the County Commissioners
(Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said _____ Name

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (~~agrees--does not agree~~) with the recommendation of the Assessor, and that the petition be (~~approved--approved in part--denied~~) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
------	----------------	--------------------

Chairperson of the Board of County Commissioners' Signature _____

I, _____ County Clerk and Ex-Oficio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County

this _____ day of _____, _____
Month Year

County Clerk's or Deputy County Clerk's Signature _____

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V: Action of the Property Tax Administrator
(For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s): _____

Secretary's Signature _____

Property Tax Administrator's Signature _____

Date _____

Ken Musso
Assessor



Assessor's Office
4430 South Adams County Parkway
2nd Floor, Suite C2100
Brighton, CO 80601-8201
Phone 720-523-6038
Fax 720-523-6037
www.adcogov.org

BOARD OF COUNTY COMMISSIONERS

STIPULATION (As to Tax Year(s) 2019 & 2020 Actual Value(s))

1. The property subject to this Stipulation is:
Schedule No. (S): R0094766 Parcel NO.(S) 0182334313006

2. The subject property is classified as a Residential property.

3. The County Assessor originally assigned the following actual value to the subject property for tax year(s) 2019 & 2020 :


Land	\$76,200
Improvements	\$1,332,222
Total	\$1,408,422

4. The Adams County Assessor has reviewed this file and agrees to make the following adjustment to the valuation for the subject property for tax year(s) 2019 & 2020 :

Land	\$76,200
Improvements	\$873,800
Total	\$950,000

5. By entering into this agreement, the Petitioner understands that they are giving up rights to further appeal of the value of this property for tax year(s) 2019 & 2020 .

DATED this: June 9, 2021



Petitioner's Representative
Avi Schwalb

Gregory J. Broderick

Assessor Representative
Adams County Assessor's Office

Digitally signed by Gregory J. Broderick
DN: cn=Gregory J. Broderick,
o=Adams County, ou=Assessor's
Office,
email=gbroderick@adcogov.org, c=US
Date: 2021.06.09 16:49:54 -0600

**ASSESSOR'S RECOMMENDATION
BOARD OF COUNTY COMMISSIONERS**

Account No : R0094766
 Petition Year : 2020
 Owner Entity : Avi Schwalb
 Owner Address : 1575 Galena St. #C-105
 Owner City : Aurora
 Property Location :

Parcel No : 0182334313006
 Date Filed : March 2, 2021
 State : Colorado
 1720 Chester St. Aurora, CO 80010

TYPE	OCC CODE	PETITIONER'S REQUESTED VALUES		ASSESSOR'S ASSIGNED VALUES		ORIGINAL TAX WARRANT	
		Actual Value	Assessed Value	Actual Value	Assessed Value		
REAL		L: \$0	\$0	L: \$76,200	\$5,450	A. Ratio	7.15%
		I: \$0	\$0	I: \$1,332,222	\$95,250	Mill Levy	118.007
TOTALS :		\$785,000	\$56,130	\$1,408,422	\$100,700	Original Tax	\$11,883

Petitioner's Statement :

Value too High!

Assessor's Report

Situation :

Abatement petition filed based on value.

Action :

The market was researched for comparable sales similar to the subject property.

Recommendation :

Upon further review, a reduction in value appears warranted.

ASSESSOR'S RECOMMENDED ADJUSTMENT

TYPE	OCC CODE	ASSESSOR'S ASSIGNED VALUE		RECOMMENDED VALUE		REVISED TAX WARRANT
		Actual Value	Assessed Value	Actual Value	Assessed Value	Tax Refund
REAL		L: \$76,200	\$5,450	L: \$76,200	\$5,450	\$3,867.08
		I: \$1,332,222	\$95,250	I: \$873,800	\$62,480	Revised Tax
TOTALS :		\$1,408,422	\$100,700	\$950,000	\$67,930	\$8,016.22

Tax Exempt Portion
0%

Gregory J Broderick
 Appraiser

June 15, 2021
 Date

Certified General Appraiser

PETITION FOR ABATEMENT OR REFUND OF TAXES

County: Adams

Date Received _____
(Use Assessor's or Commissioners' Date Stamp)

Section I: Petitioner, please complete Section I only.

Date: 12/22/2020
Month Day Year

Petitioner's Name: Avi Schwalb
Petitioner's Mailing Address: 1875 Galena St. C105
Aurora CO 80010
City or Town State Zip Code

SCHEDULE OR PARCEL NUMBER(S)

R0094766

PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY

1720 Chester St.
Aurora CO 80010

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for property tax year(s) 2019 and 1 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error or overvaluation. Attach additional sheets if necessary.)

Petitioner's estimate of value:

\$785,000 (2019) and \$ _____
Value Year Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me, and to the best of my knowledge, information and belief, is true, correct, and complete.

[Signature]
Petitioner's Signature

Daytime Phone Number 303 364 1310

Email _____

By _____
Agent's Signature

Daytime Phone Number () _____

Printed Name: _____

Email _____

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-116, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision, § 39-10-114.5(1), C.R.S.

Section II:		Assessor's Recommendation (For Assessor's Use Only)					
		Tax Year _____			Tax Year _____		
		Actual	Assessed	Tax	Actual	Assessed	Tax
Original		_____	_____	_____	_____	_____	_____
Corrected		_____	_____	_____	_____	_____	_____
Abate/Refund		_____	_____	_____	_____	_____	_____
<input type="checkbox"/> Assessor recommends approval as outlined above.							
If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer, § 39-10-114(1)(a)(i)(D), C.R.S.,							
Tax year: _____ Protest?		<input type="checkbox"/> No		<input type="checkbox"/> Yes (If a protest was filed, please attach a copy of the NOD.)			
Tax year: _____ Protest?		<input type="checkbox"/> No		<input type="checkbox"/> Yes (If a protest was filed, please attach a copy of the NOD.)			
<input type="checkbox"/> Assessor recommends denial for the following reason(s):							
_____ Assessor's or Deputy Assessor's Signature							

OFFICE OF THE
ADAMS COUNTY ASSESSOR

MAR 02 2021

RECEIVED

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY

(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner

(Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	<u>Actual</u>	<u>Assessed</u>	<u>Tax</u>
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____ Date _____

Assessor's or Deputy Assessor's Signature _____ Date _____

Section IV: Decision of the County Commissioners

(Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said _____ Name

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (~~agrees--does not agree~~) with the recommendation of the Assessor, and that the petition be (~~approved--approved in part--denied~~) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
_____	_____	_____

Chairperson of the Board of County Commissioners' Signature _____

I, _____ County Clerk and Ex-Officio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County

this _____ day of _____, _____
Month Year

County Clerk's or Deputy County Clerk's Signature _____

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V: Action of the Property Tax Administrator

(For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s): _____

Secretary's Signature _____

Property Tax Administrator's Signature _____

Date _____

Ken Musso
Assessor



Assessor's Office
4430 South Adams County Parkway
2nd Floor, Suite C2100
Brighton, CO 80601-8201
Phone 720-523-6038
Fax 720-523-6037
www.adcogov.org

ABATEMENT

STIPULATION (As to Tax Year(s)) 2020 Actual Value(s))

1. The property subject to this Stipulation is:
Schedule No. (S): R0103239 Parcel NO.(S) 01825-08-3-00-047
2. The subject property is classified as a Vacant Land property.
3. The County Assessor originally assigned the following actual value to the subject property for tax year(s) 2020 :

Land	\$205,380
Improvements	\$0
Total	\$205,380
4. The Adams County Assessor has reviewed this file and agrees to make the following adjustment to the valuation for the subject property for tax year(s) 2020 :

Land	\$48,900
Improvements	\$0
Total	\$48,900
5. By entering into this agreement, the Petitioner understands that they are giving up rights to further appeal of the value of this property for tax year(s) 2020.

DATED this: June 23, 2021

Thomas E. Downey, Jr.
Petitioner's Representative
Thomas E. Downey, Jr. #9686
Attorney for Petitioner
303-813-1111
tom@downeylawpc.com

Pierre
Lescano
Assessor Representative
Adams County Assessor's Office

Digitally signed by Pierre Lescano
DN: cn=Pierre Lescano, o=Adams
County, ou=Adams County Assessor's
Office, email=plescano@adcogov.org,
c=US
Date: 2021.06.23 09:59:46 -0800

**ASSESSOR'S RECOMMENDATION
BOARD OF COUNTY COMMISSIONERS**

Account No : R0103239 Parcel No : 01825-08-3-00-047
 Petition Year : 2020 Date Filed : June 16, 2021
 Owner Entity : Bohn, Carol Hudak and Bohn, Eddie Arthur
 Owner Address : 5880 Lowell Blvd
 Owner City : Denver State : CO
 Property Location :

TYPE	OCC CODE	PETITIONER'S REQUESTED VALUES		ASSESSOR'S ASSIGNED VALUES		ORIGINAL TAX WARRANT	
		Actual Value	Assessed Value	Actual Value	Assessed Value		
REAL	530	L: \$48,900	\$14,180	L: \$205,380	\$59,560	A. Ratio	29.00%
		I: \$0		I: \$0	\$0	Mill Levy	123.003
TOTALS :		\$48,900	\$14,180	\$205,380	\$59,560	Original Tax	\$7,326

Tax Exempt Portion
0%

Petitioner's Statement :

Petitioner's agent referenced the previous 2019 BAA Stipulation to lower the 2020 assessed value.

Assessor's Report

Situation :

Values adjusted in system for 2019 but require a stipulation for 2020.

Action :

Create and send a stipulation for 2020.

Recommendation :

Reduction warranted.

ASSESSOR'S RECOMMENDED ADJUSTMENT

TYPE	OCC CODE	ASSESSOR'S ASSIGNED VALUE		RECOMMENDED VALUE		REVISED TAX WARRANT
		Actual Value	Assessed Value	Actual Value	Assessed Value	Tax Refund
REAL	530	L: \$205,380	\$59,560	L: \$48,900	\$14,180	\$5,581.88
		I: \$0	\$0	I: \$0	\$0	Revised Tax
TOTALS :		\$205,380	\$59,560	\$48,900	\$14,180	\$1,744.18

Pierre Lescano

Appraiser

June 25, 2021

Date

Ad Valorem Appraiser

PETITION FOR ABATEMENT OR REFUND OF TAXES

County: ADAMS

Date Received _____
(Use Assessor's or Commissioners' Date Stamp)

Section I: Petitioner, please complete Section I only.

Date: 06 16 2021
Month Day Year

Petitioner's Name: BOHN CAROL HUDAK & BOHN EDDIE ARTHUR

Petitioner's Mailing Address: 5880 Lowell Boulevard

Denver

CO

80221-1938

City or Town

State

Zip Code

SCHEDULE OR PARCEL NUMBER(S)
R0103239

PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY
A site on the East side of Lowell Boulevard,
North of I-76, Unincorporated Adams County, CO

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for the property tax year 2020 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error, or overvaluation. Attach additional sheets if necessary.) **- SEE ATTACHED -**

Petitioner's estimate of value: \$ 48,900 (2020)
Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me, and to the best of my knowledge, information, and belief, is true, correct, and complete.

Petitioner's Signature _____ Daytime Phone Number (____) _____
Email _____
By Thomas E. Downey, Jr. Daytime Phone Number (303) 813-1111
Agent's Signature* - Attorney for Petitioner Email tom@downeylawpc.com
Thomas E. Downey, Jr. #9686

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-116, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision, § 39-10-114.5(1), C.R.S.

Section II:

Assessor's Recommendation

(For Assessor's Use Only)

Tax Year _____

Actual

Assessed

Tax

Original _____

Corrected _____

Abate/Refund _____

☐ Assessor recommends approval as outlined above.

If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer, § 39-10-114(1)(a)(i)(D), C.R.S.

Tax year: _____ Protest? ☐ No ☐ Yes (If a protest was filed, please attach a copy of the NOD.)

☐ Assessor recommends denial for the following reason(s):

Assessor's or Deputy Assessor's Signature

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner

(Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	<u>Actual</u>	<u>Assessed</u>	<u>Tax</u>
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____

Date _____

Assessor's or Deputy Assessor's Signature _____

Date _____

Section IV:**Decision of the County Commissioners**

(Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (~~agrees--does not agree~~) with the recommendation of the Assessor, and that the petition be (~~approved--approved in part--denied~~) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
------	----------------	--------------------

Chairperson of the Board of County Commissioners' Signature _____

I, _____ County Clerk and Ex-Officio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County

this _____ day of _____, _____

Month Year

County Clerk's or Deputy County Clerk's Signature _____

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V:**Action of the Property Tax Administrator**

(For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s):

Secretary's Signature _____

Property Tax Administrator's Signature _____

Date _____

PETITION FOR ABATEMENT OR REFUND OF TAXES

County: ADAMS

Date Received 06/22/2021
(Use Assessor's or Commissioners' Date Stamp)

Section I: Petitioner, please complete Section I only.

Date: 06/22/2021
Month Day Year

Petitioner's Name: ADAMS COUNTY ON BEHALF OF WESTBOUND SOLAR
Petitioner's Mailing Address: 550 S TRYON ST UNIT DEC44P
CHARLOTTE NC 28202
City or Town State Zip Code

SCHEDULE OR PARCEL NUMBER(S)	PROPERTY ADDRESS OR LEGAL DESCRIPTION OF PROPERTY
<u>P0038060</u>	<u>14601 GRANT ST THORNTON, CO</u>

Petitioner requests an abatement or refund of the appropriate taxes and states that the taxes assessed against the above property for the property tax year 2020 are incorrect for the following reasons: (Briefly describe why the taxes have been levied erroneously or illegally, whether due to erroneous valuation, irregularity in levying, clerical error, or overvaluation. Attach additional sheets if necessary.)

ACCOUNT SHOULD HAVE BEEN STATE ASSESSED. THE STATE HAS SINCE ASSESSED IT AND SENT AN NOV.SEE ATTACHED.

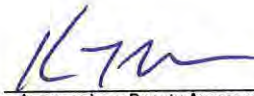
Petitioner's estimate of value: \$ 0.00 (2020)
Value Year

I declare, under penalty of perjury in the second degree, that this petition, together with any accompanying exhibits or statements, has been prepared or examined by me, and to the best of my knowledge, information, and belief, is true, correct, and complete.

Alma Reyes - Personal Property Daytime Phone Number (720) 523-6702
Petitioner's Signature Appraiser Email areyes@adcogov.org
By _____ Daytime Phone Number () _____
Agent's Signature* Email _____

*Letter of agency must be attached when petition is submitted by an agent.

If the Board of County Commissioners, pursuant to § 39-10-114(1), C.R.S., or the Property Tax Administrator, pursuant to § 39-2-116, C.R.S., denies the petition for refund or abatement of taxes in whole or in part, the Petitioner may appeal to the Board of Assessment Appeals pursuant to the provisions of § 39-2-125, C.R.S., within thirty days of the entry of any such decision, § 39-10-114.5(1), C.R.S.

Section II: Assessor's Recommendation (For Assessor's Use Only)		
Tax Year _____		
Actual	Assessed	Tax
Original	_____	_____
Corrected	_____	_____
Abate/Refund	_____	_____
<input checked="" type="checkbox"/> Assessor recommends approval as outlined above.		
If the request for abatement is based upon the grounds of overvaluation, no abatement or refund of taxes shall be made if an objection or protest to such valuation has been filed and a Notice of Determination has been mailed to the taxpayer, § 39-10-114(1)(a)(I)(D), C.R.S.		
Tax year: _____ Protest? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (If a protest was filed, please attach a copy of the NOD.)		
<input type="checkbox"/> Assessor recommends denial for the following reason(s):		
 <u>6/23/21</u> Assessor's or Deputy Assessor's Signature		

FOR ASSESSORS AND COUNTY COMMISSIONERS USE ONLY(Section III or Section IV must be completed)

Every petition for abatement or refund filed pursuant to § 39-10-114, C.R.S. shall be acted upon pursuant to the provisions of this section by the Board of County Commissioners or the Assessor, as appropriate, within six months of the date of filing such petition, § 39-1-113(1.7), C.R.S.

Section III: Written Mutual Agreement of Assessor and Petitioner

(Only for abatements up to \$10,000)

The Commissioners of _____ County authorize the Assessor by Resolution No. _____ to review petitions for abatement or refund and to settle by written mutual agreement any such petition for abatement or refund in an amount of \$10,000 or less per tract, parcel, or lot of land or per schedule of personal property, in accordance with § 39-1-113(1.5), C.R.S.

The Assessor and Petitioner mutually agree to the values and tax abatement/refund of:

	Tax Year _____		
	<u>Actual</u>	<u>Assessed</u>	<u>Tax</u>
Original	_____	_____	_____
Corrected	_____	_____	_____
Abate/Refund	_____	_____	_____

Note: The total tax amount does not include accrued interest, penalties, and fees associated with late and/or delinquent tax payments, if applicable. Please contact the County Treasurer for full payment information.

Petitioner's Signature _____ Date _____

Assessor's or Deputy Assessor's Signature _____ Date _____

Section IV: Decision of the County Commissioners

(Must be completed if Section III does not apply)

WHEREAS, the County Commissioners of _____ County, State of Colorado, at a duly and lawfully called regular meeting held on ____/____/____, at which meeting there were present the following members:

Month Day Year

with notice of such meeting and an opportunity to be present having been given to the Petitioner and the Assessor of said County and Assessor _____ (being present--not present) and

Petitioner _____ (being present--not present), and WHEREAS, the said

County Commissioners have carefully considered the within petition, and are fully advised in relation thereto, NOW BE IT RESOLVED that the Board (~~agrees--does not agree~~) with the recommendation of the Assessor, and that the petition be (~~approved--approved in part--denied~~) with an abatement/refund as follows:

Year	Assessed Value	Taxes Abate/Refund
------	----------------	--------------------

Chairperson of the Board of County Commissioners' Signature _____

I, _____ County Clerk and Ex-Officio Clerk of the Board of County Commissioners in and for the aforementioned county, do hereby certify that the above and foregoing order is truly copied from the record of the proceedings of the Board of County Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County

this _____ day of _____, _____

Month Year

County Clerk's or Deputy County Clerk's Signature _____

Note: Abatements greater than \$10,000 per schedule, per year, must be submitted in duplicate to the Property Tax Administrator for review.

Section V: Action of the Property Tax Administrator

(For all abatements greater than \$10,000)

The action of the Board of County Commissioners, relative to this petition, is hereby

☐ Approved ☐ Approved in part \$ _____ ☐ Denied for the following reason(s): _____

Secretary's Signature _____

Property Tax Administrator's Signature _____

Date _____

ABATEMENT FOR TAX YEAR:		2020	
TODAYS DATE		06/22/21	
BUSINESS NAME:	WESTBOUND SOLAR LLC		
ACCOUNT NUMBER:	P0038060		
PARCEL NUMBER:			
	ACTUAL	ASSESSED	MILL
	VALUE	VALUE	LEVY
ORIGINAL VALUE	\$5,473,915	\$1,587,440	111.562
REVISED VALUE	\$0	\$0	111.562
ABATED VALUE	\$5,473,915	\$1,587,440	111.562
<p>Provide your reason for the Abatement/Added in the space below:</p> <p>THIS ACCOUNT SHOULD HAVE BEEN STATE ASSESSED. THE STATE HAS SINCE ASSESSED IT AND SENT AN NOV.</p>			
<p>ADDED ASSESSMENT FOR TAX YEAR: <input type="text"/></p>			
BUSINESS NAME:			
ACCOUNT NUMBER:			
PARCEL NUMBER:			
	ACTUAL	ASSESSED	MILL
	VALUE	VALUE	LEVY
ORIGINAL VALUE		\$0	
REVISED VALUE		\$0	0
ADDED VALUE	\$0	\$0	0



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Café Lease for Culinary Services within the Pete Mirelez Human Services Center
FROM: Raymond H. Gonzales, County Manager Alisha Reis, Deputy County Manager Nicci Beauprez, Project Manager of Land & Assets – Facilities & Fleet Management
HEARD AT STUDY SESSION ON: PH 6/29/2021
AUTHORIZATION TO MOVE FORWARD: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners Approves the Adams County Colorado Lease Agreement for a portion of the Pete Mirelez Human Services Center located at 11860 Pecos Street, Westminster, CO 80033

BACKGROUND:

Adams County (County) owns 11860 Pecos Street in Westminster Colorado known as its Pete Mirelez Human Services Center (HSC). The Adams County Human Services Department Workforce Business Center Temporary Assistance for Needy Families presented to the Board of County Commissioners (BOCC), and the BOCC approved on June 29th, 2021 an agreement with Work Options for Women doing business as Work Options (WO) to provide Culinary Training and Internship Program services (the CTIP Agreement). As required by the CTIP Agreement, this Lease secures space needed for providing training through various stations to enrich each student with skills in the culinary field in County's vacant café space on the 2nd floor of the HSC through July 2023, according to the terms and conditions of the attached Adams County Colorado Lease Agreement for a portion of the Pete Mirelez Human Services Center located at 11860 Pecos Street, Westminster, CO 80033.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

County Manager's Office,
Human Services Department Workforce Business Center Temporary Assistance for Needy Families,
Facilities & Fleet Management,
County Attorney's Office

ATTACHED DOCUMENTS:

Resolution
Lease Agreement

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 15**Cost Center: 100005007000**

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:	Various		10
Total Revenues:			10

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:			
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			0

New FTEs requested: ☐ YES ☐ NO

Future Amendment Needed: ☐ YES ☐ NO

Additional Note:

Additional rent payments are dependent on sales as stated in the lease agreement.

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING ADAMS COUNTY COLORADO LEASE
AGREEMENT FOR A PORTION OF THE PETE MIRELEZ HUMAN SERVICES
CENTER LOCATED AT 11860 PECOS STREET, WESTMINSTER, CO 80033
BETWEEN WORK OPTIONS FOR WOMEN AND ADAMS COUNTY

Resolution 21-

WHEREAS, Adams County (County) owns 11860 Pecos Street in Westminster Colorado known as its Pete Mirelez Human Services Center (HSC); and,

WHEREAS, The Adams County Human Services Department Workforce Business Center Temporary Assistance for Needy Families presented to the Board of County Commissioners (BOCC), and the BOCC approved on June 29th, 2021 an agreement with Work Options for Women doing business as Work Options (WO) to provide Culinary Training and Internship Program services (the CTIP Agreement); and,

WHEREAS, As required by the CTIP Agreement, this Lease secures space needed for providing training through various stations to enrich students' skills in the culinary field; and,

WHEREAS, County wishes to Lease to WO, and WO wishes to lease from County through July 2024, the premises according to the terms and conditions of the attached.

NOW THEREFORE BE IT RESOLVED, by the Board of County Commissioners of the County of Adams, State of Colorado, that the Adams County Colorado Lease Agreement for a portion of the Pete Mirelez Human Services Center located at 11860 Pecos Street, Westminster, CO 80033 with Work option for Women for Cafe Space at its Human Services Center, a copy of which is attached hereto, be and hereby is approved.

BE IT FURTHER RESOLVED that the Chair is authorized to execute said Adams County Colorado Lease Agreement for a portion of the Pete Mirelez Human Services Center located at 11860 Pecos Street, Westminster, CO 80033 on behalf of Adams County.

ADAMS COUNTY, COLORADO
LEASE AGREEMENT FOR A PORTION OF THE PETE MIRELEZ HUMAN
SERVICES CENTER LOCATED AT 11860 PECOS STREET, WESTMINSTER,
CO 80033

THIS LEASE AGREEMENT ("Lease") is entered into this 1ST day of AUGUST 2021, by and between the Board of County Commissioners of Adams County, State of Colorado, located at 4430 S. Adams County Parkway, Brighton, Colorado 80601, hereinafter referred to as "Landlord" or "County," and Work Options for Women, dba Work Options, located at 1200 Federal Blvd, Denver, CO 80204, hereinafter referred to as "Tenant."

WHEREAS, Landlord is a local governmental entity that provides various social services the community, and Landlord owns and operates a building for the provision of said social services named the Pete Mirelez Human Services Center, located at 11860 Pecos Street, Westminster, CO 80033; and,

WHEREAS, Tenant is a non-profit corporation that provides job training to Adams County residents, funded in part with a Temporary Assistance to Needy Families ("TANF") grant administered by Landlord; and,

WHEREAS, pursuant to the terms of this Lease, Landlord wishes to lease to Tenant, and Tenant wishes to lease from Landlord, the café at the Pete Mirelez Human Services Center for job training in Tenant's Culinary Training and Internship Program ("CTIP").

NOW, THEREFORE, for the consideration hereinafter set forth, the Parties agree as follows:

1. **Premises.** Landlord agrees to lease to Tenant, and Tenant agrees to rent from Landlord, the café at the Pete Mirelez Human Services Center known as Suite 3501A and 3501B (the "Premises") located at 11860 Pecos Street, Westminster, CO 80033, and depicted on the attached Exhibit 1. Subject to availability, Tenant may also have the use of such classrooms and storage space in the Pete Mirelez Human Services Center as assigned by Landlord. Tenant shall also be assigned office space within the Pete Mirelez Human Services Center, subject to availability. If office space is dedicated within the Community Partners Suite, Tenant will be one of a number of tenants allowed to occupy space in the Community Partners Suite, and Tenant and its co-tenants shall be apportioned space in the Community Partners Suite as deemed appropriate by Landlord, subject to the needs of Tenant's program and the programmatic and space needs of Landlord.

2. **Term.** This Lease shall commence on Aug. 1, 2021, and shall be for a term of three years but shall not exceed the term of the CTIP agreement. The Landlord, in its sole discretion, may offer to extend the term of the Lease for an additional two-year term. In the event Tenant continues to occupy the Premises after the expiration of the initial or extension term, such tenancy shall be month-to-month and may be terminated

by either Party upon thirty days written notice. With the exception of the café, Tenant is not guaranteed, nor shall have any expectation, of receiving the same space in the Premises from one Lease term to the next. **Early termination option:** Either party may terminate this Lease upon ninety-days prior written notice to the other party provided the other terms of the Lease have been adhered to. Upon such termination, neither Landlord nor Tenant shall have any further rights, estates, or liabilities under this Lease accruing after the effective date of termination, except for such obligations that expressly survive the termination of the Lease.

3. Rent. In consideration of this Lease, Tenant shall pay base rent of ten dollars per year. In the event Tenant's café sales exceed \$350,000 (three hundred fifty thousand dollars) in any given year, Tenant shall pay Landlord as additional rent 5% (five percent) of any gross sales in excess of the first three hundred fifty thousand dollars. Tenant shall provide records as requested by Landlord to audit Tenant's café sales. It is an express condition and requirement of this Lease that Tenant use the café and other space provided by Landlord for CTIP. A copy of the CTIP agreement is attached as Exhibit 2. As the primary consideration for this Lease, Tenant agrees to continue providing the services set forth in Exhibit 2 and complying with Section 5, below. Tenant's failure to provide said services shall be considered tantamount to a failure to pay rent and a material breach of this Lease.

4. Security Deposit. No security deposit is being required for this Lease.

5. Use of the Property. It shall be a material term of this Lease that Tenant shall use the Premises depicted in Exhibit 1 and other classroom, office, and storage space made available by Landlord only for the provision of services outlined in Exhibit 2. In the event Tenant uses the Premises for purposes inconsistent with Exhibit 2, Landlord may, at its sole discretion, terminate this Lease and evict Tenant as provided in Section 7, below.

Tenant may only access the Premises during normal business hours for the Pete Mirelez Human Services Center, subject to change by the Landlord. Provided Tenant can access the café space an hour before, the café shall be in operation from 7am to 1:30pm, unless later approved in writing by both parties as to alternate or off-hour access, and Tenant may choose to close the café each day for up to, but not longer than, 1 hour to meet program needs (example: staff meal period). Tenant shall have the use of Landlord's equipment in the café listed on Exhibit 3. All Landlord owned equipment shall be returned at the end of the Lease in a state reasonably similar to that existing at commencement of the Lease, normal wear and tear excepted. Any equipment damaged by Tenant beyond normal wear and tear shall be replaced by Tenant at Tenant's sole expense. Tenant shall, at Tenant's sole expense, clean and maintain Landlord's commercial dishwasher in compliance with manufacturer directions, which shall be supplied to Tenant by Landlord. Landlord shall, at its sole expense, repair any damage to its equipment caused in the normal course of business. Tenant shall, at Tenant's sole expense, clean and maintain the café, including the kitchen and dining area in a state that is in compliance with health department rules and that is sanitary and appealing to patrons. Tenant shall be solely responsible for promptly remedying any health

department violations. However, Landlord will provide, at its sole expense, one daily cleaning of the dining/patio area as part of Landlord's daily building cleaning. Tenant shall be responsible for removing the trash from the Premises and depositing its trash in the area designated by Landlord. Tenant shall coordinate any signs and use of dining area monitors with Landlord.

Tenant shall comply with Landlord's building use guidelines, attached as Exhibit 4, and with such other rules and restrictions imposed by Landlord. Badge access to the Premises and to restricted areas of the Pete Mirelez Human Services Center shall be as determined by Landlord based on Tenant's programmatic needs, and subject to such background checks and other security concerns as Landlord deems relevant.

Tenant shall not alter the Premises without the written authorization of Landlord. Any provided classroom and office space are part have been finished and furnished by Landlord as part of the overall building design, including Landlord providing workstations, desks, chairs, and other customary office/classroom furniture. Tenant may undertake such minor decoration and reconfiguration of provided furniture as it deems appropriate for the provision of its services, subject to the final written approval of Landlord. At the end of this Lease, any improvements to the Premises shall become the property of Landlord.

Tenant shall not allow any encumbrance or lien to be placed against the Premises and shall indemnify Landlord for the costs, including attorney fees, associated with removing any lien or encumbrance caused by Tenant and for any other damages caused by the lien or encumbrance. The parties do not anticipate Tenant undertaking any improvements that would require governmental permits, but in the event, such need arises, Tenant shall be responsible for obtaining, at its sole cost, such permits. Tenant shall have access to the shared employee breakroom, bathrooms associated with or adjacent to the Premises, and parking for staff and clients. Tenant shall not have access to the employee fitness center, the employee clinic/health center, or other facilities and areas Landlord determines, in its sole discretion, are meant for Landlord's employee use only. Tenant's employees shall comply with all County building use policies and other county standards applicable to the Premises. Tenant shall be responsible for conducting background checks on its employees. It is expressly prohibited for Tenant to invite its students or anyone into shared office space or storage without written approval from Landlord. Any such invitation may also require pre-screening including background checks and allowance is solely in the Landlord's discretion.

Tenant shall be allowed to park a rotisserie food truck class vehicle upon Landlord's parking lot. This allowance may be cancelled at any time if the parking adversely impacts Landlord's operations, is prohibited by the property owner's association, or violates association rules, or if the use is not allowed by governmental authorities. Landlord reserves the right to terminate permission for the food truck. If Landlord terminates food truck permission Landlord must provide Tenant with 90 days written notice to remove the truck. After written approval by Landlord, Tenant shall pay for any costs associated with installing, maintaining, and providing utilities for the food truck. Tenant agrees that food truck parking is at its own risk. Landlord makes no representation to protect

Tenant's property or keeping Tenant's property secure. Parking does not authorize use as a vendor. Tenant must obtain any additional approvals needed from Landlord, owner's association, and governmental authorities before selling food from the food truck

6. Utilities and Miscellaneous Building Services. Landlord shall be responsible for paying all utility costs associated with the Premises, including phone service, electricity, and heat/air conditioning. Landlord shall provide access to the internet, but Tenant and its co-tenants shall be responsible for obtaining and paying their own internet service provider. Tenant shall be responsible for providing its own computers, printers, and other IT devices. Landlord, at its cost, shall provide snow removal, maintenance, building (outside café and dining areas) trash removal, and security services. Tenant shall be responsible for any damage caused by its employees, clients, and visitors beyond ordinary wear and tear. Tenant, and its co-tenants, shall, at their sole cost, be responsible for providing and maintaining any copier(s) they deem appropriate and for providing any office supplies, including, but not limited to, copier paper, pens/pencils, envelopes, post-it notes, and other customary office supplies. Tenant, and its co-tenants, shall share the cost of any reception desk personnel or other joint personnel said Tenant and co-tenants deem appropriate.

7. Eviction. Tenant may be evicted pursuant to Colorado statutes if Tenant does not comply with all of the terms of this Lease and for all other causes allowed by law. Tenant must pay all costs, including reasonable attorney fees, related to the eviction and the collection of any monies owed the Landlord, along with the cost of re-entering, cleaning, and repairing the Premises.

8. Non-Compliance by Tenant. If Tenant fails to comply with the terms of this Lease, Landlord may take any reasonable action to enforce Landlord's rights and remedies under this Lease and Colorado state law and charge the reasonable costs, including reasonable attorney fees, to the Tenant. Failure to pay such additional charges shall be a violation of this Lease.

9. Care of Premises. Tenant has examined the Premises and is satisfied with its present physical condition. Landlord makes no warranties or representations about the habitability of the Premises or its fitness for a particular purpose. Tenant accepts the Premises in its "as is" condition. Landlord agrees to maintain the interior and exterior of the Premises in as good condition as it is at the start of this Lease except for ordinary wear and tear. Landlord shall be responsible for the routine maintenance of the mechanical systems, including, but not limited to, heating, plumbing, air conditioning, and electrical. Landlord shall be responsible for the repair of all structural damage to or defects in the Premises, as well as for the routine repair to or defects in the mechanical systems, including their replacement as necessitated by damage or obsolescence. Tenant must pay for all repairs, replacements, and damages caused by the act or neglect of Tenant, Tenant's employees, and Tenant's visitors, but Landlord shall perform such repair/replacement work or contract for the same at Tenant's sole cost. Tenant shall be solely responsible for maintaining its property and equipment. Tenant shall remove all of Tenant's property at the end of this Lease. Any Property that is left shall become the property of Landlord and may be discarded.

10. Repairs by Landlord. Landlord has no duty to repair the Premises if the Premises is partially or completely destroyed. In the event of complete destruction of the Premises, the parties shall work in good faith to determine whether the Premises should be re-constructed, as well as the terms for any re-construction.

11. Alterations. Tenant shall obtain the Landlord's prior written consent to alter, improve, remodel or refurbish the Premises. Alterations, additions, and improvements become the Landlord's property upon termination of this Lease.

12. Compliance with Laws and Hazardous Use. Tenant must comply with laws, orders, rules, and requirements of governmental authorities, and insurance companies which have issued or are about to issue policies covering the Premises and/or its contents. Tenant will not keep anything on the Premises which is dangerous, flammable, explosive, or that might increase the danger of fire or any other hazard. There shall be no waste disposal or dumping on the Premises, including the disposal or storage of construction materials. CO2 for fountain drinks and butane for small portable devices are allowed, subject to applicable storage, use, and disposal requirements.

13. Indemnification. Tenant hereby indemnifies and holds Landlord, Landlord's elected officials, officers, directors, agents, employees, successors and assigns (collectively, "Landlord's Indemnified Parties") harmless from and against any and all Losses arising from: (i) the negligence or willful acts of Tenant or its agents, employees, or contractors occurring in the Building or the Premises; and/or(ii) the presence of hazardous materials in, on, under, or around the Building or the Premises to the extent such hazardous materials were brought upon or used by Tenant in the Building or the Premises. Notwithstanding the foregoing, Tenant shall have no liability for any Losses under this Section 13 to the extent such Losses are caused by Landlord's gross negligence or willful misconduct. In the event any action or proceeding shall be brought against Landlord's Indemnified Parties by reason of any such claim, Tenant shall defend the same at Tenant's expense by counsel reasonably approved by Landlord.

14. No Waiver by Landlord. Landlord does not give up any rights by failing to enforce any terms of this Lease.

15. Assignment and Subleasing. Tenant shall not assign or sublease the Premises without the prior written consent of the Landlord.

16. Entry by Landlord. Upon reasonable notice, Landlord may enter the Premises to inspect it or to protect Landlord's rights pursuant to this Lease. In the case of an emergency or the Tenant's absence, the Landlord may enter the Premises without Tenant's consent.

17. Notice. Any notices given under this Agreement are deemed to have been received and to be effective: 1) three (3) days after the same shall have been mailed by certified mail, return receipt requested; 2) immediately upon hand delivery; or 3)

immediately upon receipt of confirmation that a facsimile was received. For the purposes of this Agreement, any and all notices shall be addressed to the contacts listed below:

For Landlord:

Director of Human Services Center
11860 N Pecos Street
Westminster, CO 80234

Director of Facilities & Fleet Management
4430 S. Adams County Parkway
Brighton, CO 80601
Phone: 720-523-6003
Facsimile: 720-523-6008

And

Project Manager of Land & Assets
4430 S. Adams County Parkway
Brighton, CO 80601
Phone: 720-523-6060
Facsimile: 720-523-6008

Copy to:

County Attorney's Office
4430 S. Adams County Parkway
Brighton, CO 80601
Phone: 720-523-6116
Fax: 720-523-6114

For Tenant:

Work Options for Women dba Work Options
1200 Federal Blvd.
Denver, CO 80204

Attention: JULIE STONE
Phone: 720-601-8032

Facsimile: _____

18. Quiet Enjoyment. Tenant may use the Premises without interference, subject to the terms of this Lease, and subject to its co-tenants' use of the Premises.

19. Jurisdiction and Venue. The laws of the State of Colorado shall govern as to the interpretation, validity, and effect of this Lease. The Parties agree that jurisdiction and venue for any disputes arising under this Lease Agreement shall be in Adams County, Colorado.

20. Injury or Damage. Tenant shall be solely responsible for any injury or damage caused by the act or neglect of Tenant, Tenant's employees, and Tenant's visitors. Landlord is not responsible for any injury or damage unless due to the gross negligence of Landlord.

21. Integration of Understanding. This Lease contains the entire understanding of the Parties hereto and the rights and obligations contained therein may be changed, modified, or waived only by an instrument in writing signed by the Parties hereto.

22. Paragraph Headings. Paragraph headings are inserted for the convenience of reference only.

23. Parties Interested Herein. Nothing expressed or implied in this Lease is intended or shall be construed to confer upon or to give to any person other than the Parties any right, remedy, or claim under or by reason of this Lease. All covenants, terms, conditions, and provisions in this Lease shall be for the sole and exclusive benefit of Tenant and Landlord.

24. Severability. If any provision of this Lease is determined to be unenforceable or invalid for any reason, the remainder of this Lease shall remain in effect, unless otherwise terminated in accordance with the terms contained herein.

25. Authorization. Each party represents and warrants that it has the power and ability to enter into this Lease, to grant the rights granted herein, and to perform the duties and obligations herein described.

26. Insurance: The Tenant agrees to maintain insurance of the following types and amounts:

Commercial General Liability Insurance: to include products liability, completed operations, contractual, broad form property damage and personal injury.

Each Occurrence	\$1,000,000
General Aggregate	\$2,000,000

Comprehensive Automobile Liability Insurance: to include all motor vehicles owned, hired, leased, or borrowed.

Bodily Injury/Property Damage \$1,000,000 (each accident)

Workers' Compensation Insurance: Per Colorado Statutes

Professional Liability Insurance: to include coverage for damages or claims for damages arising out of the rendering, or failure to render, any professional services.

Each Occurrence \$1,000,000

This insurance requirement applies only to Tenants who are performing services under this Agreement as professionals licensed under the laws of the State of Colorado, such as physicians, lawyers, engineers, nurses, mental health providers, and any other licensed professionals.

Adams County as "Additional Insured": The Tenant's commercial general liability, comprehensive automobile liability, and professional liability insurance policies and/or certificates of insurance shall be issued to include Adams County as an "additional insured," and shall include the following provisions:

Underwriters shall have no right of recovery or subrogation against the County, it being the intent of the parties that the insurance policies so effected shall protect both parties and be primary coverage for any and all losses resulting from the actions or negligence of the Tenant.

The insurance companies issuing the policy or policies shall have no recourse against the County for payment of any premiums due or for any assessments under any form of any policy.

Any and all deductibles contained in any insurance policy shall be assumed by and at the sole risk of the Tenant.

Licensed Insurers: All insurers of the Tenant must be licensed or approved to do business in the State of Colorado. Upon failure of the Tenant to furnish, deliver and/or maintain such insurance as provided herein, this Agreement, at the election of the County, may be immediately declared suspended, discontinued, or terminated. Failure of the Tenant in obtaining and/or maintaining any required insurance shall not relieve the Tenant from any liability under this Agreement, nor shall the insurance requirements be construed to conflict with the obligations of the Tenant concerning indemnification.

Endorsement: Each insurance policy herein required shall be endorsed to state that coverage shall not be suspended, voided, or canceled without thirty (30) days prior written notice by certified mail, return receipt requested, to the County.

Tenant shall be solely responsible for obtaining insurance for any of its personal property located on the Premises and for any loss or damage to its personal property.

(INTENTIONALLY LEFT BLANK)

IN WITNESS WHEREOF, the Parties hereto have caused their names to be affixed hereto.

LANDLORD:
BOARD OF COUNTY COMMISSIONERS
ADAMS COUNTY, COLORADO

Chair

Date

ATTEST:
JOSH ZYGIELBAUM
CLERK AND RECORDER

APPROVED AS TO FORM:

Deputy Clerk

Adams County Attorney's Office

TENANT:
WORK OPTIONS FOR WOMEN

Name: Julie Stone

Date 7/15/2021



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Resolution Amending the Adams County Open Space Policies and Procedures and Bylaws
FROM: J. Byron Fanning, Jr., Mary Willis, and Rae-Anne Reichow
AGENCY/DEPARTMENT: Parks, Open Space and Cultural Arts
HEARD AT STUDY SESSION ON: July 20, 2021
AUTHORIZATION TO MOVE FORWARD: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners Approves changes

BACKGROUND:

Staff presented the Spring 2021 updates to the Policies and Procedures and the Open Space Bylaws. During the study session, the BOCC agreed to the updates to the policies and procedures and bylaws.

Amendments to the Adams County Open Space Policies and Procedures

Page 4, Paragraph 2 (Introduction)

Adams County citizens passed an Open Space Tax on November 2, 1999, and reauthorized it on November 2, 2004, to be extended until December 31, 2026. The voter approved issue called for 68% of the proceeds from the tax to be distributed to eligible jurisdictions by a grant process. The Open Space "Tax Issue" also provides for 30% of the funds to be returned to the Cities and County based on a formula of where the tax is collected. Two percent may be used for administrative purposes. Adams County Open Space Sales Tax funds are subject to an annual independent audit.

At an election on November 3, 2020, Adams County citizens then approved permanently extending the existing county wide sales tax of one-fourth of one percent (one-fourth penny per dollar) for the continued purpose of preserving open space and creating and maintaining parks and recreation facilities.

Page 5, Paragraph 3 (30% Share Back Program)

The Share back Program distributes a portion of Open Space Sales Tax revenues directly back to the taxing jurisdiction for use on either passive or active projects. The share back is distributed as described in ~~Section 8, b (iii) of Resolution 99-1 (Appendix A):~~ Section 7(b)(iii) of Resolution 2020-480: "After

payment of the administrative fee, thirty percent (30%) of the remaining Open Space Sales Tax collected shall be automatically returned to the cities, towns and unincorporated area of Adams County in the same proportion as is the ratio of Open Space Sales Tax collected within the city, town or unincorporated area to the total County sales tax collections, as computed from information provided by the Colorado Department of Revenue. This money may be used by the jurisdiction for either active or passive uses but shall not be used to augment existing parks and open space budgets”.

Page 5, Paragraph 6 (Eligible Expenses)

As stated in ~~Resolution 99-1 (Appendix A)~~ 2020-480 Section 7 (c) (iv), “no land or interests acquired with revenues of the Open Space Sales Tax may be sold, leased, traded, or otherwise conveyed, nor may an exclusive license or permit on such land or interests be given, without the approval of such action by the Board of County Commissioners”.

Page 6, Paragraph 6 (Grant Cycle Timeline)

~~Grant cycles occur twice each year in March and September. For a more detailed grant cycle schedule, visit www.adcogov.org/openspaceor or contact Open Space Sales Tax Program Staff.~~

Grant cycles occur twice each year in March and September. For a more detailed grant cycle schedule, visit www.adcogov.org/open-space-grant-information or contact Open Space Sales Tax Grant Program staff.

Page 8, Paragraph 1 (Eligible Project Types)

The following is a list of eligible projects for the Adams County Open Space Sales Tax Grant Program. This list comes from ~~Resolution 99-1 (Appendix A)~~ Resolution 2020-480 7-(c). If a prospective project is not directly related to one of these items, please contact Open Space staff for further discussion. Adams County Open Space Sales Tax funds in the grant program can be used for:

Page 13, Paragraph 1 (Specific Requirements of Land Acquisitions)

To meet the intent of ~~Resolution 2020-480 7-(e)~~, Resolution 2020-480 7-(c), land purchased with Open Space sales tax dollars with passive funds will be encumbered to perpetually protect the passive uses of the property.

Page 13, Paragraph 4 (Applying to the Program)

- ~~• Passive Project applications are for uses defined in Resolution 99-1, Section C, (ii), see Glossary of Terms, page 17.~~
- ~~• Active Project applications are for uses defined in Resolution 99-1, Section C, (iii), see Glossary of Terms, page 17.~~
- ~~• Mini Grant applications are for uses defined in either of the above sections but are geared towards smaller scale projects. A project is determined to be a Mini Grant if the total amount of the grant request does not exceed \$5,000. Funding for mini grants is limited to \$50,000 per year. The Mini Grant is also limited to one application per applicant, per grant cycle. Mini Grants are subject to the same requirements as both the Active and Passive Grants.~~
- The terms Passive and Active are only used for internal purposes.
- Mini Grant applications are for uses defined in either of the above sections but are geared towards smaller scale projects. A project is determined to be a Mini-Grant if the total amount of the grant request does not exceed \$25,000. Funding for mini grants is limited to \$50,000 per year. The Mini Grant is also limited to one application per applicant, per grant cycle.

Page 14, Paragraph 2 (Submission Requirements)

~~Applications must be made on the pertinent Application Form. See the current Application Form for the number of completed application and all attachments that are required for submittal. Mail or deliver application to Adams County Parks & Open Space, 9755 Henderson Road, Brighton, Colorado 80601. Applications must arrive no later than 4:30 p.m. of the specified grant application deadline date. No material will be accepted after the deadline date with the exception of additional materials or documentation requested by the Open Space staff, the OSAB or the BoCC.~~
Applications must be submitted online during the spring and fall grant cycles. Applications are submitted online at www.adcogov.org/open-space-grant-information. No applications will be accepted after the deadline date, with the exception of additional documentation requested by the Parks, Open Space and Cultural Arts Staff, the OSAB, or the BoCC.

Page 14, Paragraph 6 (Matching Funds)

~~All projects must leverage the funds being requested of the Open Space Grant Program. For passive applications, applicants must provide a minimum of 30% of the total project costs toward the project. For active applications, a minimum of 40% must be provided. Applicants must provide a minimum of 30% of the total project costs toward the project. Any additional funds brought toward the project will be considered favorably by the OSAB during their evaluation.~~

Page 15, Paragraph 2 (Application Criteria and Scoring)

Other factors favorably considered by the OSAB when included in an applicant's answers to the existing questions on the grant application:

- Inclusivity of projects for people of all abilities
- Measured water efficiency
- Measured energy conservation
- Facility maintenance
- Use of recycled material
- Use of sustainable materials in construction, when possible
- Use of native/Colorado appropriate species

Page 16, Paragraph 1 (After Grant Award)

~~"Funds were awarded from proceeds of the Adams County Open Space Sales Tax, which was passed by Adams County voters in 1999, and reauthorized in November, 2004 to be extended until December 31, 2026 and reauthorized for a permanent extension on November 3, 2020."~~

Page 16, Paragraph 4 (Project Extension Policy)

~~Requests for extension must be received prior to the project due date, preferably one month prior to the project due date. A sample Extension Request form is included as Appendix B but may be updated at any time. now available on the website at <https://www.adcogov.org/open-space-grant-information> under "Required Forms". Forms may be updated at any time.~~

Page 17, Paragraph 2 (Project Modification Policy)

~~If it is deemed necessary, the Grantee must submit a Modification Request form to Adams County Open Space staff. A sample Modification Request form is included as Appendix C but may be updated at any time. As such, Grantee should confirm with Open Space staff the correct form to submit for their request. A sample Modification form is available on the website at <https://www.adcogov.org/open-space-grant-information> under "Required Forms". Forms may be updated at any time.~~

School playgrounds funded by the Open Space Tax must post the hours that the play areas are open to the public. Example: Playground is closed while school is in session from 8 am to 2pm. Playground is open to the public from 3:30 p.m. time to 8:00 p.m.

Page 20, Paragraph 1 (Reporting Following Closeout)

As stated in ~~Resolution 99-1~~, Resolution 2020-480 “no land or interests acquired with revenues of the Open Space Sales Tax may be sold, leased, traded, or otherwise conveyed, nor may an exclusive license or permit on such land or interests be given, without the approval of such action by the Board of County Commissioners”.

Page 20, Paragraph 4 (Glossary of Terms)

ACTIVE USE: Lands for park purposes and other recreational uses such as sports fields, golf courses and recreation centers. Park purposes shall be defined as the construction, equipping, acquisition and maintenance of park and recreational improvements and facilities for the use and benefit of the public. (~~Source: Resolution 99-1, Section C, item iii, Appendix A~~)-(Source: Resolution 2020-480, Section 7 (b)(iv)(2)(B), item iii)

Page 20, Paragraph 5 (Glossary of Terms)

PASSIVE USE: Passive uses shall include, but not be limited to the purchase, construction and maintenance of: horse, bike or running trails; natural areas with limited development for fishing, hiking, walking or biking; wildlife preserves; lakes for fishing with accessible walks, docks, picnic areas and restrooms; conservation easements on agricultural land; environmental education programs; lands and waterways as community buffers; river and stream corridor land; unimproved flood plains; wetlands; preservation of cemeteries; and picnic facilities. (~~Source: Resolution 99-1, Section C, item iii, Appendix A~~)-(Source: Resolution 2020-480, Section 7 (b)(iv)(2)(B), item iii)

Amendments to the Open Space Bylaws

Page 1 (ARTICLE II – PURPOSE)

B. To implement the provisions as detailed in ~~Resolution 99-1~~Resolution 2020-480 as adopted by the Board of County Commissioners.

Pages 2-3

Chairperson and Vice Chairperson updated to Chair and Vice Chair.

Page 3, Paragraph 2

Secretary: ~~Parks and Open Space~~ Parks, Open Space and Cultural Arts staff shall serve as Secretary, but shall not sit as an Officer of the Board and shall not have voting privileges. In addition to other assigned duties, the Secretary shall prepare the minutes for public meetings.

Page 4, Paragraph 2

In making recommendations to the Board of County Commissioners, the Board shall abide by Section ~~Resolution 99-1~~ 7. C. of Resolution 2020-480, which provides for both active and passive uses and describes how the funds are to be used, the allowable expenditures and the agencies that are permitted to apply.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Open Space Advisory Board, Applicants

ATTACHED DOCUMENTS:

Resolution approving the updates to the Policies and Procedures and bylaws.

FISCAL IMPACT:

Please check if there is no fiscal impact ☒. If there is fiscal impact, please fully complete the section below.

Fund:**Cost Center:**

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:			
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☒ NO

Additional Note:

N/A

**BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO**

**RESOLUTION AMENDING THE ADAMS COUNTY OPEN SPACE POLICIES AND
PROCEDURES AND OPEN SPACE BYLAWS**

WHEREAS, Adams County voters approved an Open Space Sales Tax on November 2, 1999; and,

WHEREAS, Adams County voters authorized an increase in an existing countywide sales tax from one-fifth of one percent to one-fourth of one percent, and extending the sales tax through December 31, 2026, in accordance with Resolution 99-1 and 2004-1; and,

WHEREAS, on December 3, 2007, the Board of County Commissioners adopted the Adams County Open Space Policies and Procedures, which set forth the process and policies governing the administration of the Open Space Sales Tax program; and,

WHEREAS, on November 3, 2020, Adams County voters approved a permanent extension of the existing county wide sales tax of one-fourth of one percent (one-fourth penny per dollar) for the continued purpose of preserving open space and creating and maintaining parks and recreation facilities, in accordance with Resolution 2020-480; and,

WHEREAS, the Adams County Open Space Bylaws and Policies and Procedures require revisions to enact this change and conform with the current needs and desires of the program in matters including application procedure, eligibility, and application review criteria, the revisions to which are attached hereto and incorporated by reference.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the Adams County Open Space Policies and Procedures and the Adams County Open Space Bylaws be amended as set forth above.

Amendments to the Adams County Open Space Policies and Procedures

Page 4, Paragraph 2 (Introduction)

Adams County citizens passed an Open Space Tax on November 2, 1999, and reauthorized it on November 2, 2004, to be extended until December 31, 2026. The voter approved issue called for 68% of the proceeds from the tax to be distributed to eligible jurisdictions by a grant process. The Open Space “Tax Issue” also provides for 30% of the funds to be returned to the Cities and County based on a formula of where the tax is collected. Two percent may be used for administrative purposes. Adams County Open Space Sales Tax funds are subject to an annual independent audit.

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Amendments to the Open Space Bylaws

Page 1 (ARTICLE II – PURPOSE)

B. To implement the provisions as detailed in ~~Resolution 99-1~~ Resolution 2020-480 as adopted by the Board of County Commissioners.

Pages 2-3

Chairperson and Vice Chairperson updated to Chair and Vice Chair.

Page 3, Paragraph 2

Secretary: ~~Parks and Open Space~~ Parks, Open Space and Cultural Arts staff shall serve as Secretary, but shall not sit as an Officer of the Board and shall not have voting privileges. In addition to other assigned duties, the Secretary shall prepare the minutes for public meetings.

Page 4, Paragraph 2

In making recommendations to the Board of County Commissioners, the Board shall abide by Section ~~Resolution 99-1~~ 7. C. of Resolution 2020-480, which provides for both active and passive uses and describes how the funds are to be used, the allowable expenditures and the agencies that are permitted to apply.



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 20, 2021
SUBJECT: Transportation Services
FROM: Raymond H. Gonzales, County Manager Alisha Reis, Deputy County Manager Nancy Duncan, Budget & Finance Director Jennifer Tierney Hammer, Procurement and Contracts Manager
AGENCY/DEPARTMENT: Adams County Human Services Department – Child and Family Services
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves Amendment Two to renew the agreement with American Logistics Company, LLC., to provide Transportation Services for the Adams County Human Service Department.

BACKGROUND:

Transportation services are needed to maintain children in their home school when they are placed outside of the family home and no other mode of transportation is available and to allow family members to participate in Family Team meetings. Maintaining children in their home school is required under federal law through Every Student Succeeds Act (ESSA) and Family Team Meetings are required to be held under current Colorado child welfare rule.

The Board of County Commissioners approved an Agreement with American Logistics Company LLC., on February 15, 2019, to provide transportation services. On June 21, 2020, the Board of County Commissioners approved Amendment One to extend the agreement for one year.

Staff is pleased with American Logistics Company LLC., and wishes to renew the Agreement for an additional one-year term. The fees for the second-year renewal will be \$361,190.00 for a total contract amount of \$896,190.00. The effective date will begin July 1, 2021, through June 30, 2022. The Agreement breakdown is as follows:

Agreement	Amount	Total Agreement Amount
Original Agreement	\$145,000.00	\$145,000.00
Amendment One	\$390,000.00	\$535,000.00
Requested Amendment Two	\$361,190.00	\$896,190.00

The recommendation is the Board of County Commissioners approves Amendment Two to renew the agreement with American Logistics Company, LLC., to provide Transportation Services for the Adams County Human Services Department.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Children and Family Services

ATTACHED DOCUMENTS:

Resolution

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 15
Cost Center: 99915, Various

	Object Account	Subledger	Amount
Current Budgeted Revenue:	99915.5755		\$50,239,790
Additional Revenue not included in Current Budget:			
Total Revenues:			<u>\$50,239,790</u>

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	Various,7645		\$6,078,100
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			<u>\$6,078,100</u>

New FTEs requested: ☐ YES ☐ NO

Future Amendment Needed: ☐ YES ☐ NO

Additional Note:

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING AMENDMENT TWO TO THE AGREEMENT BETWEEN
ADAMS COUNTY AND AMERICAN LOGISTICS COMPANY LLC., TO PROVIDE
TRANSPORTATION SERVICES

WHEREAS, in 2018, American Logistics Company, LLC., was awarded an Agreement to provide Transportation Services for the Adams County Human Services Department; and,

WHEREAS, the Board of County Commissioners approved Amendment One to extend the Agreement for Transportation Services with American Logistics Company, LLC., for an additional year in 2020; and,

WHEREAS, American Logistics Company, LLC., agrees to provide Transportation Services for the second renewal year in the amount of \$361,190.00 for a total not to exceed Agreement amount of \$896,190.00.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that Amendment Two with American Logistics Company, LLC., to provide Transportation Services is hereby approved.

BE IT FURTHER RESOLVED, that the Chair is hereby authorized to sign Amendment Two to the agreement with American Logistics Company, LLC., on behalf of Adams County after negotiation and approval as to form is completed by the County Attorney's Office.



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Guaranteed Beds
FROM: Raymond H. Gonzales, County Manager Alisha Reis, Deputy County Manager Nancy Duncan, Budget and Finance Director Jennifer Tierney Hammer, Procurement and Contracts Manager
AGENCY/DEPARTMENT: Adams County Human Services Department, Division of Children & Family Services
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves Amendment One to the Agreement with Shiloh Home Inc., to provide Guaranteed Beds.

BACKGROUND:

Shiloh Home Inc., provides guaranteed beds, shelter and residential care of children and youth within Adams County. Shiloh Home Inc., also provides emergency shelter for children in crisis as well as a residential facility for children needing long-term treatment.

The current contract was approved by the Board of County Commissioners in 2019. The contract allowed for 28 guaranteed beds for shelter care and residential care for children and youth. Children and youth who enter the shelter are thoroughly assessed to determine appropriate level of service interventions and level of placement. It was determined that the 28 guaranteed beds are no longer required and Shiloh Home Inc., agreed to decrease the number of guaranteed beds 28 beds to 8 beds.

Adams County Human Services Department, Division of Children & Family Services would like to decrease the current agreement for the remaining three years through May 31, 2024.

The Agreement breaks down as follows:

Agreement/Amendment	Original Approved Amount	Requested Decreased Funds	Total Amount	Yearly	Cumulative Agreement Amount
Year One	\$1,798,720	\$0	\$1,798,720		\$1,798,720.00
Year Two	\$1,798,720	\$0	\$1,798,720		\$3,597,440.00
Year Three	\$1,798,720	(\$1,129,835.60)	\$668,884.40		\$4,266,324.40
Year Four	\$1,798,720	(\$1,129,835.60)	\$668,884.40		\$4,935,208.80
Year Five	\$1,798,720	(\$1,129,835.60)	\$668,884.40		\$5,604,093.20
Total Agreement Amount	\$8,993,600.00	(\$3,389,506.80)	\$5,604,093.20		\$5,604,093.20

The recommendation is to approve Amendment One to the Agreement between Adams County and Shiloh Home Inc., to decrease funding to the Agreement for the remaining three years in the amount of \$1,129,835.60 per year for a total not to exceed Agreement amount of \$5,604,093.20.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Adams County Human Services Department, Division of Children & Family Services

ATTACHED DOCUMENTS:

Resolution

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 15			
Cost Center: 99915, Various			
	Object Account	Subledger	Amount
Current Budgeted Revenue:	99915.5755		\$50,239,790
Additional Revenue not included in Current Budget:			
Total Revenues:			\$50,239,790
	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	Various, 7645		\$6,078,100
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			\$6,078,100

New FTEs requested: ☐ YES ☐ NO

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING AMENDMENT ONE TO THE AGREEMENT BETWEEN
ADAMS COUNTY AND SHILOH HOME INC., TO PROVIDE GUARANTEED BEDS

WHEREAS, Adams County and Shiloh Home Inc., entered into an agreement in 2019, (the "Original Agreement"), to provide Guaranteed Beds for the Adams County Human Services Department, Division of Children & Family Services; and,

WHEREAS, Adams County Human Services would like to decrease the amount of the Original Agreement due to the decreased demand of this service; and,

WHEREAS, Shiloh Home Inc., agrees to decrease the amount of the Original Agreement by \$1,129,835.60 each year for the next three years for a total not to exceed agreement amount of \$5,604,093.20; and,

WHEREAS, the program is being funded 80/20 under the Child Welfare Block Grant, 80% paid by the State and a 20% County match.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that Amendment One to the Agreement between Shiloh Home Inc., to provide Guaranteed Beds County is hereby approved.

BE IT FURTHER RESOLVED, that the Chair is hereby authorized to sign said Amendment One with Shiloh Home Inc., after negotiation and approval as to form is completed by the County Attorney's Office.



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Customer Journey Mapping
FROM: Raymond H. Gonzales, County Manager Alisha Reis, Deputy County Manager Nancy Duncan, Budget & Finance Director Jennifer Tierney Hammer, Procurement and Contracts Manager
AGENCY/DEPARTMENT: Adams County Human Services Department Workforce and Business Center, Temporary Assistance for Needy Families (TANF)
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves an Agreement with Guidehouse Inc., to provide Customer Journey Mapping.

BACKGROUND:

Adams County's Human Services Department Workforce and Business Center, Temporary Assistance for Needy Families (TANF) is seeking providers to provide an understanding of the current customer experience to define customer segments and develop a Current State Journey Map.

A formal Request for Proposal (RFP) was posted on BidNet for the Adams County Human Services Department, TANF program. Proposals were accepted on April 30, 2021. Three proposals were received.

The proposals were evaluated on the following criteria:

- Contractor's experience, qualifications, references, past performance and ability to provide all services as defined in the Scope of Work.
- Contractor's fee structure for performing the services.
- Contractor's demonstrated understanding of the project and overall merit of the application.
- Contractor's demonstrated understanding of the project and experience managing projects with Federal funding and reporting requirements.

The evaluation team found that the proposal submitted by Guidehouse Inc., met the criteria set forth in the RFP and recommends an award.

The Workforce Business Center Department receives federal TANF block grant funds through the State to assist with the goals of the Workforce and Business Center TANF program. The grant awarded will provide eighty-five percent (85%) funding with Adams County responsible for the remaining fifteen percent (15%).

The recommendation is to approve an Agreement with Guidehouse Inc., to provide Customer Journey Mapping in the not to exceed amount of \$435,200.00.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Human Services Department Workforce and Business Center (TANF)

ATTACHED DOCUMENTS:

Resolution

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 15			
Cost Center: 99915, Various			
	Object Account	Subledger	Amount
Current Budgeted Revenue:	99915.5755		\$50,239,790
Additional Revenue not included in Current Budget:			
Total Revenues:			<u>\$50,239,790</u>
	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	Various.7645		\$6,078,100
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			<u>\$6,078,100</u>

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☐ NO

Additional Note:

These expenditures are based on 2020 budget approval.

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING AN AGREEMENT BETWEEN ADAMS COUNTY AND
GUIDEHOUSE INC., FOR CUSTOMER JOURNEY MAPPING

WHEREAS, Guidehouse Inc., submitted a proposal on April 30, 2021, to provide Customer Journey Mapping for the Human Services Department, Temporary Assistance for Needy Families; and,

WHEREAS, the evaluation team found that the proposal submitted by Guidehouse Inc., met the required criteria and is qualified to provide Customer Journey Mapping; and,

WHEREAS, Guidehouse Inc., agrees to provide the Customer Journey Mapping in the amount not to exceed \$435,200.00; and,

WHEREAS, Guidehouse Inc., is funded 85/15 under the Federal Temporary Assistance for Needy Families block grant funds, 85% is paid by the State of Colorado with a 15% County match required.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the Agreement between Adams County and Guidehouse Inc., for Customer Journey Mapping is hereby approved.

BE IT FURTHER RESOLVED, that the Chair is hereby authorized to sign the Agreement with Guidehouse Inc., after negotiation and approval as to form is completed by the County Attorney's Office.



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: July 27, 2021
SUBJECT: Adams County Signal System Equipment Upgrade Project
FROM: Raymond H. Gonzales, County Manager Alisha Reis, Deputy County Manager Nancy Duncan, Budget & Finance Director Jennifer Tierney Hammer, Procurement & Contracts Manager
AGENCY/DEPARTMENT: Public Works Department
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves an Agreement with Lumin8 Transportation Technologies for the Adams County Signal System Equipment Upgrade Project.

BACKGROUND:

The Adams County Signal System Equipment Upgrade (the Project) is located on Pecos Street between 55th Avenue and 84th Avenue and Washington Street between 55th Avenue and 78th Avenue. The Project consists of upgrading traffic signal cabinets and control equipment at 25 signalized intersections on Pecos Street and Washington Street.

A formal Invitation for Bid was solicited through BidNet. Bids were opened on April 28, 2021 and two responsive bids were received. After verifying the unit bid prices for each company, the Public Works Department confirmed that Lumin8 Transportation Technologies is the lowest responsive and responsible bidder.

A summary of the evaluation and results is in the table below:

RANK	BIDDER	TOTAL BID
1	Lumin8 Transportation Technologies	\$1,975,707.00
2	Sturgeon Electric Company	\$1,982,560.00

The recommendation is to award an Agreement for the Adams County Signal System Equipment Upgrade Project to Lumin8 Transportation Technologies in the not to exceed amount of \$1,975,707.00.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Public Works Department

ATTACHED DOCUMENTS:

Resolution

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 13**Cost Center: 3056**

	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			<u> </u>

	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	7685	30561836	\$1,453,470
Add'l Operating Expenditure not included in Current Budget:			
Current Budgeted Capital Expenditure:	9135	30562101	\$15,000,000
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			<u>\$16,453,470</u>

New FTEs requested: ☐ YES ☒ NOFuture Amendment Needed: ☐ YES ☒ NO**Additional Note:**

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING AN AGREEMENT
BETWEEN ADAMS COUNTY AND LUMIN8 TRANSPORTATION TECHNOLOGIES FOR
THE ADAMS COUNTY SIGNAL SYSTEM EQUIPMENT UPGRADE PROJECT

WHEREAS, on April 28, 2021, Lumin8 Transportation Technologies submitted a bid to provide services for the Adams County Signal System Equipment Upgrade Project; and,

WHEREAS, Lumin8 Transportation Technologies agrees to provide services for the Adams County Signal System Equipment Upgrade Project in the not to exceed amount of \$1,975,707.00.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the Agreement between Adams County and Lumin8 Transportation Technologies for the Adams County Signal System Equipment Upgrade Project is hereby approved.

BE IT FURTHER RESOLVED, that the Chair is hereby authorized to sign the Agreement with and Lumin8 Transportation Technologies on behalf of Adams County, after negotiation and approval as to form is completed by the County Attorney's Office.



PUBLIC HEARING AGENDA ITEM

DATE OF PUBLIC HEARING: June 27, 2021
SUBJECT: Anti-Ligature Inmate Bunk System
FROM: Raymond H. Gonzales, County Manager Alisha Reis, Deputy County Manager Nancy Duncan, Budget & Finance Director Jennifer Tierney Hammer, Procurement and Contracts Manager
AGENCY/DEPARTMENT: Facilities and Fleet Management Department, Sheriff's Office
HEARD AT STUDY SESSION ON: N/A
AUTHORIZATION TO MOVE FORWARD: <input type="checkbox"/> YES <input type="checkbox"/> NO
RECOMMENDED ACTION: That the Board of County Commissioners approves an Agreement with MaxSecure Systems, Inc., for an anti-ligature inmate bunk system at the Adams County Detention Facility.

BACKGROUND:

The Adams County Facilities and Fleet Management Department has budgeted \$3,322,768.23, for an anti-ligature inmate bunk and desk system at the Adams County Detention Facility. An assessment of the Detention Facility was performed in 2019 and found that anti-ligature measures was the highest concern. The new suicide-resistant bunk and desk system will alleviate tie-off ligature locations within the inmate cells.

Clark County, Washington awarded a cooperative contract to MaxSecure Systems, Inc., for the anti-ligature inmate bunk system. Since installing the new composite bunk system in the Clark County Jail, there has been no successful inmate suicides. By utilizing the cooperative contract, the County can streamline the procurement process and receive competitive pricing. The contract award includes cooperative language, the use of these agreements adheres to the Adams County Purchasing Policy, Appendix E – Cooperative, Single, and Sole Source Purchases.

The recommendation is to approve an Agreement with MaxSecure Systems, Inc., for the anti-ligature inmate bunk and desk system, in the not to exceed amount of \$3,322,768.23.

AGENCIES, DEPARTMENTS OR OTHER OFFICES INVOLVED:

Facilities and Fleet Management Department
Sheriff's Office

ATTACHED DOCUMENTS:

Resolution

FISCAL IMPACT:

Please check if there is no fiscal impact ☐. If there is fiscal impact, please fully complete the section below.

Fund: 1			
Cost Center: 2071			
	Object Account	Subledger	Amount
Current Budgeted Revenue:			
Additional Revenue not included in Current Budget:			
Total Revenues:			
	Object Account	Subledger	Amount
Current Budgeted Operating Expenditure:	9055	20711807	\$3,180,571.00
Add'l Operating Expenditure not included in Current Budget:	9055		142,197.23
Current Budgeted Capital Expenditure:			
Add'l Capital Expenditure not included in Current Budget:			
Total Expenditures:			<u>\$3,322,768.23</u>

New FTEs requested: ☐ YES ☒ NO

Future Amendment Needed: ☐ YES ☐ NO

Additional Note:

This project will continue into 2022 and the additional \$142,197 will be covered in the 2022 budget.

BOARD OF COUNTY COMMISSIONERS FOR
ADAMS COUNTY, STATE OF COLORADO

RESOLUTION APPROVING AN AGREEMENT BETWEEN ADAMS COUNTY AND
MAXSECURE SYSTEMS, INC., FOR AN ANTI-LIGATURE INMATE BUNK SYSTEM

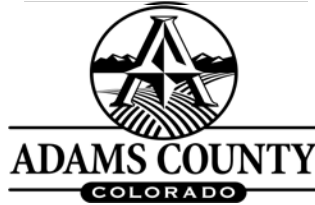
WHEREAS, the Facilities and Fleet Management Department budgeted for a suicide resistant bunk and desk system within the inmate cells at the Adams County Detention Facility; and,

WHEREAS, Clark County, Washington awarded a cooperative agreement to MaxSecure Systems, Inc., for an anti-ligature inmate bunk system which included cooperative language. The use of cooperative agreements adheres to the Adams County Purchasing Policy, Appendix E-Cooperative, Single and Sole Source Purchases; and,

WHEREAS, MaxSecure Systems, Inc., agrees to provide an anti-ligature inmate bunk and desk system in the not to exceed amount of \$3,322,768.23.

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners, County of Adams, State of Colorado, that the Agreement between Adams County and MaxSecure Systems, Inc., for an anti-ligature inmate bunk system is hereby approved.

BE IT FURTHER RESOLVED, that the Chair is hereby authorized to sign the Agreement with MaxSecure Systems, Inc., on behalf of Adams County, after negotiation and approval as to form is completed by the County Attorney's Office.



**COMMUNITY AND ECONOMIC DEVELOPMENT
DEPARTMENT
STAFF REPORT**

CASE NO.: PLN2021-00004

**CASE NAME: OIL & GAS AMENDMENTS TO THE ADAMS COUNTY DEVELOPMENT
STANDARDS & REGULATIONS**

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- 3.1 Tabulated Comments, Staff Recommendations, and Responses
- 3.21 Referral Comments – Residents (A-F)
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- 4.1 Referral Agency Labels
- 4.2 Request for Comments (Initial and Revised Drafts)
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- 4.5 Staff Proposed Setback Maps

EXHIBIT 5- Stakeholder Engagement

- 5.1 Invitations for Stakeholder Meetings
- 5.2 Stakeholder Meeting Presentation
- 5.3 Summary Table of Proposed Changes

EXHIBIT 6 – Scientific References

- 6.1 Colorado Department of Public Health and Environment. (2019). Final Report: Human Health Risk Assessment for Oil & Gas Operations in Colorado. https://drive.google.com/open?id=1pO41DJMXw9sD1NjR_OKyBJP5NCb-AO0I
- 6.2 Blair, B. D., Brindley, S., Dinkeloo, E., McKenzie, L. M., & Adgate, J. L. (2018). Residential noise from nearby oil and gas well construction and drilling. *Journal of Exposure Science & Environmental Epidemiology*, 28(6), 538–547. <https://doi.org/10.1038/s41370-018-0039-8>
- 6.3 Colorado Department of Public Health and Environment; Regional Air Quality Council. (2020). State Implementation Plan for the 2008 8-Hour Ozone National Ambient Air Quality Standard. <https://raqc.org/sip/the-sip-planning-process-and-colorado-sip-summaries-2/>

EXHIBIT 7 – PC Public Hearing Sign-In Sheets

CASE No.: PLN2021-00004 CASE NAME: Oil & Gas Amendments to the Adams County Development Standards & Regulations
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Location of Request:	Unincorporated Adams County
Nature of Request:	Amendments to Chapters 2, 4, and 11 of the Adams County Development Standards and Regulations with respect to OGF permit procedures, design requirements, and performance standards.
Hearing Date(s):	PC: July 8, 2021 / 6:00 p.m.
	BoCC: July 27, 2021 / 9:30 a.m.
Report Date:	July 16, 2021
Case Manager:	Greg Dean
Staff Recommendation:	APPROVAL with 3 Findings of Fact and 1 Condition

SUMMARY OF APPLICATION

Background:

On April 16, 2019, Governor Polis signed Senate Bill 19-181 (SB19-181), which clarifies, reinforces, and establishes the regulatory authority of local governments over the surface impacts of oil and gas development. Adams County adopted revised oil and gas regulations in September 2019 aimed at establishing a permit process, siting criteria, performance standards, enforcement process for new oil and gas production facilities (OGF) and updating definitions pertinent to the scope and applicability of the proposed oil and gas regulations. The regulations adopted in 2019 by the County incorporated various provisions for protecting public health, safety, welfare, the environment and wildlife resources that included a 1,000-foot setback requirement for OGFs from schools, licensed daycares, residences, environmentally sensitive areas, and high-occupancy buildings as a site approval criterion. Additional provisions adopted by the County in 2019 include, among other things, worker training and safety requirements, a list of prohibited chemical additives, emission combustion controls, financial assurances, a prohibition on new waste water injection wells, and a myriad of site-specific protections for air, water, and nuisance-type impacts.

From late 2019 through 2020, the Colorado Oil and Gas Conservation Commission (COGCC) conducted a statewide mission change rulemaking to amend the state's oil and gas regulations for alignment with the more protective intent and revised local government siting authority granted in SB19-181. Adams County was a party to and active stakeholder in the mission change rulemaking process. The COGCC adopted new statewide rules by a unanimous vote in November 2020 and the rules became effective on January 15, 2021. The majority of the revised COGCC rules apply prospectively to new oil and gas facilities, with only a limited number of operational standards for noise, odor, dust, and light applying retroactively to existing or previously approved facilities. The

revised state regulations reinforced the co-equal regulatory framework allowed in SB19-181 between local governments and the state agency by requiring Operators to obtain both local permits, where applicable, and state permits for new oil and gas operations. SB19-181's statutory revisions further expanded a local government's authority to expressly adopt their own standards that may be more protective or stricter than state requirements. While a local government may adopt less strict or less protective standards, if a conflict arises between local regulations and state regulations, an Operator will be required to comply with the more protective standard.

Staff was provided direction from the Board of County Commissioners (BoCC) on December 15, 2020 to revise the County's oil and gas regulations for alignment with the newly adopted COGCC regulations. These proposed text amendments are necessary for that alignment and for the shared regulatory authority and coordination now required of local governments. The proposed amendments will ensure that the siting of OGFs is done in a manner that is protective of public health, safety, welfare, the environment and wildlife resources.

Development Standards and Regulations:

Section 2-02-13 of the Adams County Development Standards and Regulations details the procedures for amendments to the text of the standards and regulations. Only the Board of County Commissioners may, after a recommendation from the Planning Commission, adopt a resolution amending the text of the standards and regulations.

Section 2-02-13-06-01 of the Development Standards and Regulations lists three criteria for reviewing text amendments. The first two criteria require consistency with the Comprehensive Plan and the purpose of the Development Standards. The third criterion requires the text amendment to not be detrimental to the majority of persons or property in the surrounding areas nor to the community in general. The changes proposed in the subject text amendment are consistent with the County's Comprehensive Plan, the purpose of the Development Standards and Regulations, and will not be detrimental to the residents of Adams County. By enhancing the County's requirements and performance standards for permitting of new oil and gas facilities, the proposed changes fulfill the purpose of the Development Standards while meeting the objectives of the Comprehensive Plan. The changes aim to protect public health, safety, welfare, the environment and wildlife through responsible development of oil and gas resources and, therefore, will better serve the residents of Adams County.

Existing provisions within the Adams County Development Standards and Regulations (DSR) established an Oil and Gas Facility Permit (OGF) that directly regulates surface impacts of oil and gas development, including land uses, design requirements, performance standards, and zone district requirements that ensure potential off-site impacts are avoided, minimized and mitigated, compatibility with surrounding land uses and conformance with land use designations. Regulation text amendments are being proposed for Chapter 2, Chapter 4, and Chapter 11 of the DSR, the OGF Application, and a newly created Development Application Guide.

A summary of each chapter and proposed changes, including the purpose for the text amendments, is outlined below:

Oil and Gas Facility (OGF) Permit (Section 2-02-14):

The proposed regulations amend existing requirements for consistency with other County land use permit processes. The amendments incorporate provisions that ensure adequate resident, landowner, and community engagement and provides additional clarification to stakeholders on the permitting process for OGF applications.

Among the major proposed amendments to Section 2-02-14 are the expansion of public notices and neighborhood meeting criteria, requirements for identification and engagement with Disproportionately Impacted Communities (DComms), significant modifications to the OGF permit terms, and the introduction of specific criteria for setback waivers. Staff is proposing to expand required notices and neighborhood meeting invitations for landowners, primary residents, and tenants from one-half (1/2) to one (1) full mile. The intent of this proposed modification is to engage more residents or groups that may be impacted by the Oil and Gas Facility in the permit process and to address their concerns associated with potential off-site impacts from oil and gas operations that could extend out past the edge of the OGF, specifically traffic and noise. Staff is further proposing to require applicants to identify and adequately engage with DComms within one (1) mile of an OGF based on primary and secondary languages, culturally appropriate communication parameters, and other socio-economic factors that could impact the availability of information and participation from members of those communities that have historically borne an unequal environmental burden of development.

Additionally, Staff is proposing to modify the OGF permit terms such that at the end of the initial three (3) year term, the approval of any wellbore not completed or in production status would lapse. This would require an entirely new OGF from the County before an Operator could return to a facility to drill additional wells, rather than one well permanently vesting the entire OGF as is in current County regulations.

Lastly, Staff has introduced specific criteria for the evaluation of setback waivers and a substantially equivalent determination by the BoCC for any OGF that does not meet the County's setback requirements (including setbacks from residences, school facilities, environmentally sensitive areas, groundwater wells, and parks and open spaces). The intent of the substantially equivalent criteria is to outline what mitigation and control factors will be required of the Operator to ensure that the OGF is equally protective of public health, safety, welfare, the environment, and wildlife resources as that of the required setback distance. The proposed specific criteria for approval of a setback waiver in Section 2-02-14 align with those similar requirements in COGCC rules for such an exception and include, among other parameters, the location and proximity of residences and other receptors, size and intensity of the facility, planned best management practices and control measures, compatibility with surrounding land use, the degree to which waivers from landowners and residents inside the setback have been obtained, and cumulative impacts. The objective of this proposed provision is two-fold: to align with COGCC setback exception requirements; and provide a mechanism for future siting approval by the BoCC of OGFs that do not qualify for an administrative setback waiver after a robust evaluation of impacts by Staff and applicable stakeholders.

Staff is proposing to maintain the provisions in the current OGF regulations that provide for both an administrative permit process when all siting approval criteria and performance standard requirements can be met and a non-administrative waiver process through BoCC public hearing when a modification from one or more requirements is sought, including setbacks. Specifically, Staff is proposing to maintain the provision allowing for an administrative waiver from residential setbacks if an Operator can obtain consent from each landowner and resident within the setback. If the applicant cannot, or elects not to, obtain consent from landowners and residents within the setback or requests any other non-administrative waiver from one or more requirements, the OGF Permit can only be approved by the BoCC and requires a public hearing. An OGF Permit that meets all requirements and does not need a waiver can be approved administratively by the Director of the Community and Economic Development Department (CED). Further, Staff is proposing to maintain the requirement of an alternative site analysis for all OGF permit applications that demonstrate the location can meet all approval criteria before continuing through the standard permit process. Staff intends to make every effort to consult with COGCC and Colorado Parks and Wildlife, as allowable by rule, during the County's conceptual review process to address any issues early in the process in order to streamline permitting and ensure County and COGCC processes do not become overly duplicative. See Exhibit 2.1 for the proposed text.

OGF Design Requirements and Performance Standards (4-11-02-03-03):

The proposed regulations amend existing requirements by integrating industry best practices, design technologies and operational controls into the performance standards applicable to oil and gas facilities permitted under the revised regulations. The amendments integrate both programmatic and prescriptive approaches toward requirements to address land use compatibility issues, as well as potential impacts to public health, safety, welfare the environment, and wildlife. Some of the major proposed amendments to Section 4-11-02-03-03 include expanding setback distances for numerous receptors, clarification on the measurement of these setbacks, expanded requirements for nuisance-type impacts, new requirements for community outreach, and the evaluation and mitigation of cumulative impacts.

Staff is proposing to increase the setback distance from the property line of existing residences, platted residential lots, school or future school facilities, state licensed daycares, high occupancy building units, and environmentally sensitive areas to OGFs from 1,000-feet to 2,000-feet. Further, Staff is proposing new setback requirements from parks and open spaces and certain groundwater and aquifer wells of 2,000-feet and 1,000-feet, respectively. See Exhibit 4.5 for maps illustrating Staff's setback proposals. Staff is also proposing rules that will clarify the County's intent, as adopted in 2019, to measure setbacks from the edge of an Oil and Gas Location to a parcel or property line, rather than from a wellhead, equipment, or drilling area to a physical dwelling structure as is required in COGCC rules. This subtle difference would make the County's proposed setback provisions more protective than the state standard and allow surface landowners full use of their property for recreation, agriculture or other uses. Under current County regulations, there are no specific criteria for the granting of a non-administrative setback waiver. While Staff is proposing to increase the setback measurement from 1,000-feet to 2,000-feet, Staff is also proposing clearly defined pathways for the granting of a waiver and approval of OGF permits after a public hearing in front of the BoCC that is in accordance with Section 2-02-14-07-07 and described above. The revised residential building setback requirements being proposed

correspond to similar provisions recently adopted by the COGCC and are further supported by findings published in the recent Colorado Department of Public Health and Environment (CDPHE) study that found an elevated risk of potential acute health impacts during preproduction operations (drilling, completions, and flowback) for residents living, working, or recreating near oil and gas sites (*see* Exhibit 6.1). The amended setback provisions proposed by Staff apply to the permitting of new or substantially modified oil and gas sites near existing or platted residential development, school and daycare facilities, and other protected receptors. The proposed setback revisions will not be applied in reverse to new residential or commercial development from existing oil and gas facilities. The County adopted reverse setback provisions for oil and gas development pursuant to Section 4-11-02-03-05 in 2018 and further revisions to reciprocal or reverse setback rules will occur during a later phase of oil and gas regulation amendments, after direction from the BoCC and a robust stakeholder and public engagement process.

Staff is also proposing amendments to nuisance-type provisions including expanded requirements to mitigate impacts from noise, light, odor, and dust. Specifically, Staff's proposed noise rules would require an Operator conduct continuous noise monitoring for all oil and gas facilities located within one-half (1/2) mile of existing residences, require the Operator of a facility to attenuate noise to the maximum allowable sound level of the adjacent land uses at the land use boundary, and require an Operator to utilize County approved sound professionals for all impact studies. The intention of the proposed noise provisions is to mitigate health impacts to residents exposed to noise propagated from oil and gas facilities, often generated 24 hours a day during active drilling and completion operations. Continuous noise, specifically nighttime noise, has been shown to be detrimental to public health and welfare in certain circumstances (*see* Exhibit 6.2). To address odor-related impacts, and after consultation with CDPHE, Staff is further proposing a rule that would allow the Director of CED to require an Operator to conduct air quality sampling in response to verified odor-related complaints, mirroring a similar provision in COGCC rules. Staff is further proposing various site-specific best management practices to avoid, minimize, and mitigate other nuisance-type impacts including, as examples, limitations on earthwork activities on high wind days to reduce dust, use of motion activated lighting, and increased landscaping for OGFs visible from public areas. Staff's proposals for light, odor, and dust mitigation directly incorporates many of the recently adopted COGCC standards.

Staff is additionally proposing the creation of a Community Outreach Plan within Section 4-11-02-03-03 that includes, among other things, the requirement for an Operator to conduct quarterly neighborhood meetings commencing upon approval of the OGF permit when the OGF is located within one (1) mile of existing residences, platted residential development, DComms, and school facilities. The provisions of the proposed Community Outreach standards could also require an Operator to provide all written and digital materials in languages other than English and to provide interpretation services for meetings on a site-specific basis to ensure equitable access to information and participation for all residents. Staff is also proposing a rule to require Operators to provide at least seven (7) days advance notice prior to the commencement of decommissioning or plugging operations to the County and all property owners and current residents within one-half (1/2) mile. The notice would require the Operator to provide survey coordinates of the well or facility, proposed access routes, duration of activity, and a list of equipment to be utilized on site. The intention of this notice proposal is to keep landowners and residents informed about impending operations and associated equipment such as workover rigs, heavy trucks, and

temporary storage tanks that could result in potential off-site impacts. This proposal will further allow Staff to review the proposed access routes and other information to ensure any impacts to the County transportation system are addressed, where applicable.

Lastly, Staff is proposing new rules to evaluate cumulative impacts associated with oil and gas development. These proposed amendments would require an applicant to address the qualitative and quantitative impacts to air quality, public health and welfare, traffic, and environmental resources from all foreseeable industrial development within one (1) mile of the proposed facility and demonstrate plans to avoid, mitigate, and offset such impacts through proposed best management practices, operational control measures, or compensatory plans. Staff believes these provisions are necessary and reasonable given the volume of oil and gas and other industrial activity in the County that can have immediate and long-term impacts on air, water, traffic, climate, etc. (*see* Exhibit 6.3). This proposed cumulative impact plan will allow Staff is to critically evaluate cumulative impacts as part of their overall review of an OGF permit application to ensure impacts to relevant resources are meaningfully addressed. The proposed provisions in the cumulative impacts plan closely align with similar regulations recently adopted by COGCC.

Though the proposed amendments to Section 4-11-02-03-03 incorporate operational control technologies, the proposed regulations also support outcome-based measures of performance, including systematic root cause analysis of incidents and continuous improvement programs that proactively address potential impacts. The proposed amendments reflect the broader authority granted by SB19-181 to develop local regulations that may be more protective than state standards and mechanisms to mitigate the surface impacts of local oil and gas development. See Exhibit 2.2 for the proposed text.

Definitions (Chapter 11):

Many terms that apply to Oil and Gas Facilities are incorporated and defined through Section 4-11-02-03-02 of the DSR. As such, Staff is only proposing a modification to the definition of Environmentally Sensitive Areas (Section 11-02-183) to include applicable surface water such as rivers, lakes, streams, and springs that could be impacted by oil and gas development. See Exhibit 2.3 for the proposed text.

OGF Application and Development Application Guide (Appendix A):

The proposed amendments include the revisions to the OGF Application, OGF application checklist, and the creation of a new Development Application Guide (Guide) within Appendix A of the County DSR. The proposed Guide would relocate all application submittal requirements currently incorporated within Chapter 2 and Chapter 4 of the County DSR into one reference document included as part of the application packet for an OGF. This proposed Guide provides added clarity and specificity to applicants and other stakeholders on the requirements necessary for a completeness determination and evaluation of a permit application by Staff. Additionally, the Director of CED may make changes to the application submission requirements pursuant to Section 1-03-01-01-02 periodically to ensure all potential impacts are being adequately evaluated by Staff and applicable stakeholders prior to a permitting decision. Lastly, the Guide for OGF permit applications, as proposed, is consistent with other land use application processes within the

County DSR. See Exhibit 2.4 for the proposed application and development application guide. See Exhibit 5.3 for a summary table of all proposed changes and comparison with applicable COGCC standards.

STAFF ANALYSIS

Compatibility with the Adams County Comprehensive Plan:

Imagine Adams County, the County's Comprehensive Plan (Plan), updated in December 2012, recognizes that extraction of sand, gravel, coal, oil, and gas resources contributes to the local economy, providing employment to County citizens and tax income to the County. However, the Plan also notes that sensitive extraction and reclamation practices are essential in order to prevent potential negative impacts to the community. Policy 7.5 of the Plan reads as follows:

Provide for the extraction of subsurface resources in accordance with State law but require mitigation of undesirable impacts to the natural environment and community as well as plans for viable potential reuse of the land.

Specific strategies for meeting the objectives of this Policy, as outlined in 7.5.b, and 7.5.c, have been incorporated into the proposed amendments through reclamation and environmental assurance requirements, and implementation of control measures that mitigate impacts to the surrounding community, public infrastructure and the natural environment. Strategy 7.5.b seeks to ensure the reclamation of lands impacted by resource extraction in a manner that will create wildlife habitat, restore vegetation, and provide other essential ecosystem services. Parallel to this is Strategy 7.5.c, which calls for the strengthening of resource extraction regulations in order to mitigate adverse impacts to the environment and the surrounding community. Furthermore, direction provided by Comprehensive Plan Policy 9.3 to preserve water corridors and the valuable habitat they provide, is reflected in the proposed regulation's prescribed setback from these sensitive environmental areas.

In addition, the Plan contains extensive analysis of the County's natural and man-made hazards through the Hazard Identification and Risk Assessment (HIRA) outlined in Appendix C of the Plan and discussed in Policy 12.1, Reduce Risk and Effects of Natural and Industrial Hazards. In this section, the Plan notes the importance of reducing risk and minimizing loss of life and property from natural and industrial hazard events and protecting public health and safety. The enhanced regulatory structure within this proposed regulation amendment provides for additional site-specific review of any new oil and gas facility in order to address issues, such as public health and safety, as well as community risk and emergency response and preparedness.

Finally, there are many sections within the Plan that provide policy direction to balance the need for new development with the burdens associated with that development. The Plan directs the County's decision makers to "evaluate and quantify potential impacts associated with high-impact, region-serving uses that may create burdens on the County (e.g., landfills, parole facilities, telecommunication towers, etc.) to ensure impacts are substantially mitigated. (*Imagine Adams County*, p. 38). The proposed amendments also support this notion of balancing the economic

considerations of resource development, while mitigating and addressing the impacts to existing communities and the natural environment.

Incorporation of Stakeholder Input:

Community and Economic Development Department Staff and County Attorney's Office held several meetings with stakeholders, including residents, neighborhood groups, environmental groups, the oil and gas industry, emergency management and response professionals, proximate local governments, and other regulatory agencies, early in the regulation development process with the goal of obtaining valuable input to inform the content of the regulations.

Staff conducted preliminary stakeholder and public engagement from February 18-23, 2021 to solicit general comments and input on the direction, goals, and concerns for the upcoming amendment process. Stakeholder groups included interested residents, neighborhood groups, environmental advocacy groups, industry, operators, and trade groups, other local governments and agencies, and emergency management and response professionals. Staff reviewed and considered the input received while drafting their recommendations for the first draft of text amendments that were presented during study sessions at to Planning Commission on March 11, 2021 and to the BoCC on March 16, 2021. Based on direction received, Staff released the official first draft of the amendments on April 6, 2021 for public and referral agency comment. Initial draft regulations were distributed by email to 257 stakeholders for comment and were posted to the County website.

Staff conducted additional public stakeholder meetings to solicit comments and questions on the draft regulations throughout late April 2021 via Zoom. The first public comment period closed on April 28, 2021. Staff reviewed, considered, and summarized all public comment received and utilized this stakeholder input for revisions to the draft regulations that were presented to the BoCC during a public Study Session on May 11, 2021. A summary of substantive comments and Staff's responses were posted to the County website prior to the release of a second draft. After further direction from the BoCC, Staff issued a second formal request for comments with a revised draft of the proposed regulations on May 19, 2021. Staff met, by request, with various stakeholders in early June to discuss their submitted comments and answer questions on the draft regulations prior to revisions and posting of the final draft of the amendments, which were released on June 24, 2021. Staff hosted a public open house at the Government Center on June 29, 2021 to answer resident questions about the final draft of the regulations prior to the hearings. An updated summary of comments including Staff recommendations is presented as Exhibit 3.1. All stakeholder, public, and referral agency comments received are included as Exhibits 3.21 through 3.53. The notice for public hearing was also published in the June 25, 2021 issue of the I-70 Scout/Eastern Colorado News and posted on the County's website.

Each stakeholder group submitted a robust list of comments on the proposed regulations. Many public comments requested more stringent notification, siting criteria, performance standards, and setback distance requirements than proposed. Additionally, public stakeholders requested the County address additional topics during this amendment process such as, reverse or reciprocal setbacks, financial assurance, and air quality regulations, which are currently scheduled for the second phase of oil and gas regulation amendments. Lastly, many residents and property owners submitted comments regarding the potential economic impacts of the proposed regulations on the

oil and gas industry, associated businesses, and the County finances and revenues. The most substantive comments were addressed through modifications to the proposed regulations.

The majority of concerns expressed by the oil and gas industry pertained to the prescriptive nature of specific regulatory requirements, clarity on the scope, intent, and applicability of the proposed regulations, and allowable waiver pathways for setback provisions and other performance standards. The most substantive concerns were addressed by Staff, resulting in modifications to the proposed regulations to all drafts of the amendments that clarify scope and intent, adjust certain requirements to ensure implementation of reasonable and necessary protective measures, as well as reconcile certain performance standards with the regulatory authorities of SB19-181 and alignment with applicable COGCC and CDPHE rules. All comments received from Operators, industry associations and representatives are presented as Exhibits 3.31 and 3.32.

Lastly, comments provided by referral agencies such as COGCC, Tri-County Health Department, and local school districts aided Staff in refining proposed regulatory language and incorporating changes to certain requirements to align with other jurisdictional regulations of oil and gas development operations. The proposed regulation amendments address the majority of the concerns and requests put forth by the stakeholders.

Regulatory Conformance:

Staff believes the proposed amendments within these sections and chapters of the regulations will ensure compliance with state laws, as allowed for by SB19-181. After extensive input from residents, neighborhood groups, the oil and gas industry, local school and fire districts, water districts, landowners, local governments, and referral agencies, Staff believes that most significant concerns were addressed. The revised regulations will provide protections for the health, safety, welfare, environment, and wildlife resources of Adams County, while continuing to allow responsible and appropriate development of mineral rights.

Staff Recommendation:

Staff believes the proposed amendments are necessary in order to respond to the current challenges for regulating oil and gas development in Adams County and the broader authorities granted under SB19-181. Based upon the criteria for approving a text amendment, Staff recommends Approval of this request with 3 findings-of-fact and 1 condition.

PLANNING COMMISSION UPDATE:

The Planning Commission held a public hearing on July 8, 2021 to discuss this case. There were 13 members of the public that provided comments at the hearing. The predominant concerns raised were regarding the proposed setbacks, including the increased distance, the measurement of setbacks, and the waiver process. Additionally, the public made comments on potential economic or financial impacts of the proposed amendments and suggested that many of the performance standards were either overly burdensome or not protective enough. The Planning Commission asked questions regarding the application and measurement of setbacks, the scientific justification for the recommendations, and questions regarding the application of the proposed noise provisions.

The Planning Commission recommend approval by a 4-3 vote.

RECOMMENDED FINDINGS OF FACT

1. The text amendment is consistent with the Adams County Comprehensive Plan.
2. The text amendment is consistent with the purposes of these standards and regulations.
3. The text amendment will not be detrimental to the majority of persons or property in the surrounding areas nor to the community in general.

RECOMMENDED CONDITION OF APPROVAL

1. The Community and Economic Development Department Staff may make minor corrections to these text amendments until August 10, 2021 including but not limited to, typographical errors, to ensure consistency and accuracy throughout the regulations.

Staff Recommendation:	Approval with 3 Findings of Fact and 1 Condition
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CHAPTER 2—APPLICATION AND PERMITTING PROCEDURES

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DRAFT

2-02-14 OIL AND GAS FACILITY (OGF) PERMIT**2-02-14-01 PURPOSE**

The purpose of the Oil and Gas Facility regulation is to allow for reasonable development of oil and gas in unincorporated Adams County while ensuring that facilities are sited in appropriate areas and utilize best practices to protect public health, safety, welfare, the environment, and wildlife resources. ~~the health, safety, and welfare of our residents and the environment and wildlife.~~

The purpose of an OGF Permit is to regulate the surface land use of oil and gas ~~development production in a manner that protects in order to protect~~ the public safety, health, welfare, ~~and~~ the environment and wildlife of Adams County and its residents by ensuring that facilities are constructed and operated in accordance with best practices, to provide for sound environmental practices to protect the County's natural resources, to provide for the orderly siting and development of oil and gas operations, as well as to prevent damage to County roads and bridges.

The Colorado Oil and Gas Conservation Commission (COGCC), the Colorado Department of Public Health and the Environment (CDPHE) and the federal government have authority to regulate certain aspects of oil and gas mineral extraction. Requirements contained in this section shall not exempt the owner or operator of an Oil and Gas Facility from compliance with the requirements of the COGCC, CDPHE, or any other regulatory authority.

The provisions of these standards and regulations shall apply to the construction, installation, alteration, repair, erection, location, maintenance, operation, and abandonment of all new or substantially modified oil and gas ~~f~~acilities within the unincorporated areas of the County. Substantially modified for the purposes of this section means anything requiring a Major Amendment.

2-02-14-02 APPLICABILITY

All uses that require an OGF must be processed in accordance with this Section. The Director of Community and Economic Development (CED) is the permit issuing authority for OGF Permits that do not require any waiver from approval criteria or performance standards. OGF Permits requiring waivers from approval criteria or performance standards must be approved by the Board of County Commissioners through the designated Waiver process.

2-02-14-03 WHO CAN INITIATE AN OGF PERMIT

An OGF Permit may be requested, without limitation, by any owner of, or person demonstrating a legal interest in property on which the OGF use is proposed to be located. The applicant has the burden of proof to demonstrate the use fully complies with these standards and regulations and meets the criteria for approval.

2-02-14-04 OGF PERMIT REVIEW PROCEDURES

An OGF Permit may be approved by the Director of Community and Economic Development if the application does not require waiver or modification from any approval criteria or performance standards. An OGF Permit requiring a waiver or modification from any of the approval criteria or performance standards, or as otherwise stated in these regulations, must be approved by the Board of County Commissioners and requires a public hearing. The Director of Community and Economic Development or the Board of County Commissioners shall approve, approve with conditions, or deny the OGF Permit based on consideration of the staff report, the evidence from the public hearing (if applicable), and compliance with the criteria for approval.

2-02-14-05 OGF PERMIT REVIEW STEPS

The processing of a proposed OGF permit shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures (although not necessarily conducted in the following order) as follows:

1. Conceptual Review. Operator shall identify three (3) proposed locations for the Oil and Gas facility for the Alternative Site Analysis process outlined below. For each location, Operator shall identify, and visually depict the same on a map, the following items that are located within a half-mile (1/2) radius of the parcel boundary of the proposed facility: existing or platted residences, occupied buildings, parks, open space, schools, future school facilities, state licensed daycares, known areas of environmental contamination such as superfund sites, hospitals, water bodies, floodplains, floodways, water supply facilities including wells, existing active and decommissioned wells, and roadways. Proposed access routes to the site should also be provided. This information must be submitted to Community and Economic Development for review. Following that, a conceptual review meeting shall be held with the Operator.

Operators are encouraged to schedule a conceptual review prior to entering into any surface use agreements.

- a. **Alternative Site Analysis:** Prior to submittal of Form 2 ~~or 2A~~, or Oil and Gas Development Plan to the COGCC and during the conceptual review, the applicant must consult with the County on an Alternative Site Analysis as outlined below:

(1) In General. The County seeks to site OGFs in areas that have the least off-site impact possible in order to protect the health, safety, and welfare of its residents and to protect the environment and wildlife. In order to determine whether proposed siting is appropriate, ~~CED staff~~ the Community and Economic Development Department must evaluate alternative sites.

(2) Description of potential sites. Applicant must submit descriptions of at least three (3) potential sites for the OGF that were considered by applicant. All potential site descriptions shall include Geographic Information System (GIS) data. The GIS data shall include, at a minimum, the outline edge of maximum disturbance and the access road for each proposed site. The description shall include an explanation of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.

(a) Potential sites ~~must be a minimum of~~ shall be: (1) a minimum of 500+1,000 feet away from each other but can be located on the same parcel; and (2) uniquely distinct different from one another as determined by the Director of Community and Economic Development. Description must include description of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off site impacts associated with those sites, and why a particular site is proposed, if any.

~~(2)(3)~~ Evaluation materials. ~~CED staff~~ the Community and Economic Development Department will evaluate the potential sites to determine which site is likely to have the least off-site impacts. The ~~CED~~ Director of Community and Economic Development will determine whether applicant is required to provide traffic impact studies, engineering studies, Environmental Impact Analysis as defined in these

standards and regulations, or other evaluation tools in order to adequately evaluate site options. If not required by the ~~CED~~ Director of Community and Economic Development as part of the alternative site analysis, these site-specific evaluation tools can be submitted by the applicant after site selection has occurred.

~~(3)~~(4) Evaluation criteria. In determining which sites are likely to have the least off-site impact, ~~CED~~ the Community and Economic Development Department may consider the following, at a minimum:

- (a) Distance from existing or platted residences, schools, state licensed daycares, high occupancy buildings, active open spaces, environmentally sensitive areas, public drinking water supply areas, or other areas likely to be adversely impacted;
- (b) Traffic impacts and impact to roads, bridges, and other infrastructure;
- (c) Access to water and other operational necessities;
- (d) Whether the site allows for utilization of impact mitigation, such as use of proximate pipelines;
- (e) Noise impacts;
- (f) The impact on the surrounding land;
- (g) The impact on wildlife; and
- (h) Impact on nearby environmental resources such as water bodies.

(5) Site Selection. The ~~C~~county shall review all proposed locations in order to determine which location(s) best protects public health, safety, welfare, ~~and~~ the environment, and wildlife resources and will choose the location that best satisfies this goal. The Director of Community and Economic Development will determine if any proposed sites meet this goal. If no location satisfies this goal, Operator shall submit three new proposed locations. The County may recommend denial of the OGF Permit if it does not believe that any of the proposed sites meet the siting goal. Site Selection as part of the Alternative Site Analysis, as outlined above, does not constitute the approval of an OGF application.

~~(4)~~(6) The County will make every effort to consult with the COGCC as part of the Alternative Site Analysis, as provided for in COGCC Rule 301.f.

2. Neighborhood Meeting: Applicable. At the neighborhood meeting, the applicant shall provide an overview of its proposed oil and gas operation and allow those in attendance to provide input as to the proposed operation, including, but not limited to, issues that arise from application of these regulations to the proposed operation, and suggested mitigation to adequately ensure compliance with these regulations. Where Disproportionately Impacted Communities, as defined in COGCC rules, are located within one (1)-half mile of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns, as determined by the Director of Community and Economic Development, based on primary and secondary languages, culturally sensitive methods of communication and, other socio-economic factors that impact public availability and participation in neighborhood meetings. If any additional neighborhood meetings are required, those meetings shall comply with the requirements of Section 4-11-02-03-03. Any additional neighborhood meetings shall comply with the Community Outreach requirements of Adams County Development Standards and Regulations (Chapter 4).
- ~~2-3.~~ Development Application Submittal: The Community and Economic Development Department has developed a checklist and development application guide for required submittals for OGF Permits that are subject to change (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed.
- ~~3.~~ Development Application Submittal: ~~the~~ Community and Economic Development ~~Department~~ has developed a check list ~~and~~ development application guide for ~~of~~ required submittals for OGF Permits that ~~are subject may change to change~~ from time to time (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed. At a minimum, the following items are required as part of an OGF application submittal:
- ~~4.~~ Application Form: a completed OGF Permit application form.
- ~~5.~~ Application Fee: OGF application fee
- ~~6-4.~~ Operations Plan:
- ~~(1) Plan Format:~~ Two hard copies of all plans shall be provided, and one copy of the plans shall be provided in digital format, on either a thumb drive or CD. No

~~plans shall contain copyright restrictions or public use restrictions.~~

~~(2) Cover Sheet: The cover sheet shall have a title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township and range. The cover sheet shall also include a legal description of the area, date of the drawing, existing zoning of the site, a sheet key, a vicinity map with north arrow (scale of 1" = 2,000' preferred) with an emphasis on the major roadway network within two (2) miles of the proposal, and all applicable County notes, an approval signature block and a block to insert the COGCC Permit number when approved.~~

~~(3) Impact Area Map: The second sheet shall contain an Impact Area Map that shows the proposed location of the Oil and Gas Facility, locations of all producing oil and gas wells and other oil and gas operations within the one-mile (1) impact area; locations of all abandoned and shut-in wells within one quarter (1/4) mile radius of the projected track of the borehole; locations of all permitted registered water wells within one-half (1/2) mile of the proposed Oil and Gas Operation; existing improvements within 1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one-mile impact area.~~

~~(4) Drilling Operations Plan: The third sheet shall provide a site plan of drilling operations with drilling equipment with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum acceptable to the County. The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.~~

~~(5) Production Plan: The fourth sheet shall provide a site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum~~

~~acceptable to the County. The production plan shall also identify tentative drilling and completion schedules. A seed mix shall be provided for reseeding the well pad. Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility; if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.~~

~~(6) Signage Plan/Sign Detail: A dimensioned Signage Plan or Sign Detail shall be included on one of the sheets describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs. Directional signs for emergency responders and inspectors shall be included, along with a 24-hour, 7-days per week contact information to deal with all noise complaints. The sign with the 24-hour contact information must be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way.~~

~~(7) Final Plan: Once the review process is complete and staff has determined that all outstanding issues have been resolved, staff will request a final copy of the Oil and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the County staff.~~

~~b. **Emergency Preparedness and Response:** in accordance with the Emergency Preparedness and Response requirements in Section 4-10-02-03-03(9).~~

~~(1) Emergency Service Providers: The applicant must provide a commitment to serve ("will serve") letter from the authority having jurisdiction for providing emergency services (fire protection and emergency medical services) for that facility, or, where no authority has jurisdiction, from an emergency services provider with the ability to provide such emergency services.~~

~~c. **Engineering Documents:** The following technical Engineering documents are required by the CED staff unless otherwise waived:~~

~~(1) Construction Plans: If applicable, Construction Plans for the proposed Oil and Gas Operation's public improvements including road plan and profile sheets, storm drainage improvements plans and other public~~

~~improvements, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~

~~(2) Pavement Design Report: If applicable, a Pavement Design Report prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 7).~~

~~(3) Grading Erosion and Sediment Control: If applicable, a Grading, Erosion, Sediment Control Report and Plan as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~

~~(4)(1)~~ Transportation, roads, access standards, and fees:

(a) The applicant's transportation plan must be designed and implemented to ensure public safety and maintain quality of life for other users of the county transportation system, adjacent residents, and affected property owners.

(b) Where available, existing private roads shall be used to minimize land disturbance unless traffic safety, visual or noise concerns, or other adverse surface impacts clearly dictate otherwise.

(c) Access roads on the site and access points to public roads as identified in the application materials shall be reviewed by the Community and Economic Development Department CED department and shall be built and maintained in accordance with the engineering specifications and access road standards defined in the Adams County Development Standards and Regulations (Chapter 8).

~~(d) All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:~~

~~i. Access permit fees~~

~~ii. Oversize/overweight permit fees~~

~~iii. Right of way construction permit fees; and~~

~~iv. Traffic impact and road maintenance fees.~~

~~(e)(d)~~ Oil and gas operations must minimize impacts to the physical infrastructure of the

county transportation system. Any costs to improve county transportation system infrastructure necessitated by the proposed oil and gas operation shall be the responsibility of the Applicant. All transportation system infrastructure improvements and associated costs shall be determined by the -Community and Economic Development Department~~CED department~~. The County shall perform the work or arrange for it to be performed. If the Applicant disagrees with the infrastructure improvements or associated costs as assessed by ~~CED~~the Community and Economic Development Department, it may request that the department approve a different route for its proposed oil and gas operation that avoids the need for such improvements. Alternatively, the Applicant may engage a licensed civil engineering firm to perform a traffic impact study in accordance with Chapter 8 of the Development Standards and Regulations to independently evaluate county transportation system infrastructure improvements necessitated by the proposed oil and gas operation.

- ~~(5) Drainage study/technical drainage letter/plan: If applicable, a Drainage Study/Technical Drainage Letter/Plan prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~
- ~~(6) Floodplain Use Permit: The applicant must obtain a Floodplain Use Permit, in accordance with the latest version of the Adams County Development Standards and Regulations, if the proposed Oil and Gas construction disturbance or operation encroaches into the 100-year floodplain, or the access is crossing a major drainage way, as defined by the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~
- ~~(7) Natural Resource Conservation Overlay (NRCO): if the Oil and Gas Facility is located in the NRCO, a Resource Review may be required.~~

- ~~d. **Water Supply:** the applicant must provide proof of adequate water supply. Operator shall identify a water resource lawfully available for industrial use, including oil and gas development, to be utilized by Operator and its suppliers.~~
- ~~e. **Surface Owner Documentation:** Documentation as to whether the surface owner and others with interest in the property have authorized the proposed OGF.~~
- ~~f. **Additional Information:** Community and Economic Development will develop an application check list that may require additional information to process an OGF Permit application. In addition to the items required on the check list, the Director of Community and Economic Development may require additional information deemed necessary to evaluate particular applications.~~

7-5. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.

8-6. Staff Report: Applicable.

- a. Concurrent Referral and Review. County staff may refer the complete application review by the various County Departments and the County Attorney's Office, as deemed appropriate. An application may require review by outside experts or agencies such as the U.S. Army Corps of Engineers, if the project impacts a floodplain, life-safety providers, adjacent jurisdictions, local public health departments, and others as may be deemed appropriate. Operator shall reimburse the County for reasonable costs incurred in connection with the use of third-party expert reviewers.

9-7. Notice: Applicable, except notice shall be sent by the applicant to all property owners and current residents within ~~a one (1) half mile of~~ the proposed parcel where an application for an Oil and Gas Facility has been filed with the County, at a minimum, or greater, as determined by the Director of Community and Economic Development. The Notice shall meet the format prescribed by the County. The notice shall contain a statement informing the recipients of the notice that they may request written notification by the Applicant of the commencement of construction and commencement of drilling operations. The applicant shall provide written notification by U.S. Mail, which shall include an offer to consult, to any municipality, special district, or ~~Ce~~ county whose boundaries are within one-half (1/2) mile of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County. Posted notice shall

be required for all OGF Permits. The signs shall be posted by the County on the subject property in a manner and at a location to afford the best notice to the public. Posting for an OGF Permit shall take place no later than ten days after the Operator selects a site for the facility.

~~10-8.~~ Public Hearing. Applicable if the OGF Permit requires non-administrative waiver from any approval criteria or performance standards. In cases requiring a waiver, a public hearing shall be held in front of the Board of County Commissioners.

~~11-9.~~ Standards: Applicable.

~~12-10.~~ Conditions of Approval: Applicable. The Director of Community and Economic Development in approving a permit for an OGF may attach any conditions necessary to implement the Adams County Comprehensive ~~Plan~~ Plan, and to ensure the compatibility with adjacent uses, and are protective of public health, safety, welfare, the environment, and wildlife resources. Conditions may include a requirement of an Access Permit or Oversize Load Permit prior to development of the Oil and Gas Facility, a Floodplain Use Permit prior to any work within the floodplain, or a building permit prior to construction of certain structures within the Oil and Gas Facility.

a. Term: The approving authority shall specify the term of the OGF Permit as three (3) years. If, at the expiration of the three (3) year period, a well is not completed or has not commenced production operations as defined by the COGCC Rules and Regulations, the approval of that well shall lapse. For any wells for which approval has lapsed, the applicant shall be required to apply for a new OGF Permit in accordance with these regulations. ~~the following: provided that at least one well is drilled and completed during the initial three (3)-year period following all required State and local approvals of the OGF, such action permanently vests the permitted location for the number of wells contained within the initial permit approval. If wells permitted as part of the initial OGF permit are to be drilled at the multi-well pad location following expiration of the initial three (3)-year period, those permit(s) for those wells shall be renewed following the OGF permit process as outlined in these regulations.~~

~~13-11.~~ Amendments. Applicable. All amendments must be processed in accordance with Section 2-01-10, Amendments. Major Amendments for OGFs include, at a minimum, any amendments to a Form 2A with the COGCC. For purposes of an OGF Permit, anything not identified as a major amendment shall be processed as a Minor Amendment.

2-02-14-06 CRITERIA FOR APPROVAL

The Board of County Commissioners or Director of Community and Economic Development, in approving an OGF Permit, shall consider:

1. The OGF is consistent with the purposes of these standards and regulations.
2. The OGF will comply with the requirements of these standards and regulations including, but not limited to, all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
3. The siting of the OGF, after evaluation of alternative sites, is the most compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare, the environment and wildlife of the County.
4. The siting of the OGF does not create any site-specific conditions that present significant or material impacts to nearby land uses.
5. The OGF has addressed off-site impacts and complies with all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
6. The site is suitable for the use, including adequate usable space, adequate access, and adherence of environmental or wildlife stipulations.
7. The site plan for the proposed use will provide adequate parking, traffic circulation, fencing, screening, and landscaping.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are available and adequate to serve the needs of the OGF as designed and proposed.
9. Cultural and Historical Resources: the OGF does not cause significant degradation of cultural, historic, or archaeological sites eligible for County landmarking, or the National Historic Register.
10. Water Bodies and Water Quality: the OGF does not cause adverse impacts to surface or ground waters within Adams County. The Operator shall comply with all applicable water quality standards.
11. Emergency Preparedness and Response: the OGF does not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
12. Air Quality: The OGF meets all required air quality standards.

2-02-14-07 OIL AND GAS FACILITY PERMIT WAIVER**2-02-14-07-01 PURPOSE**

The purpose of this section is to establish criteria and detail the steps whereby the Board of County Commissioners, at public meeting, may grant waivers or modifications from approval criteria or performance standards normally required for OGF Permits, allow the OGF use in an area not zoned for OGFs, or allow applicant to develop an OGF site not selected by Community and Economic Development.

2-02-14-07-02 APPLICABILITY

If the OGF permit application is denied based on noncompliance with the approval criteria or performance standards, if the applicant seeks to develop in an area not zoned for OGF development, or if an applicant seeks to develop on a site not approved by ~~CED staff~~ the Community and Economic Development Department, an applicant may apply for an Oil and Gas Facility Permit Waiver.

2-02-14-07-03 WHO CAN INITIATE A WAIVER

A waiver may be proposed by any applicant that may apply for an OGF. The applicant has the burden of proof to demonstrate that the waiver or proposed site selection meets the criteria for approval.

2-02-14-07-04 WAIVER REVIEW PROCEDURES

Any waiver shall be processed through a public hearing before the Board of County Commissioners (See Steps 1 through 10 below). Waiver applications will be heard by the Board of County Commissioners at a public hearing. At such public hearing, the Board of County Commissioners may waive or modify specific regulations or standards requested by the applicant and approve the application, may approve with conditions, or may deny the application.

Applicants may only seek a waiver after submitting a complete application for an OGF Permit and participating in a conceptual review meeting with Community and Economic Development staff. If applicant is unable to meet all approval criteria and comply with all performance standards required for an OGF Permit, applicant may choose to seek a waiver from the Board of County Commissioners. The processing of a waiver shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures as follows:

1. Conceptual Review: Must be completed prior to application for waiver as part of OGF Permit process.
2. Neighborhood Meeting: Director of Community and Economic Development will determine whether neighborhood meetings are required after evaluating steps taken as part of OGF process.
3. Development Application Submittal: In addition to all requirements for an OGF Permit, applicant must provide a request for waiver that articulates the specific waivers sought and explains why waivers are necessary.
4. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.
5. Staff Report: Applicable.
6. Notice: Applicable.
7. Public Hearing: Applicable. A public hearing shall be held before the Board of County Commissioners. Any requested waiver shall be reviewed and acted upon by the Board of County Commissioners prior to issuance of an OGF Permit.
8. Standards: Applicable.
9. Conditions of Approval: Applicable. The Board of County Commissioners, in approving a waiver for an OGF Permit, may attach any conditions necessary to implement the Adams County Comprehensive Plan and to ensure the compatibility with adjacent uses.
10. Amendments: Applicable.

2-02-14-07-05 *CRITERIA FOR APPROVAL*

The Board of County Commissioners, in approving a waiver, shall find:

1. Extraordinary hardships or practical difficulties result from strict compliance with these standards and regulations
2. The purpose of these standards and regulations are served to a greater extent by the alternative proposal.
3. The waiver does not have the effect of nullifying the purpose of these standards and regulations.

2-02-14-07-06 *ADDITIONAL CRITERIA FOR A ZONE DISTRICT WAIVER*

The Board of County Commissioners, in approving zone district waiver, in addition to the criteria outlined above, shall find:

1. The proposed Oil and Gas Facility is consistent with the Adams County Comprehensive Plan.
2. The proposed Oil and Gas Facility is compatible with the surrounding area, harmonious with the character of the neighborhood, and not

detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare or the environment of the inhabitants of the area and the County.

2-02-14-07-07 ADDITIONAL CRITERIA FOR A SETBACK WAIVER

The Board of County Commissioners, in approving a setback waiver, in addition to the criteria outlined above, shall find:

1. if the The Oil and Gas Facility is deemed to provides substantially equivalent protections to public health, safety, welfare, the environment, and wildlife resources that are equal to or more effective to satisfy the criteria of approval. The criteria for determining substantially equivalent protections may include, but are not limited to:
 - i. The location of receptors and proximity of those receptors;
 - ii. The location, nature, and size of the facility;
 - iii. The duration and intensity of all phases of operation at the Oil and Gas Facility;
 - iv. The extent to which the Oil and Gas Facility design, any planned best management practices, best available control measures and technologies, and conditions of approval avoid, minimize, and mitigate adverse impacts;
 - v. The extent to which the Oil and Gas Facility is compatible with the surrounding area, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County;
 - vi. The level of consent or waivers obtained from primary resident(s), landowners, or applicable Public Water System(s) located within the setback and;
 - vii. The extent to which the Oil and Gas Facility will minimize, avoid, mitigate, and offset cumulative impacts.

2-02-15 AMENDMENT TO TEXT OF THE STANDARDS AND REGULATIONS AND/OR ZONING MAP (REZONING) AND/OR COMPREHENSIVE PLAN

2-02-15-01 PURPOSE

The purpose of this section is to detail the steps to follow for changing the text of these standards and regulations, or the boundaries of the zone districts shown on the Zoning Map (Rezoning), or the Comprehensive Plan.

2-02-15-02 APPLICABILITY

All amendments to the text of these standards and regulations and any changes to the Zoning Map or Comprehensive Plan must be processed in accordance with this section. Only the Board of County Commissioners may, after recommendation of the Planning Commission, adopt a resolution amending the text of these standards and regulations, or the Zoning Map, or the Comprehensive Plan.

2-02-15-03 WHO CAN INITIATE A TEXT, ZONING MAP, OR COMPREHENSIVE PLAN AMENDMENT

2-02-15-03-01 *AMENDMENT TO ZONING MAP (REZONING)*

An amendment to the Zoning Map may be proposed, without limitation, by the Planning Commission, the Board of County Commissioners, or the owner(s) of the property to be rezoned.

In addition, a municipality, airport authority, or other owner or operator of an aviation facility available for public use may propose an amendment to the Zoning Map to establish or amend an Aviation Zone or Influence Area Overlay District for the area including area surrounding an aviation facility.

2-02-15-03-02 *AMENDMENT TO COMPREHENSIVE PLAN*

An amendment to the Comprehensive Plan may be proposed, without limitation, by the Planning Commission, the Board of County Commissioners, the Director of Community and Economic Development or the owner(s) of the property to be amended on the plan.

2-02-15-03-03 *TEXT AMENDMENT*

An amendment to the text of these standards and regulations may be proposed by the Planning Commission, Board of County Commissioners, the Director of Community and Economic Development, the Director of Public Works,* any owner or person having an interest in land located within the unincorporated area of the County, or any resident of the County.

The applicant has the burden of proof to demonstrate a text or a Zoning Map amendment fully complies with these standards and regulations and meets the criteria for approval.

***Adopted by the BOCC on June 27, 2011.**

2-02-15-04 TEXT, ZONING MAP, AND COMPREHENSIVE PLAN AMENDMENT REVIEW PROCEDURES

An amendment to the text of these standards and regulations, an amendment to the Zoning Map, or an amendment to the Comprehensive Plan may be approved by the Board of County Commissioners by resolution. Any proposed amendment shall be processed through a public hearing before the Planning Commission, which shall provide a recommendation to the Board of County Commissioners (See Steps 1 through 10 below). Upon completion of a hearing by the Planning Commission, the amendment and recommendation of the Planning Commission shall be forwarded to the Board of County Commissioners. The Board of County Commissioners shall, after receiving a recommendation from the Planning Commission, hold a public hearing. The Board of County Commissioners shall then approve, approve with conditions, or deny the amendment based on consideration of the staff report, the Planning Commission's recommendation and findings, the evidence from the public hearings, and the amendment's compliance with the criteria for approval. In the case of a Comprehensive Plan amendment, the Planning Commission shall make a decision on the amendment and the matter will be referred to the Board of County Commissioners to ratify the decision at a public hearing.

2-02-15-05 TEXT, ZONING MAP, AND COMPREHENSIVE PLAN AMENDMENT REVIEW STEPS

The processing of a proposed text, Zoning Map, or Comprehensive Plan amendment shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures as follows:

1. Conceptual Review: Applicable.
2. Neighborhood Meeting: Optional, unless the Director of Community and Economic Development, or in the case of Comprehensive Plan Amendment the Director of Community and Economic Development, determines the development proposal could have significant neighborhood impacts.
3. Development Application Submittal: All items or documents required for amendment of the text of these standards and regulations and/or to the Zoning Map as described in the development application submittal requirements shall be submitted to the Director of Community and Economic Development at least fifty (50) days prior to the first unfilled Planning Commission public hearing agenda.
4. Determination of Sufficiency: Applicable. No application shall be processed if any taxes due are not paid.
5. Staff Report: Applicable.

6. Notice:
 - a. Text Amendments: Partially applicable. Publication in the official County newspaper is required. Written notice and posting are not required.
 - b. Zoning Map Amendments (Rezoning): Applicable.
7. Public Hearing: Applicable. A public hearing shall be held before both the Planning Commission and Board of County Commissioners.
8. Standards: Applicable.
9. Conditions of Approval: Applicable. The Board of County Commissioners in approving a Zoning Map amendment may attach conditions necessary to implement the Adams County Comprehensive Plan and ensure compatibility with adjacent uses.
10. Amendments: Applicable.

2-02-15-06 CRITERIA FOR APPROVAL

2-02-15-06-01 TEXT AMENDMENTS

The Planning Commission, in making their recommendation, and the Board of County Commissioners, in approving a text amendment, shall find:

1. The text amendment is consistent with the Adams County Comprehensive Plan.
2. The text amendment is consistent with the purposes of these standards and regulations.
3. The text amendment will not be detrimental to the majority of persons or property in the surrounding areas nor to the community in general.

2-02-15-06-02 ZONING MAP AMENDMENTS (REZONING)

The Planning Commission, in making their recommendation, and the Board of County Commissioners, in approving a Zoning Map amendment, shall find:

1. The Zoning Map amendment is consistent with the Adams County Comprehensive Plan.
2. The Zoning Map amendment is consistent with the purposes of these standards and regulations.
3. The Zoning Map amendment will comply with the requirements of these standards and regulations.
4. The Zoning Map amendment is compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County.

CHAPTER 4—DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

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3. Marijuana Hospitality Business (see section 4-18-07 for detailed performance standards)
4. Outdoor Storage, Loading and Garbage Areas (see Section 4-03-04-02-~~0203~~ Accessory Uses, Commercial for detailed performance standards)
5. Parking (see Section ~~4-1304-22~~ Parking and Loading for detailed performance standards)
6. Signs (see Section 4-01 Signs and Outdoor Commercial Advertising Devices for detailed performance standards)
7. Solar Energy Systems for use on Property (see Section 4-03-03-02-11 Accessory Uses, Residential for detailed performance standards)
8. Temporary Use. All temporary uses shall meet the temporary use performance standards contained in Section 4-05 and shall be required to obtain a Special Use Permit unless the temporary use is a permitted principal use within the zone district in which it will be located.
9. Vending and Produce Stands (see Section 04-03-02-02-05 Accessory Uses, Agricultural for detailed performance standards)
10. Wind Powered Generators (see Section 4-03-02-02-06 Accessory Uses, Residential for detailed performance standards)
11. Other accessory uses approved by the Director of Community and Economic Development. The Director of Community and Economic Development may require the accessory use meet performance standards for similar uses permitted by these standards and regulations.

4-03-04-02 PERFORMANCE STANDARDS

4-03-04-02-01 **GUARD DOGS**

1. *Number of Guard Dogs Permitted:* See the Animal Density Table in Section 4-20 to calculate the number of permitted household pets.
2. *Confinement of Guard Dog(s):* The area being patrolled by a guard dog(s) shall be fenced with a minimum seventy-two (72) inch high chain link or solid screen fence.
3. *Notice of Guard Dog(s):* A sign warning of the presence of said dog(s) stating what hours the dog(s) is on patrol shall be posed in plain view of the public around the perimeter of the fenced area. The sign must also state the name of the owner and the handler of the dog(s), with a phone number where the handler can be reached.
4. *Garbage Disposal:* All animal and food waste shall be handled and disposed of in a sanitary manner as approved by Tri-County Health Department.
6. *Pest Control:* Environmental and/or chemical and scientific controls shall be provided for pest control.

- g. *Vector Controls*: All sites shall maintain vector controls as prescribed by the approved plan.
- h. *CDPHE Regulations*: Colorado Department of Public Health and Environment Regulations 6CCR 1007-2, Section 14 are hereby incorporated in these Zoning Regulations.
- 6. *Infectious Waste Disposal Site and/or Processing Facility Standards* (required in addition to General Standards)
 - a. *Radiation Monitoring Program*: The operator shall operate a radiation monitoring program in accordance with an approved plan.
 - b. *General Monitoring Program*: The general monitoring program, approved by the County for each infectious waste disposal and/or processing facility, shall be adhered to.
 - c. *Temperature Operating Charts*: Temperature operating charts from an infectious waste disposal and/or processing facility shall be retained for two (2) years for review by the Director of Community and Economic Development. The County may require additional monitoring if a facility has problems maintaining a temperature or other operational standard.
 - d. *Truck Washing*: All trucks shall be washed at least once a week with a detergent and disinfectant to minimize nuisance conditions, unless spills or leaks are detected which must be disinfected immediately. All wash water shall be properly controlled to prevent runoff.
 - e. *Waste Incineration*: Infectious waste incineration facilities shall be permitted to burn infectious waste only. Incineration of wastepaper, contraband, or other materials is not permitted unless specifically approved as part of the wastestream.
- 7. *Hazardous Waste Disposal Site and Facility Standards*: All hazardous waste disposal sites and facilities shall meet the standards established by State and Federal regulatory requirements.

4-11-02-03-03

OIL AND GAS FACILITY

4-11-02-03-03-01

Purpose

This Section is enacted to protect and promote the health, safety, values, convenience, order, prosperity and general welfare of the current and future residents of the County. It is the County's intent by enacting this Section to facilitate the development of oil and gas resources within the unincorporated area of the County while avoiding or mitigating potential land use conflicts between such development and existing, as well as planned, land uses. It is recognized that under state law the surface and mineral estates are separate and distinct interests in land and that one may be severed from the other. Owners of subsurface mineral interests have certain legal rights and privileges, including the right to use that part of the surface estate reasonably required to extract and develop their subsurface mineral interests from a consenting

surface owner, subject to compliance with the provisions of this Section and any other applicable statutory and regulatory requirements. Similarly, owners of the surface estate have certain legal rights and privileges, including the right to have the mineral estate developed in a reasonable manner and to have adverse impacts upon their property, associated with the development of the mineral estate, avoided or mitigated through compliance with this Section.

4-11-02-03-03-02

Definitions

Oil and Gas Facility means an oil and gas facility as defined by the rules ~~and regulations~~ and regulations of the Colorado Oil and Gas Conservation Commission (“COGCC”); For any other definition not listed in this section, the definitions listed in Chapter 11 of the Adams County Development Standards and Regulations and the COGCC’s regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the COGCC’s definitions, the COGCC’s definitions shall prevail. If the term is not found in the COGCC’s definitions or in Chapter 11, the term shall have its common meaning along with the spirit and intent of the Development Standards and Regulations and may be subject to interpretation by the Director of Community and Economic Development or his or her designee.

~~For any other definition not listed in this section, the definitions listed in Chapter 11 of the Adams County Development Standards and Regulations and the COGCC’s regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the COGCC’s definitions, the COGCC’s definitions shall prevail. If the term is not found in the COGCC’s definitions or in Chapter 11, the term shall have its common meaning along with the spirit and intent of the Development Standards and Regulations and may be subject to interpretation by the Director of Community and Economic Development or his or her designee.~~

4-11-02-03-03-03

General Provisions

1. Access: Oil and gas well installation shall be located to provide convenient access, shall accommodate the traffic and equipment related to the oil and gas operations and emergency vehicles, and shall conform to ~~comply with~~ COGCC rules and Adams County Development Standards and Regulations. Oil and gas operations shall ~~must~~ avoid or minimize impacts to the physical infrastructure of the county transportation system.

1-2. Signage: A sign with the 24-hour, 7-days per week contact information shall be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way. Signage shall conform to follow ~~follow~~ COGCC regulations for signage and posting.

2-3. Building Permit Required: For all new or substantially modified wells, a building permit is required for the installation of permanent electrical, pumps, tank batteries, and all other above-ground structures as well as any other applicable permits including, but not limited to, culvert permits, oversized-load permits, and floodplain use permit.

~~3.4.~~ Setbacks: Oil and Gas Facilities shall be at least ~~2,000~~ 1,000 feet from the property line of any existing residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, ~~and~~ environmentally sensitive areas, and designated parks and open spaces. Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

a. Setbacks will be measured from the edge of the Oil and Gas Location, as defined by the COGCC, ~~of maximum disturbance which includes the rough grading footprint of the Oil and Gas Facility, including the final landscaping boundary.~~ The measurement of setbacks will not include the access road.

b. Administrative Waiver from ~~s~~Setback ~~r~~Requirements: an administrative waiver may be obtained from the setback requirements if the Operator receives a written waiver from each primary resident, and property owner located ~~-~~within the setback. Staff will evaluate the granting of an Administrative Waiver from setback requirements based on the following criteria: including, but not limited to: (1) the number of affected residents within the setback, ~~receptors,~~ (2) location, ~~nature,~~ and size of the facility, (2) size of the facility, (4) compatibility of the facility with surrounding land uses; and (5) conformance with the Adams County Comprehensive Plan.

i. No Administrative Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.

c. For Oil and Gas Facilities that do not meet the above setback requirements: A waiver may be granted by the Board of County Commissioners that complies with the requirements of Section 2-02-14-07-07. ~~after a public hearing if the Oil and Gas Facility is deemed to provide substantially equivalent protections to public health, safety, welfare, the environment, and wildlife resources that are equal to or more effective to satisfy the criteria of approval. The criteria for determining substantially equivalent protections may include, but are not limited to:~~

i. ~~The location of receptors and proximity of those receptors;~~

ii. ~~The location, nature, and size of the facility;~~

iii. ~~The duration and intensity of all phases of operation at the Oil and Gas Facility;~~

iv. ~~The extent to which the Oil and Gas Facility design, any planned best management practices, best available control measures and technologies, and conditions of approval avoid, minimize, and mitigate adverse impacts;~~

- ~~v. The extent to which the Oil and Gas Facility is compatible with the surrounding area, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County;~~
- ~~vi. The level of consent or waivers obtained from primary resident(s), landowners, or applicable Public Water System(s) located within the setback and;~~
- ~~vii. The extent to which the Oil and Gas Facility will minimize, avoid, mitigate, and offset cumulative impacts.~~

~~4.5.~~ Fees and Permits: All applicable County fees adopted by the County, including postage fees and inspection fees, must be paid at time of application and prior to issuance of a building permit, including for all applicable permits required by the Adams County Development Standards and Regulations.

~~5.6.~~ Oil and Gas Road Impact and Maintenance Fees:

- a. Operators ~~shall~~must pay oil and gas road impact and maintenance fees, as approved by the Board of County Commissioners, for all proposed oil and gas wells and pads. This fee shall be paid at the time of issuance of an Oil and Gas Facilities Permit or at the time of issuance of a building permit, and prior to the commencement of any ground disturbing activities. Any person or entity required to pay the oil and gas road impact fee may elect to submit an independent study and fee calculation to demonstrate that the nature, timing, or location of the proposed oil and gas development is likely to generate impacts costing less to mitigate than the amount of the fee that would be generated by the use of the fee schedule. Any independent fee study for oil and gas development shall generally follow the methodology established in the Adams County Oil & Gas Traffic Impact Study.
 - i. The preparation of the independent fee calculation study shall be the sole responsibility of the electing party.
 - ii. Any person or entity who requests to perform an independent fee calculation study shall pay an application fee for administrative review. An administrative decision related to the independent study may be appealed to the Board of County Commissioners. The appeal shall be filed within 14 days of staff decision and shall follow the appeal process established for OGF Permit Waivers.

~~6.7.~~ Safety Standards:

- a. Operator shall implement a safety management plan and maintain a safety management system applicable to all covered processes.

Upstream facilities consisting of a standard, repeatable design may be covered with a single safety management plan. The safety management system shall provide for employees and systems to oversee implementation and periodic revision of the plan. The plan shall include the following elements and describe the manner in which each of the following elements will be applied to the covered processes:

- i. Process safety information. Compilation of written process safety information needed to conduct process hazard analysis. Process safety information shall include information pertaining to hazards of substances and chemicals used by the process, information pertaining to the technology of the process, information pertaining to the equipment used in the process, and information pertaining to the hazards of the substances or chemicals in the process. Documentation that equipment used in the process complies with recognized and generally accepted good engineering practices;
- ii. Operating procedures. Written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information, and at least annual review of operating procedures to ensure they reflect current operating practices;
- iii. Employee participation. Plan for ensuring employee participation in conduct and development of process hazards analysis and access to process hazards analysis;
- iv. Training. Written procedures detailing initial and refresher employee training requirements and documentation of employee training;
- v. Mechanical integrity. Written procedures designed to maintain the on-going integrity of process equipment, ensure employees involved in maintenance are properly trained to ensure the ongoing integrity of process equipment, ensure that process equipment is tested and inspected in accordance with manufacturer specifications, correct deficiencies in equipment in a safe and timely manner, and ensure that new equipment is installed or constructed properly;
- vi. Management of change. Written procedures to manage changes to covered processes, technologies, equipment and procedures;
- vii. Pre-startup reviews. Written procedures regarding pre-startup safety reviews;
- viii. Compliance audits. Written procedures requiring an audit every five years to verify compliance with the procedures and practices developed under the safety management plan, and procedures

- requiring correction of any deficiencies identified in audit; operator will make results of audit available to inspector upon request;
- ix. Incident investigation. Written procedures requiring investigations of all near-misses and incidents, including root cause analysis of all incidents resulting in fatalities or serious environmental harm, establishing a system to promptly address and resolve the incident, and requiring that all employees and contractors whose job tasks are relevant to the investigation of the near miss or incident review the investigation report.
 - x. Hot work. The facility shall ensure that all hot work complies with local and state fire prevention and protection requirements.
 - xi. Contractors. Written procedures describing how operator screens, oversees, shares process safety and emergency response and preparedness information with contractors;
 - xii. Process hazard analysis. Process hazard analysis for each covered process;
 - xiii. Incident history. List of all reportable safety events as defined by the COGCC rules and regulations that have occurred at the operator's facilities within the last five years, along with any investigation reports, root cause analysis and operational or process changes that resulted from the investigation of the accident;
 - xiv. Safety culture assessment. Written procedures requiring operator periodically review safety culture, and at a minimum conduct such review after each major accident; and
 - xv. Inherently safer systems analysis. Require analysis at least every five years, whenever a change is proposed at the facility that could result in an incident, after an incident if recommended by the investigation report or root cause analysis, and during the design of new processes, equipment or facilities.
 - xvi. Operator shall make available the safety management plan to Adams County at the County's request. Adams County may retain outside consultants to review safety management plan and may request modifications to safety management plan based on its review. Operator ~~shall must~~ reimburse County for any costs associated with retaining outside consultants.
- b. Automatic safety protective systems and surface safety valves. Operator is required to install automated safety system prior to commencement of production. Automated safety system shall include the installation, monitoring and remote control of a surface safety valve or a wellhead master control valve and shall be able to remotely shut in wells on demand. Surface safety valve or a wellhead master control valve shall be equipped to operate remotely via the automated

safety protective system. Operator shall test the automated safety system ~~quarterly to~~quarterly to ensure functionality and provide results of testing to County ~~quarterly~~within 14 days of such testing.

c. Incident and accident reporting.

- i. Incidents. ~~As soon as practicable, but no more than~~Within a week~~three (3) days~~ of any reportable safety event or emergency situation as defined by the COGCC, ~~O~~operator shall submit a report to the County including the following, to the extent available:

(a) Fuel source, location, proximity to residences and other occupied buildings, cause, duration, intensity, volume, specifics and degree of damage to properties, if any beyond the facility, injuries to persons, emergency response, impacts, if any, to public health, safety, welfare, the environment or wildlife resources, and remedial and preventative measures to be taken within a specified amount of time.

~~(a)(b)~~ If public health, safety, welfare, the environment or wildlife resources are threatened, the Operator responsible for the operation causing the threat shall immediately notify the County's Local Government Designee ("LGD") electronically and orally.

- ii. County may require operator to conduct root cause analysis of any incidents or Grade 1 gas leaks, as defined by the COGCC.
- iii. Operator shall keep a daily incident log that shall be made available to Adams County upon request. Any spill or release that is reportable to the COGCC shall be simultaneously reported to the County's LGD and applicable fire district.
- iv. ~~The Operator shall notify~~ Notification to the County's LGD within 24 hours of discovery ~~of~~ all spills of one barrel or more that leaves the facility or released outside of berms or secondary containment, all spills of any material or volume on permeable ground at the facility that has a reportable spill quantity under any law, all spills or releases required to be reported by COGCC regulations, and copies of any self-reporting submissions that operator provides to the COGCC.
- v. Notification of the surface owner or the surface owner's tenant, and the water rights holder if applicable, of spills and releases in conformance with COGCC Rules.
- vi. The Operator may be required to obtain additional permits from the County, such as an inert fill or access permits, for site remediation as defined in Chapter 4 of the Adams County Development Standards and Regulations.

d. Worker Training and Records

- i. Workers at an OGF shall have nationally recognized certifications for the work they are performing. This includes, but is not limited to, Hazard Communications Training, Hazardous Waste Operations Certifications, heavy equipment operator training, and welding certifications per API 1104 and/or ASME Section 9.
- ii. All workers at an OGF shall have completed a nationally recognized occupational safety and health training program.
- iii. Upon request from the County, the Operator shall supply the County written procedures detailing employee training requirements and training records.

7-8. Spill Prevention and Containment. Oil and gas operations shall be in compliance with COGCC safety and spill and release requirements.

- a. Requirements to minimize and prevent liquid spills and releases include the following:
 - i. Berms or other secondary containment devices around crude oil, condensate, and produced water storage tanks enclosing an area sufficient to contain and provide secondary containment for ~~150~~110% of the largest single tank.
 - ii. Berms or other secondary containment devices shall be sufficiently impervious to contain any spilled or released material.
 - iii. Inspection of all berms and containment devices at regular intervals, but not less than monthly. Berms shall be inspected within forty-eight (48) hours of a precipitation event of 1.0" or more, and Operator shall make necessary repairs as soon as possible, but not more than seventy-two (72) hours after the event.
 - iv. Maintain all berms and containment devices to ensure they are in good condition.
 - v. A prohibition on the storage or use of ignition sources inside the secondary containment area unless the containment area encloses a fired pressure vessel.
 - vi. Construction of containment berms using steel rings, designed and installed to prevent leakage and resist degradation from erosion or routine operation.
 - vii. Construction of secondary containment areas with a synthetic or engineered liner that contains all primary containment vessels and flowlines and is mechanically connected to the steel ring to prevent leakage.

- viii. For locations within 500 feet and upgradient of a surface water body or ground water source, tertiary containment, such as an earthen berm, around oil and gas facilities. Alternatively, the County may require Operator to install retention ponds for stormwater management.
- ix. Discharge valves shall be secured, inaccessible to the public and located within the secondary containment area. Open-ended discharge valves shall be placed within the interior of the tank secondary containment.
- b. Anchoring. Anchoring is required within floodplain or geological hazard areas, as needed to resist flotation, collapse, lateral movement, sinking, or subsidence, and in compliance with Federal Emergency Management Agency (FEMA). All guy line anchors left buried for future use shall be identified by a marker of bright color not less than four feet in height and not greater than one (1) foot east of the guy line anchor.

8.9. Chemical Handling and Requirements

- a. The owner or operator of any installation that is required to prepare or have available a safety data sheet for a hazardous chemical under the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 et seq., and regulations promulgated under that Act, shall submit both a safety data sheet (SDS) for each such chemical and an annual emergency and hazardous chemical inventory form to the Local Emergency Planning Commission (LEPC) and the local fire district. A comprehensive and universal listing of all hazardous chemicals stored, handled, and/or used on site must be maintained in an inventory list and must be made available to the County upon request.
- b. Drilling and completion chemicals shall be removed at most sixty days after completion.
- c. Operator shall provide to the County a copy of the chemical disclosure registry form provided to the COGCC pursuant to the COGCC's "Hydraulic Fracturing Chemical Disclosure" rule prior to conducting hydraulic fracturing.
- d. The following toxic, including orally toxic chemicals shall not be added to the hydraulic fracturing fluid:
 - 1. Benzene
 - 2. Lead
 - 3. Mercury
 - 4. Arsenic
 - 5. Cadmium
 - 6. Chromium
 - 7. Ethylbenzene
 - 8. Xylene

9. 1,3,5-trimethylbenzene
10. 1,4-dioxane
11. 1-butanol
12. 2-butoxyethanol
13. N,N-dimethylformamide
14. 2-ethylhexanol
15. 2-mercaptoethanol
16. Benzene, 1, 1'-oxybis-,tetrapropylene derivatives, sulfonated, sodium salts
17. Butyl glycidyl ether
18. Polysorbate 80
19. Quaternary ammonium compounds, dicoco alkyldimethyl, chlorides
20. Bis hexamethylene triamine penta methylene phosphonic acid
21. Diethylenetriamine penta
22. FD&C blue no 1.
23. Tetrakis (triethanolaminate) zirconium (IV) (TTZ)

9.10. Emergency Preparedness and Response

- a. In General. Oil and gas operations shall not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
- b. Emergency Preparedness Plan. Each Applicant with an operation in the County is required to implement an emergency preparedness plan for each specific oil and gas facility. The plan shall be referred to the Office of Emergency Management (OEM), and the applicable fire district, filed with the County and updated on an annual basis or as conditions change (responsible field personnel change, ownership changes, etc.). The emergency preparedness plan shall consist of at least the following information:
 - i. Name, address and phone number, including 24-hour emergency numbers for at least two persons located in or near Adams County who are responsible for emergency field operations.
 - ii. An as-built facilities map in a format suitable for input into the County's GIS system depicting the locations and type of above and below ground facilities including sizes, and depths below grade of all oil and gas gathering and transmission lines and associated equipment, isolation valves, surface operations and their functions, as well as transportation routes to and from exploration and development sites, for emergency response and management purposes. The information concerning pipelines and isolation valves shall be held confidentially by the

County's OEM, and shall only be disclosed in the event of an emergency. The County shall deny the right of inspection of the as-built facilities maps to the public pursuant to C.R.S. § 24-72-204.

- iii. Detailed information addressing each potential emergency that may be associated with the operation. This may include any or all of the following: explosions, fires, gas, oil or water pipeline leaks or ruptures, hydrogen sulfide or other toxic gas emissions, or hazardous material vehicle accidents or spills. For each potential emergency, threshold / trigger levels shall be pre-identified that govern when an emergency state is declared by the Applicant.
- iv. The plan shall include a provision that any spill outside of the containment area or which has the potential to leave the facility or to threaten a water body shall be reported to the emergency dispatch and the Director immediately.
- v. Detailed information identifying site access, evacuation routes as determined by first responders, impact zones for each emergency scenario identifying impacted facilities, and buildings and health care facilities anticipated to be used.
- vi. Project specific emergency preparedness plans are required for any project that involves drilling or penetrating through known zones of hydrogen sulfide gas.
- vii. The plan shall include a provision that obligates the Applicant to reimburse the appropriate emergency response service providers for costs incurred in connection with any emergency.
- viii. Detailed information that the Applicant has adequate personnel, supplies, and funding to implement the emergency response plan immediately at all times during construction and operations. Supplies can include adsorption boom, granulated materials, and coordination of foam supplies with the local first responders.
- ix. The plan shall include provisions that obligate the Applicant to keep onsite and make immediately available to any emergency responders the identification and corresponding Safety Data Sheets (SDS) of all products used, stored or transported to the site. The SDS sheets shall be provided immediately upon request to the Director, a public safety officer, or a health professional. In cases of spills or other emergency events, the plan shall include provisions establishing a notification process to emergency responders of potential products they may encounter, including the products used in the hydraulic fracturing fluids.

- x. The plan shall establish a process for informing surrounding neighbors and schools identified as being within the emergency impact zone of applicable emergency response plan and procedures.

~~10.11.~~ Recycle, Reuse and Disposal of Fluids:

- a. Operator shall recycle drilling, completion, flowback and produced fluids unless technically infeasible.
- b. Exploration & Production (E&P) Waste may be temporarily stored in tanks while awaiting transportation to licensed disposal or recycling sites.
- c. Produced Water must be transported by pipelines unless economically or technically infeasible.

~~11.12.~~ Stormwater Controls:

- a. Oil and gas operations shall be in compliance with COGCC rules related to stormwater management regulations and Adams County Stormwater Quality Regulations as contained in the Adams County Development Standards and Regulations / Ordinances and other applicable federal, state, and county requirements.
- b. The Owner or Operator must provide a stormwater management plan that identifies possible pollutant sources that may contribute pollutants to stormwater, best management practices, sampling procedures (if required), and inspections that, when implemented, will reduce or eliminate any possible water quality impacts.

~~12. Water Bodies and Water Quality:~~

- ~~a. General. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Rules, specifically with respect to spills and releases in floodplains and/or water bodies, and applicable water quality standards set by the Colorado Department of Public Health and Environment.~~
- ~~b. Water quality plan. Operators shall implement a water quality plan and make available to Adams County upon request. Such plan shall include details such as operator's plans for water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies. The owner or operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Rules. The owner or operator shall provide all water source test results to the county and maintain records of such results. The owner or operator shall make available to the County upon approval by the COGCC, its plans concerning downhole construction details and installation practices, including casing and~~

~~cementing design selected to protect surface waters and source water aquifers from contamination.~~

~~c. Wastewater Injection Wells used for produced water disposal are prohibited in Adams County.~~

~~d. Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering regulations. A "100-year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.~~

13. Well Plugging and Abandonment:

~~a.~~ An Operator shall comply with all COGCC rules regarding well abandonment and reclamation, including, but not limited to, removal of all equipment from the location and restoring the surface of the land to its original state. Notice of well plugging and abandonment shall be submitted by the Operator to the Community and Economic Development Department ~~within at least seven (7) days prior to the commencement of decommissioning or plugging operations~~ forty-eight (48) hours. Notice shall include, at a minimum, the approved Form 6 from COGCC, the surveyed coordinates of the decommissioned well or facility, planned or proposed access route(s), planned duration of activities, planned hours of operation, and a list of equipment to be utilized at the site.

~~b.~~ The Operator shall submit the COGCC required Notice of Intent to Abandon report to the County concurrently with the COGCC.

~~a-c.~~ Concurrently with notice to the County, n~~Notice shall be sent by the Operator or contractor to all property owners and current residents within one-half (1/2) mile of the Oil and Gas Facility, well, or site being decommissioned or plugged and abandoned. Notice shall occur at least seven (7) days prior to commencement of decommissioning or plugging operations.~~

~~b-d.~~ Decommissioned oil and gas well assessment. Prior to any hydraulic fracturing, and at periods following hydraulic fracturing, the Operator ~~shall~~ must perform assessment and monitoring of plugged and decommissioned or removed from use, and dry and removed from use oil and gas wells (abandoned wells) within one-quarter mile of the projected track of the borehole of a proposed well. The assessment and monitoring includes:

i. Identification of all abandoned wells located within one-quarter mile of the projected track of the borehole of a

proposed well based upon examination of COGCC and other publicly available records,

- ii. A Risk assessment of leaking gas or water to the ground surface or into subsurface water resources, taking into account plugging and cementing procedures described in any recompletion or plugged and abandoned (P&A) report filed with the COGCC.
- iii. Notification to the County and COGCC of the results of the risk assessment of the plugging and cementing procedures.
- iv. Permission from each surface owner who has an abandoned well on the surface owner's property to access the property in order to test the abandoned well. If a surface owner has not provided permission to access after thirty days from receiving notice, the applicant shall not be required to test the abandoned well.
- v. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well prior to hydraulic fracturing
- vi. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well within ninety (90) days after completion, and then every year after production has commenced if initial survey results suggest increased risk of leaking gas or water from the abandoned well.
- vii. Notification of the results of the soil gas survey to the County and the COGCC within three weeks of conducting the survey or advising the County that access to the abandoned wells could not be obtained from the surface owner.
- viii. In the event that contamination is detected during any soils testing, no further operations may continue until the cause of the contamination is detected and resolved and the County has given its approval for additional operations to continue.

~~e.e.~~ Marking of plugged and abandoned wells. The ~~O~~operator shall permanently mark by a brass plaque set in concrete, similar to a permanent bench mark to monument the plugged and abandoned well's existence and location. Such plaque shall contain all information required by the COGCC and the County.

14. Noise. The Operator shall control noise levels as follows:

- a. Prior to operations ~~O~~operator ~~will~~ shall obtain a baseline noise study that encompasses at least ~~five (5)~~ three days, one of those days being a weekend. The Operator may use the baseline noise study submitted with the Development Application to fulfill this requirement, if that noise study is completed within twelve (12) months of any ground disturbing activities.

- b. Beginning with construction and up to production, the County ~~will~~ may require continuous noise monitoring for all oil and gas facilities located with one-half mile (1/2), or greater depending on the location, nature, and size of the facility, of the property line of any existing residences, schools, state licensed daycares or high occupancy building units. and may require that this ~~The County may –require continuous noise monitoring~~ be conducted by an approved third-party consultant based on the location, nature, and size of the facility.
- c. The Operator ~~must shall conform to follow~~ COGCC Regulations for noise level.
- d. The Operator shall post 24-hour, 7 days per week contact information to deal with all noise complaints arising from Operator's oil and gas facility. Such posting shall be visible from the public rights-of-way.
- e. For Oil and Gas Facilities located within 2,000 feet of a land use or zoning designation boundary the Operator shall be required to comply with the lower maximum permissible noise level as defined in COGCC regulations for noise of that corresponding land use or zone district.
 - i. For locations within 2,000 feet of a land use or zoning designation boundary, noise must be attenuated to the maximum permissible noise levels for the corresponding land use or zone district, as specified in COGCC rules, at the land use designation boundary as determined by the Director of Community and Economic Development.
- ~~d.f.~~ The Operator shall update the noise modeling study or noise impact analysis if the planned or actual equipment at the Oil and Gas Facility is expected to produce noise levels that will exceed those previously presented to the County or if the noise modeling study or noise impact analysis was completed more than twelve (12) months prior to any ground disturbing activities.
- e.g. To ensure the Operator controls noise to the allowable levels set forth above, one or more of the following may be required based on the location, nature, and size of the facility:
 - i. Acoustically insulated housing or cover enclosing the motor or engine;
 - ii. Noise management plan identifying hours of maximum noise emissions, type, frequency, and level of noise to be emitted, and proposed mitigation measures;
 - iii. Obtain all power from utility line power or renewable sources;
 - iv. Utilize the most current equipment to minimize noise impact during drilling, completions, and all phases of operation including the use of "Quiet Fleet" noise mitigation measures for completions;

- v. Sound walls around well drilling and completion activities to mitigate noise impacts;
- vi. Restrictions on the unloading of pipe or other tubular goods between 6:00 p.m. and 8:00 a.m.;
- vii. Any abatement measures required by COGCC for high-density areas, if applicable.
- viii. The use of electric drill rigs.
- ix. Tier 4 or better diesel engines, diesel and natural gas co-fired Tier 2 or Tier 3 engines, natural gas fired spark ignition engines, or electric line power for hydraulic fracturing pumps.
- x. Use of quiet design mufflers (also referred to as hospital grade or dual dissipative) or equivalent.
- xi. The use of liquefied natural gas dual fuel hydraulic fracturing pumps.

h. All noise studies and assessments required by the County shall be completed by a qualified sound professional. Professional Consultant(s) Required: The baseline noise study and noise modeling shall be prepared by one (1) or more professionals deemed professionally qualified by the Community and Economic Development Department. Each professional shall be deemed qualified by the Department of Community and Economic Development based on education, professional certifications, experience in the field, and their understanding of the Adams County oil and gas regulations and COGCC rules pertaining to noise. The County shall maintain a list of qualified professional consultants. The applicant for an Oil and Gas Facility shall select one (1) or more individuals from the County's list of qualified consultants to prepare the required baseline noise studies and noise modeling reports.

- i. Professional qualifications for review and consideration may be submitted to the County by the sound professional, the applicant, or the Operator.

15. Air Emissions: Air contaminant emission sources shall comply with the permit and control provisions of the state air quality control program (C.R.S. § 25-7-101 et seq.) and the rules and regulations promulgated by the State Air Quality Control Commission. The Operator shall employ the following control measures and operating procedures to avoid or minimize all emissions into the atmosphere.

- a. Air quality action days. Operator shall respond to air quality action day advisories posted by the CDPHE for the front range area by implementing suggested air emission reduction measures as feasible. Emissions reduction measures shall be implemented for the duration of an air quality action day advisory and may include measures such as:
 - i. Minimize vehicle and engine idling;

- ii. Reduce truck traffic and worker traffic;
 - iii. Delay vehicle refueling;
 - iv. Suspend or delay use of fossil fuel powered ancillary equipment; and
 - v. Postpone construction or maintenance activities, if feasible.
 - vi. Postpone well maintenance and liquids unloading activities that would result in emission to the atmosphere.
- b. Leak Detection and Repair (LDAR). Operator shall develop and maintain an LDAR program using modern leak detection technologies for equipment used at the facility that complies with applicable AQCC Regulations and the following requirements:
 - i. Inspections must occur at least semi-annually; more frequent inspections may be required based on the nature, location and size of the facility.
 - ii. Any leaks discovered by operator, including any verified leaks that are reported to operator by a member of the public, shall be reported to the County no later than twenty-four hours after discovery. The operator shall maintain a weekly log of all reported leaks and shall make that log available upon request from the County.
 - iii. Operator shall repair leaks in accordance with AQCC Regulation 7 LDAR repair provisions such that repair of an identified leak is initiated no later than 5 working days from the date of discovery and completed within 30 days. ~~as soon as possible, but at least within seventy two hours, unless technically or operationally infeasible.~~ If the leak presents an imminent hazard to persons or property, the operator may not operate the affected component, equipment or pipeline segment until the operator has corrected the problem and notified the County of the successful repair. In the event of leaks that do not pose an imminent hazard to persons or property, if more than ~~48 hours~~ 30 days repair time is needed after a leak is discovered, operator shall contact the County and provide an explanation of why more time is required.
 - iv. Plan shall include detailed recordkeeping of the inspections for leaking components.
 - v. At least once per year, the operator shall notify the County five business days prior to an LDAR inspection of its facilities to provide the County the opportunity to observe the inspection.
- c. Well Completions and Emissions Control
 - i. Operators shall utilize EPA Reduced Emission Completions for oil wells and gas wells.

- ii. Operators ~~shall~~must utilize closed loop, pitless drilling, completions systems without permanent on-site storage tanks for containment and/or recycling of all drilling, completion, and flowback fluids. Any emissions must be routed to and controlled by a flare or combustor operated with at least a 98% destruction removal efficiency.
- d. Combustion Devices
 - i. For any flares or combustion devices used, manufacturer test or other data must be maintained and demonstrate that the device has a destruction removal efficiency of 98% for hydrocarbons.
 - ii. To the extent used, all flares, thermal oxidizers, or combustion devices shall be designed and operated as follows:
 - (a) The flare and or combustor shall be fired with natural gas.
 - (b) The flare and or combustor shall be designed and operated in a manner that will ensure no visible emissions during normal operation. Visible emissions is defined as the observation of smoke for any period or periods of duration greater than or equal to one minute in any fifteen minute period during normal operation, pursuant to EPA Method 22. Visible emissions do not include radiant energy or water vapor.
 - (c) The flare and or combustor shall always be operated with a flame present -when emissions may be vented to it.
 - (d) All combustion devices shall be equipped with an operating auto-igniter.
 - (e) If using a pilot flame ignition system, the presence of a pilot flame shall be monitored using a thermocouple or other equivalent device to detect the presence of a flame. A pilot flame shall be maintained at all times in the flare's pilot light burner. A telemetry system shall be in place to monitor pilot flame and shall activate a visible and audible alarm in the case that the pilot goes out.
 - (f) If using an electric arc ignition system, the arcing of the electric arc ignition system shall pulse continually, and a device shall be installed and used to continuously monitor the electric arc ignition system.
- e. Well Liquids Unloading
 - i. Best management practices during liquids unloading activities are required including the installation of artificial lift,

- automated plunger lifts and at least 90% emissions reductions when utilizing combustion to control any venting.
- ii. If manual unloading is permitted, ~~Operator~~ shall remain onsite.
- f. General air quality protection measures.
 - i. Operators should work to limit truck traffic to and from the site.
 - ii. Hydrocarbon emissions control of at least 98% or better for crude oil, condensate, and produced water tanks with uncontrolled actual emissions of Volatile Organic Compounds (VOCs) greater than two tons per year (TPY) VOCs.
 - iii. No venting other than if necessary for safety or during an emergency or as otherwise allowable in COGCC rules.
 - iv. Operators should consolidate product treatment and storage facilities within a facility.
 - v. Operators should centralize compression equipment within a facility.
- g. Site-specific air quality protection measures. To eliminate or minimize air emissions, the County may require any or all of the following depending on the size, location and nature of the facility:
 - i. Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during the drilling, completion and production phases of development. The plan may include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall be able to alert the operator of increases in monitored air pollutant concentrations.
 - ii. Implementation of tankless production techniques.
 - iii. The use of zero emission dehydrators.
 - iv. Use of a pressure-suitable separator and vapor recovery unit (VRU) where applicable.
 - v. Pipeline infrastructure for produced water, natural gas, crude oil and condensate constructed and placed into service prior to the start of any fluid flow from any wellbore.
 - vi. The use of no-bleed continuous and intermittent pneumatic devices. This requirement can be met by replacing natural gas with electricity or instrument ~~air, or air or~~ routing the discharge emissions to a closed loop-system or process.

- vii. Automated tank gauging.
- viii. Flaring shall be eliminated other than during emergencies or upset conditions; all flaring shall be reported to the county

16. Odors:

- a. Operator ~~must shall~~ implement and maintain ~~and make available to the County upon request~~, an odor mitigation plan that demonstrates how ~~the O~~operator will minimize odors from its operations and comply with Colorado Department of Public Health and Environment, Air Quality Control Commission, Regulation No. 2 Odor Emissions, 5 CCR 1001-4, Regulation No. 3, 5 CCR 1001-5, and Regulation No. 7, 5 CCR 1001-9 sections VII and VIII. The plan shall also provide a plan for timely responding to odor complaints from the community, and for identifying and implementing additional odor control measures to control odors emanating from the ~~O~~oil and ~~G~~gas ~~F~~facility.
- b. Operator ~~must shall~~ notify the County's LGD no later than 24 hours after receiving odor complaint.
- c. Operator ~~shall must~~ prevent odors from oil and gas facilities from affecting the health and welfare of the public by proactively addressing and, to the fullest extent, resolving complaints filed by members of the community, in coordination with County and Tri-County Health Department staff.
- d. In response to an odor-related complaint, the County may require the Operator to provide a complete description of all activities occurring at the Oil and Facility and measures or actions taken to reduce odors to the County's LGD within 24 hours upon request.
- ~~e.e.~~ The Director of Community and Economic Development may require an Operator to collect and analyze a speciated air sample to measure for volatile organic compounds or hazardous air pollutants in response to an odor-related complaint. Speciated air sample collection shall be done utilizing a third-party vendor approved by the County.
- ~~d.f.~~ To ensure compliance with the odor mitigation plan, the County may require the Operator to implement any of the following measures depending on the size, location and nature of the facility:
 - i. Adding an odorant which is not a masking agent or adding chillers to the mud systems.
 - ii. Using filtration systems or additives to minimize odors from drilling and fracturing fluids except that operator shall not mask odors by using masking fragrances.
 - iii. Enclose shale shaker to contain fumes from exposed mud, where safe and feasible.
 - iv. Wipe down drill pipe each time drilling operation "trips" out of hole

- v. Increasing additive concentration during peak hours provided additive does not create a separate odor. Additive must be used per manufacturer's recommended level.

vi. Requiring the use of at a minimum, low odor Category III drilling fluid.

~~17. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant will be required to identify and offer to sample all available water sources located within one-half mile of the proposed well or facility. All sampling must be conducted by third-party consultant approved of by the County. Sampling requirements include:~~

- ~~i. Initial baseline samples and subsequent monitoring samples.~~
- ~~ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.~~
- ~~iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:~~
 - ~~i. One sample within six months after completion;~~
 - ~~ii. One sample between twelve and eighteen months after completion; and~~
 - ~~iii. One sample between sixty and seventy-two months after completion.~~
 - ~~iv. For multi-well pads, collection shall occur annually during active drilling and completion.~~
- ~~iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.~~
- ~~v. An operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 1, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.~~

- ~~vi. The operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the CED Director that the applicant could not obtain access to the water source from the surface owner.~~
- ~~vii. Testing for the analytes listed in Table 1, and subsequent testing as necessary or appropriate.~~
- ~~viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.~~
- ~~ix. Reporting the location of the water source using a GPS with sub-meter resolution.~~
- ~~x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.~~
- ~~xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.~~
- ~~xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:~~
 - ~~i. If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).~~
 - ~~ii. If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.~~
 - ~~iii. Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l.~~
 - ~~iv. Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.~~
 - ~~v. Further water source sampling in response to complaints from water source owners.~~

~~Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the CED Director, the COGCC and the water source owners.~~

18.17. Dust:

- a. Operator shall minimize dust pollution associated with onsite activities and traffic.
- b. No untreated produced water or other process fluids shall be used for dust suppression.
- c. The Operator ~~will~~shall avoid creating dust or dust suppression

Table 4-11-A: Water Quality Analytes	
GENERAL WATER QUALITY	Alkalinity Conductivity & TDS pH Dissolved Organic Carbon (or Total Organic Carbon) Bacteria Hydrogen Sulfide
MAJOR IONS	Bromide Chloride Fluoride Magnesium Potassium Sodium Sulfate Nitrate + Nitrite as N (total)
METALS	Arsenic Barium Boron Chromium Copper Iron Lead Manganese Selenium Strontium
DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS	Methane Ethane Propane BTEX-as Benzene, Toluene, Ethylbenzene, Xylenes Total Petroleum Hydrocarbons (TPH)
OTHER	Water Level Stable isotopes of water (Oxygen, Hydrogen, Carbon) Phosphorus

activities
within 300 feet of the ordinary high-water mark of any water body,
unless the dust suppressant is water.

shall be required to provide maintenance funding through bonding to ensure funds are available for upkeep of any planted vegetation throughout the duration of operations, including production. Weed control is required at the facility and along access roads until final reclamation and abandonment. ~~Required sound walls shall be included in the visual mitigation plan and shall comply with the color scheme approved by the County, blending with natural background.~~ All landscaping shall be in compliance with County requirements and in compliance with the safety requirements of the Operator. Existing vegetation shall be minimally impacted. Motorized equipment shall be restricted to the well sites and access roads to the well sites. Operator is responsible for obtaining consent by surface owner allowing landscaping as well as automatic irrigation for landscaping in urban mitigation areas and/or parks/recreation areas. All plant materials shall be kept in a healthy growing condition at all times.

- ~~b. Operator shall submit lighting mitigation plan for all phases of development and operation, which adheres to best management practices to minimize light escaping the facility including making all lighting downward facing and fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture. Operator shall conduct a photometric study prior to start of construction to indicate impact on surrounding properties and measure the lumens emitted from the facility outside of the walls.~~
- c. Site access and security. Site shall be properly secured during all phases of operations, including, but not limited to, security fencing or barriers to prevent unauthorized access to site. Site shall be properly secured prior to the start of drilling. ~~Proposed fencing, barriers, and screening shall be included in the visual mitigation plan.~~

19. Lighting. The Operator shall minimize light escaping the facility as follows:

- a. All lighting shall be directed downward and inward and use fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture.
- b. Operator shall conform to follow COGCC Regulations for lighting standards.
- c. Operator shall provide sufficient on-site lighting to ensure the safety of personnel on or near the site.
- d. If the facility has a noise barrier (sound walls, etc.), the Operator shall install facility lighting beneath the noise barrier, except for drilling rig lights.
- e. To ensure the Operator controls light escaping from the facility, one or more of the following may be required based on the location, nature, and size of the facility:

- i. The use of timers or motion sensor lighting,
- ii. The use of full cut-off lighting,
- iii. The use of reduced light intensity colors and low-glare or no-glare lighting.

20. Community Outreach.

- a. The Operator shall hold quarterly neighborhood meetings from initial permit approval by the County, through the completion of the first wellbore, or longer as determined by the Director of Community and Economic Development for all oil and gas facilities located within one-half mile (1/2) of any existing residences, platted residential development, high occupancy building units, school facilities, or state licensed daycare child care centers. The Operator shall hold additional quarterly neighborhood meetings for each subsequent return to the Oil and Gas Facility for any drilling or completion operations if there have been no neighborhood meetings held for a period of six consecutive (6) months or more. Notice for quarterly neighborhood meetings shall be sent by the Operator to all property owners, current residents, or school facility or childcare center administrators within one-half mile (1/2) at a minimum, or greater, as determined by the Director of Community and Economic Development, of the facility. Notice for the quarterly neighborhood meetings shall occur at least 14 days prior to the meeting.
- b. At the quarterly neighborhood meetings, the Operator shall provide an update on the status of any pending permits with the County, state or federal agencies associated with facility, an overview of all planned or ongoing operations at the Oil and Gas Facility and allow those in attendance to ask questions and provide input related to the facility.
- c. The location, timing, and format of the quarterly neighborhood meetings will be approved by the County.
- d. The Operator shall provide a recording or summary of the neighborhood meeting, which includes, at a minimum, a list of attendees and their contact information, if provided, format of the meeting, an overview of comments or questions received, and the Operator's responses to the County within seven (7) days of the meeting.
- e. The County may require one or more of the following based on the location, nature, and size of the facility:
 - i. The Operator to provide written and digital materials in languages other than English,
 - ii. The Operator to provide interpretation services at neighborhood meetings and,

iii. The Operator to hold additional neighborhood meetings to accommodate resident or property owner input.

21. Cumulative Impacts. Operators shall evaluate and address the potential cumulative impacts from the Oil and Gas Facility, and all reasonably foreseeable development associated with other oil and gas activity and heavy industrial operations within one mile (1), at a minimum, of the Oil and Gas Facility. Operators shall minimize, avoid, mitigate, and offset cumulative impacts from oil and gas operations to the extent technically feasible. This may be achieved through a suite of best management practices, engineering or operations controls, and/or compensatory measures.

a. The evaluation and review of cumulative impacts may require the submission of quantitative and/or qualitative analysis and data for the following impact areas, at a minimum:

- i. Air Quality,
- ii. Public Health and welfare, including nuisance-type impacts,
- iii. Traffic,
- iv. Water resources,
- v. Wildlife, Ecosystems, and Soil

b. The Operator shall follow all COGCC regulations and standards that address cumulative impacts related to noise, odor, dust, and light.

c. An Operator may submit substantially equivalent plans, data, or analyses as required in COGCC rules for addressing and evaluating cumulative impacts.

22. Transportation and Traffic

a. General: Oil and gas operations shall minimize impacts to the physical infrastructure of the County transportation system.

b. Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed ~~two~~ four hours.

c. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6

road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) business days of County notice. Operator will assure that temporary access roads are reclaimed and reseeded with an appropriate native seed mixture within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.

d. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department.

i. Requirements for the access permit may include the following:

1. A location that provides a safe entrance and exit that accommodates the type and volume of traffic using the access and reduces impact to residents on local roadways;
2. Haul route and traffic data;
3. Pre and post inspection of roadways used by the Operator;
4. Collateral or bond to ensure that road damage caused by the Operator is repaired;
5. Dust control (material used for dust control must be pre-approved by the County);
6. Road maintenance agreement during drilling phase; and
7. Payment of all applicable fees.

ii. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m.

iii. Operator shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school buses when schools are in session.

iv. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.

- e. All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:
 - i. Access permit fees
 - ii. Oversize/overweight permit fees
 - iii. Right of way construction permit fees; and
 - iv. Traffic impact and road maintenance fees.

23. Water and Wildlife Protection.

a. Water Bodies and Water Quality:

- i. General. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Regulations, and applicable water quality standards set by the Colorado Department of Public Health and Environment and Colorado Water Quality Control Commission.
- ii. The owner or Operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Regulations.
- iii. The owner or Operator shall provide all water source test results to the County and maintain records of such results.
- iv. The owner or Operator shall make available to the County upon approval by the COGCC, its plans concerning downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.
- v. Wastewater Injection Wells used for produced water disposal are prohibited in Adams County.
- vi. Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering regulations. A "100-year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.

- b. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant shall be required to identify and offer to sample all available water sources located within one-half mile of the proposed facility. All sampling must be conducted by third-

party consultant approved of by the County. Sampling requirements include:

- i. Initial baseline samples and subsequent monitoring samples.
- ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.
- iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:
 - (1) One sample within six months after completion;
 - (2) One sample between twelve and eighteen months after completion; and
 - (3) One sample between sixty and seventy-two months after completion.
 - (4) For multi-well pads, collection shall occur annually during active drilling and completion.
- iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.
- v. An Operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 4-11-A, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.
- vi. The Operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the Director of Community and Economic Development that the applicant could not obtain access to the water source from the surface owner.
- vii. Testing for the analytes listed in Table 4-11-A, and subsequent testing as necessary or appropriate.

- viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.
- ix. Reporting the location of the water source using a GPS with sub-meter resolution.
- x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.
- xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.
- xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:
 - (1) If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).
 - (2) If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.
 - (3) Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l.
 - (4) Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.
 - (5) Further water source sampling in response to complaints from water source owners.
 - (6) Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the Director of Community and Economic Development, the COGCC, and the water source owners.
- c. Wildlife Resources: ~~Operators shall avoid, minimize, and mitigate adverse impacts to wildlife resources.~~
 - i. General: Operators shall avoid, minimize, and mitigate adverse impacts to wildlife resources. Wildlife Resources, as used in these regulations shall mean the COGCC definition.
 - ii. Operators shall comply with all COGCC Regulations for wildlife impacts.

- iii. Operators shall actively engage Colorado Parks and Wildlife, where applicable, for the sake of avoiding, minimizing, and mitigating wildlife impacts.
- iv. Operators shall share all findings, recommendations, and reports resulting from any consultation with Colorado Parks and Wildlife with the County within seven (7) days.

<u>Table 4-11-A: Water Quality Analytes</u>	
<u>GENERAL WATER QUALITY</u>	<u>Alkalinity</u> <u>Conductivity & TDS</u> <u>Ph</u> <u>Dissolved Organic Carbon</u> <u>(or Total Organic Carbon) Bacteria</u> <u>Hydrogen Sulfide</u>
<u>MAJOR IONS</u>	<u>Bromide</u> <u>Chloride</u> <u>Fluoride</u> <u>Magnesium</u> <u>Potassium</u> <u>Sodium</u> <u>Sulfate</u> <u>Nitrate + Nitrite as N (total)</u>
<u>METALS</u>	<u>Arsenic</u> <u>Barium</u> <u>Boron</u> <u>Chromium</u> <u>Copper</u> <u>Iron</u> <u>Lead</u> <u>Manganese</u> <u>Selenium</u> <u>Strontium</u>
<u>DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS</u>	<u>Methane</u> <u>Ethane</u> <u>Propane</u> <u>BTEX as</u> <u>Benzene, Toluene, Ethylbenzene, Xylenes</u> <u>Total Petroleum Hydrocarbons (TPH)</u>
<u>OTHER</u>	<u>Water Level</u> <u>Stable isotopes of water (Oxygen, Hydrogen, Carbon)</u> <u>Phosphorus</u>

24. Flammable material. The area twenty-five feet around anything flammable shall be kept free of dry grass or weeds, conform to COGCC safety standards

and applicable fire code. The operator's conceptual review application and application shall be reviewed by the serving fire district.

- ~~e. Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two hours.~~
- ~~f. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6 road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and revegetated within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.~~
- ~~g. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department. Requirements for the access permit may include the following: a) access location providing for a safe entrance/exit and utilization of main roadways to minimize impact /conflict with residents on local roadways; b) haul route and traffic data; c) pre/post inspection of roadways used by the Operator; d) collateral or bond to insure that road damage caused by the Operator is repaired; e) dust control (material used for dust control must be pre-approved by the County);~~

~~f) road maintenance agreement during drilling phase; and g) payment of all applicable fees. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m., and shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school buses when schools are in session. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department, for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.~~

~~20-25.~~ Removal of debris. All excess debris shall be removed during construction activities. Site shall remain free of debris and excess materials at all times during operations. Burning of debris and other materials is strictly prohibited at all times.

~~21-26.~~ Removal of equipment. No permanent storage of equipment. When no longer used, equipment shall be removed within thirty days unless a Temporary Use Permit for said storage is obtained from the County.

~~22-27.~~ Maintenance of machinery. Routine field maintenance of equipment involving hazardous materials within 300 feet of any water body is prohibited. All fueling shall occur over impervious material and shall not be done during storm events. Operator shall operate and maintain all equipment in accordance with manufacturer specifications. Regular maintenance checks are required for all equipment.

~~23-28.~~ Burning. No open burning of trash, debris or other flammable materials.

~~24-29.~~ Chains. Traction chains shall be removed from heavy equipment on public streets.

~~25-30.~~ Off-location flow lines and crude oil transfer lines

- a. Off-location flow lines and crude oil transfer lines regulated by the COGCC shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, applicant shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.

- d. Operator must conduct leak detection inspections or pressure testing in order to identify flowline leaks or integrity issues in accordance with COGCC Regulations.
- e. Operator must make available to County upon request all records required to be kept by COGCC
- f. Buried pipelines shall have a minimum of four feet cover.

~~26-31.~~ 27-31. Gathering Lines

- a. Gathering lines shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, Operator shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must make available to County upon request all records submitted to the Pipeline and Hazardous Materials Safety Administration (PHMSA) or the Public Utilities Commission (PUC) including those related to inspections, pressure testing, pipeline accidents and other safety incidents.

~~e. Well Connects. Well connects do not require a separate permit as long as the well connect was permitted under the original permit for the Oil and Gas Facility. Well connects are defined as a pipeline, 10" or less inside diameter and 2 miles or less in length, laid running from the custody transfer point or production facility for a new well(s) to an existing gathering line connection point.~~

~~27-32.~~ 28-32. Temporary surface water lines

- a. Operator shall use temporary surface water lines, unless infeasible.
- ~~a-b.~~ Operator shall not use County drainage culverts or ditches for laying and operation of temporary water lines.
- ~~b-c.~~ Operator may use County Road Right-of-Way, ~~and County drainage culverts~~ for the laying and operation of temporary water lines on the surface and in accordance with Adams County Standards and Regulations only after the approval of all applicable County permits, unless infeasible.
- ~~c-d.~~ Operator will bury temporary water lines at existing driveway and gravel road crossings, ~~or utilize existing culverts,~~ if available, with County approval.

~~28-33.~~ 29-33. Financial Assurance.

- a. Operators shall be required to maintain environmental liability insurance to cover gradual pollution events.
- b. Operator shall be required to file and maintain financial assurance as determined on a site-specific basis prior to commencing operations, and thereafter during the active life of the facility, the operator shall post and maintain a performance bond or other approved financial instrument with Adams County. Should any corrective actions be required by the County in order to protect the health, safety, welfare, and the environment which result from failure of the operator to follow any regulations, standards, or conditions of approval, the performance bond shall be forfeited in an amount sufficient to defray the expense of said actions, including staff time expended by Adams County involved in such corrective actions.

~~29-34.~~ Mapping Information. Operator shall agree to provide coordinates and/or exact location of well sites to the County's GIS Department within forty-eight (48) hours of final completion of a well site in a format acceptable to the County. Any subsequent changes to a well site location shall also be provided to the County within forty-eight (48) hours of such changes.

4-11-02-03-03-04

INSPECTION AND ENFORCEMENT

1. Inspection: In recognition of the potential impacts associated with oil and gas facilities, all wells and accessory equipment and structures may be examined by the inspectors of the County at reasonable times to determine compliance with applicable provisions of this chapter, the International Fire Code, the International Building Code, and all other applicable standards in these Regulations. The County reserves the right in its discretion to make spot inspections or to inspect without notice in the event of an issue potentially involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another. For the purpose of implementing and enforcing the provisions of this chapter, the inspector and other authorized personnel have the right to enter upon private property. The County may use the information collected on the inspections to enforce the requirements of this chapter. The County may also report this information to appropriate state and federal officials, including but not limited to information regarding alleged violations of state and federal rules. Operator shall make available to County, upon request, all records required to be maintained by these regulations or to show compliance with these regulations, and the rules and regulations promulgated by the COGCC and the CDPHE, including permits, Air Pollutant Emission Notices (APENs) and other documents required to be maintained by the COGCC, CDPHE and these regulations. The County ~~will shall~~ charge a yearly inspection fee for all Oil and Gas Facilities in the County. Fees for Oil and Gas Facility inspections shall be assessed according to the County's adopted fee schedule.

2. State Notification of Violations: Adams County will cooperate fully with the State of Colorado by notifying the Oil and Gas Conservation Commission of any and all violations of the Colorado Laws and Regulations.
3. Delinquent Taxes: One condition of any oil and gas well building permit is that all taxes as provided by statute, shall be paid.
4. Penalties and Fines: The County has authority under C.R.S. § 29-20-104, as amended, to impose fines for leaks, spills, and emissions.¹ The following table summarizes the fine schedule for violations of these Development Standards and Regulations:

		Rule Classification		
		Class 1: Paperwork other ministerial regulations, a violation of which presents no direct risk of harm to public health, safety, welfare, and the environment.	Class 2: Regulations related at least indirectly to promoting the public health, safety, welfare, and the environment and wildlife resources, a violation of which presents a possibility of distinct, identifiable actual or threatened adverse impacts to those interests	Class 3: Regulations directly related to protecting public health, safety, welfare, the environment, and wildlife resources, a violation of which presents a significant probability of actual or threatened adverse impacts to those interests.
Degree of threatened or actual impact to public health, safety, welfare, the environment, or wildlife	<u>Major:</u> Actual significant adverse impacts	\$5,000	\$10,000	\$15,000
	<u>Moderate:</u> Threat of significant adverse impacts, or moderate actual adverse impacts	\$1,500	\$5,000	\$10,000
	<u>Minor:</u> No actual adverse impact and little or no threat of adverse impacts	\$200	\$2,500	\$5,000

TABLE 4-11-B: Fine Structure

¹ Violations of Section 4-10-02-03-03(15) are capped at \$300/day per violation in accordance with the State Air Pollution Control Act, C.R.S. § 25-7-128.

6. County Violations: In addition to the fines outlined above, the County has authority to cite violations under its control pursuant to Section 1-05-06 Criminal Remedies and Enforcement.
7. Legal Non-conforming: Adams County recognizes that there are oil and gas operations that were legally established prior to the effective date of these regulations that may or may not conform to these regulations. These operations may continue, provided the facility is not substantially modified.
8. Hearing, Enforcement and Appeal Procedures for Air Quality Violations
 - a. Hearings:
 - i. Operators of OGFs may request a hearing in front of the BOCC to contest any alleged violations of the provisions contained in the Air Quality section of these Development Standards and Regulations or to contest permitting decisions involving the provisions contained in the Air Quality section of these Development Standards and Regulations. The BOCC shall grant request for a hearing within 15 days of receipt of such request.
 - ii. Hearing date ~~must will~~ be set within 90 days
 - iii. Notice ~~must will~~ be printed in a newspaper of general circulation in the area where the OGF is located.
 - iv. Director of ~~CED-Community and Economic Development~~ shall appear as a party in all hearings adjudicating decisions of the ~~CED-Community and Economic Development Department~~.
 - v. The Director of ~~CED-Community and Economic Development~~ shall have the same right to judicial review as other parties.
 - vi. All testimony ~~shall must~~ be under oath or affirmation.
 - vii. A full and complete record of proceedings and testimony presented shall be taken and filed.
 - viii. Information related to secret processes or methods of manufacture or production must be kept confidential. The person seeking to keep information confidential has the burden of proof. Except as provided in the Clean Air Act, information claimed to be related to secret processes or methods of manufacture or production which is emissions data may not be withheld as confidential; except such information may be submitted under a claim of confidentiality and the County shall not disclose such information unless required under the Clean Air Act
 - ix. Any person who is affected and not adequately represented shall have an opportunity to be a party upon prior application to and approval by the BOCC in its discretion; such party shall have the right to be heard and cross-examine witnesses
 - x. BOCC shall make a decision within 30 days of completion of the hearing
 - xi. Burden of proof is on Director of ~~CED-Community and Economic Development~~ with respect to any hearings involving alleged violations.
 - xii. Where the Operator requests a hearing before the BOCC on a Permit involving provisions contained in the Air Quality section of these

Development Standards and Regulations, the permit applicant bears burden of proof with respect to justification therefor and information, data, and analysis supportive thereof or required with respect to the application

b. **Judicial Review:**

- i. Final orders or determinations of the Community and Economic Development Director or the BOCC are subject to judicial review
- ii. Any party may move the court to remand the case to the ~~CED~~-Director of Community and Economic Development or the BOCC in the interests of justice for purpose of adducing additional evidence and findings; such party shall show reasonable grounds for failure to adduce such evidence previously
- iii. Any proceeding for judicial review shall be filed in the district court in which the OGF is located

c. **Injunctions:**

- i. If any person fails to comply with a final order of the ~~CED~~-Director of Community and Economic Development or the BOCC that is not subject to a pending administrative or judicial review, or in the event of a violation of an emission control regulation, or term or condition of a permit, the ~~CED~~-Director of Community and Economic Development or the BOCC may request the District Attorney for the district court in which the air pollution source is located to bring suit for an injunction
- ii. In proceedings brought to enforce an order of the of the ~~CED~~-Director of Community and Economic Development or BOCC, a temporary restraining order or preliminary injunction, if sought, shall not issue if there is probable cause to believe granting such order or injunction will cause serious harm to the affected person or any other person and; (1) that the alleged violation or activity will not continue or be repeated; or (2) the granting of such temporary restraining order or preliminary injunction would be without sufficient corresponding public benefit.

d. **Coordination with the Air Quality Control Commission**

- i. Pursuant to section 25-7-128(4), C.R.S., upon the issuance of any enforcement order or granting of any permit, the County shall transmit to the AQCC a copy of the order or permit. Pursuant to section 25-7-128(6), C.R.S., the County shall confer and coordinate its activities regarding efforts to control or abate air pollution consistent with that provision.

4-11-02-03-03-05

RESIDENTIAL CONSTRUCTION STANDARDS

1. **Residential Construction Standards:** The Director of Community and Economic Development may impose any one (1) or more of the following standards on a specific site basis as a condition of subdivision approval and/or building permits on platted or unplatted land:

- a. The oil and gas well location shall include a two-hundred-fifty (250) foot buffer in the form of an easement on the Final Plat. No structures may be constructed within the buffer area.
 - b. Access to the oil and gas well location shall be provided by a public street or recorded easement for private access.
 - c. The Final Plat shall include notice to prospective buyers of the location of the oil and gas well and associated easements.
 - d. All oil and gas well flow lines and/or easements shall be graphically depicted on the Final Plat.
 - e. All surface and subsurface agreements shall be noted on the Final Plat by the recorded book and page number.
 - f. Pursuant to Section 4-06-01-02-01-12, where a new home and/or other permanent structure with plumbing is constructed within three hundred (300) feet of an existing oil and gas well, the property owner shall submit a signed waiver acknowledging the existence of the facility.
2. **Plugged and Abandoned, and Former Oil and Gas Production Sites:** This Section is enacted to protect and promote the health, safety, morals, convenience, order, prosperity, or general welfare of the present and future residents of the County. These regulations are based upon the land use authority of the County.
 - a. Prior to submittal of a final plat or site-specific development plan, each plugged and abandoned well shall be located and surveyed. The plugged and abandoned well shall be permanently marked by a brass plaque set in concrete similar to a permanent benchmark to monument its existence and location. Such plaque shall contain all information required on a dry hole marker by the Colorado Oil and Gas Conservation Commission and the County.
 - b. As a condition of review of any final plat or ~~site-specific~~ site-specific development plan which contains a plugged and abandoned well or former oil and gas production site or is within 200 feet of such well or site, the owner shall submit a location diagram of the location of the well.
 - c. On every final plat or site-specific development plan which contains a plugged and abandoned well, there shall be dedicated a well maintenance and workover setback depicted on the plat, the dimensions of which shall be not less than fifty feet in width and 100 feet in length. No structures shall be located within this setback. The plugged and abandoned well shall be located in the center of the setback. There shall be public access for ingress and egress to the setback of a width of not less than twenty feet.
 - d. Every final plat and site specific development plan which contains a plugged and abandoned well or a site specific development that includes a property that is less than 200 feet from a plugged and

abandon well, shall include the following notation: "The owner shall disclose to prospective purchasers of lots within a radius of 200 feet of the plugged and abandoned well of (1) the location of the plugged and abandoned well, (2) the location of the maintenance and workover setback, and (3) the purpose for the well maintenance and workover setback."

- e. As a condition of building permit review, no dwelling shall be constructed within fifty (50) feet of a plugged and abandoned well.
- f. Prior to issuance of a grading permit within a development containing a known reserve pit site, the reserve pit site shall be tested for expansive soils. Reserve pits containing expansive soils in locations proposed for buildings shall be subject to the provisions of the International Building Code.
- g. No utility lines shall be installed within ten feet of any plugged and abandoned well.

4-11-02-03-03-06

COGCC AND COUNTY APPROVALS REQUIRED

Development of the OGF shall not commence unless and until applicant receives an approved OGF Permit, including any approved waiver(s), and receives all required approvals and permits from COGCC.

4-11-02-04 **HEAVY INDUSTRY**

4-11-02-04-01

GENERAL

- 1. *Outdoor Storage:* Materials may be stored outdoors, provided the storage area is consistent with the zone district allowances. All outdoor storage shall be screened in accordance with the Fencing, Walls and Screening section (See Section 4-11-01-03) of these standards and regulations.
- 2. *Garbage Storage:* Garbage area screening shall consist of a six (6) foot high minimum screen fence made of wood or masonry material. Fencing materials should be cleaned and maintained must be clean and maintained at all times to present an orderly appearance. No garbage storage area shall be located within twenty (20) feet of a public sidewalk
- 3. *Smoke and Odor Control:* Smoke and odor shall be controlled by filter, scrubbers, fans, or other means.
- 4. *Hours of Operation:* The hours of operation shall be from 7:00 a.m. to 7:00 p.m. for this use category when within two-hundred feet of a residentially used dwelling.

4-11-02-04-02

AUCTION YARDS, WITH LIVESTOCK

- 1. *Minimum Parcel Area:* one (1) acre

4-13 PARKING, LOADING, AND CURB CUT REQUIREMENTS

4-13-01 APPLICABILITY

Off-road parking and loading requirements in all new developments shall comply with the general access, circulation, and parking standards set forth in this Section.

4-13-02 GENERAL STANDARDS

4-13-02-01 SAFETY BARRICADES

A curb, rail, fence, guard, or other continuous safety barricade of a height or design sufficient to retain vehicles within the parking area shall be provided except for single-family residences and duplexes.

4-13-02-02 COMMERCIAL AND INDUSTRIAL PARKING LOT SCREENING/FENCING REQUIRED

For each boundary line of a commercial or industrial parking area abutting directly on a residential lot a wall, fence, or screen planting of a year-round nature shall be installed at least forty-eight (48) inches high to serve as a barrier for passage of persons and waste material, to conceal glare from headlights, and to reduce noise, fumes, and pavement heat.

4-13-02-03 PLANTINGS PROTECTED

Wheel or bumper guards shall be located so no part of any vehicle extends beyond the boundary lines of the parking area or comes in contact with walls, fences, plantings, or any other structures.

4-13-02-04 PARKING AREA LANDSCAPING REQUIREMENTS

Parking areas are required to meet standards for landscaping within the parking area and around the perimeter of the parking area. Landscaping requirements are found in Section [4-17](#) ~~Error! Reference source not found.~~ of these standards and regulations.

4-13-02-05 SURFACE OF PARKING AREA

Except for agricultural areas, off-road parking areas shall be surfaced and maintained with a portland or asphalt concrete surface, or other suitable surface as determined by the Director of Community and Economic Development. Drainage shall be subject to the approval of the Director of Community and Economic Development.

The surface of the parking area shall be maintained with the following minimum requirements:

1. Potholes shall not exceed six (6) inches deep or six (6) inches wide.
2. Cracks shall not exceed three (3) inches in width.

4-16 OFF-PREMISE ADVERTISING DEVICES (BILLBOARD)

4-16-01 PURPOSE

The Purpose of this section is to advance the County's legitimate and substantial interest in limiting the number and area of off-premise advertising devices permitted to maintain the visual appearance of scenic corridors, avoid clutter, and protect the health, safety, and welfare of the citizens of Adams County by mitigating traffic distractions.

4-16-02 APPLICABILITY

Off-premise advertising devices are permitted with an approved Conditional Use Permit in the C-5 and industrial zone districts. All off-premise advertising devices shall meet the standards contained in this Section 4-~~16~~¹⁵.

A Conditional Use Permit or a Major Amendment to an existing Conditional Use Permit or Planned Unit Development shall be required to display, erect, relocate, or alter any off-premise advertising device excluding indirect lighting traditionally used and attached to a sign, but not internally located.

Provided any Off-Premise Advertising Device complies with all standards in this Section and allows off-premise commercial messages, the Off-Premise Advertising Device shall also be permitted to allow non-commercial messages to the same extent.

In conjunction with these Development Standards and Regulations, the Colorado Outdoor Advertising Act, C.R.S. 43-1-401 et. seq, and the Colorado Rules and Regulations promulgated thereunder by the Colorado Department of Transportation shall be adhered to. Nothing in these Standards and Regulations shall be construed to allow advertising devices which are prohibited, or otherwise non-conforming with the Colorado Outdoor Advertising Act.

4-16-03 MAXIMUM NUMBER OF SIGNS

Only one (1) two-faced off-premise advertising device shall be permitted per lot.

4-16-04 MAXIMUM SIZE

No off-premise advertising device shall exceed three hundred (300) square feet per face.

4-16-05 MAXIMUM HEIGHT AND MINIMUM CLEARANCE

No off-premise advertising device shall exceed forty (40) feet in height. Height shall be determined as the distance from the grade of the right-of-way on which the sign fronts to the top of the sign including all projections. If located within one thousand

5. *Required Tree Mix:* The selection of trees shall be a mix of large deciduous (10% - 50%) and ornamental (10% - 50%). Evergreens shall be considered ornamental.
6. Minimum size requirements for trees and shrubs shall be:

<i>Plant Type</i>	<i>Maturity Height</i>	<i>Minimum Plant Size at Planting</i>
Ornamentals	Less than 20'	1" to 1-1/2"
Large Deciduous	Over 20'	2" to 2-1/2"
Evergreens (Sm.)	Less than 20'	5' tall
Evergreens (Lg.)	Over 20'	6' tall
Low Shrubs	1' to 3'	5 gallon
Upright Shrubs	3' to 10'	5 gallon

7. *Irrigation System Required:* A fully automatic irrigation system is required.

4-17-09-01-05 DWELLING, MANUFACURED HOME PARK

A twenty (20) foot strip around the boundary must be landscaped to provide a visual screen. All open spaces and other unimproved areas must be suitably landscaped. All landscaping must be maintained and furnished with an automatic sprinkler system.

4-17-09-01-06 DWELLING, MOBILE HOME PARK

A landscaping plan shall be submitted for review and approval. The setbacks of the development and any other area not covered by mobile homes, driveways, ingress and egress, or other structures, shall be landscaped.

4-17-09-02 COMMERCIAL USES

4-17-09-02-01 AUTOMOBILE SERVICE STATIONS

1. *Screening:* Service stations shall be separated from abutting residential properties by a six (6) foot high masonry wall and a Bufferyard as required in Section 4-~~17~~16-06.
2. *Landscaping:* In addition to all other required landscaping, boundary landscaping is required for a minimum depth of ten (10) feet along all property lines abutting roads, except for the area required for road openings. Permanent irrigation facilities shall be provided for all landscaped areas.

4-17-14 REQUIRED LOT LANDSCAPING

In addition to the required bufferyards and bufferyard landscaping, the following site landscaping shall also be required:

4-17-15 ADMINISTRATIVE RELIEF

Administrative relief is provided to add flexibility in the application of the landscaping regulations in this Section 4-~~17-16~~ when a standard is inapplicable or inappropriate to a specific use or design proposal. However, the granting of administrative relief should not always mean a requirement is reduced without mitigation – be it landscaping combined with urban design elements (i.e. architectural elements within a parking lot that screen parking to provide shade pavement, sidewalk/tree lawn area, gathering space or plaza, or natural areas), concentrated/denser plant material within a reduced buffer yard width, or demonstrations of concepts that are equal to or superior in fulfilling the purpose of the landscaping requirements).

A written request for administrative relief shall be submitted to the Director of Community and Economic Development either before or in conjunction with the building permit review process. The written request shall:

Include a justification in terms of the findings necessary to grant administrative relief; and the written request shall close with a section for the Director of Community and Economic Development's use, which will include a block for the decision of approval/denial, the Director of Community and Economic Development's signature, and decision date.

The written request with decision shall be attached to the plan or retained in the applicable file, as appropriate. An example of this written request shall be available from the Director of Community and Economic Development.

The Director of Community and Economic Development must make all of the following findings in order to grant administrative relief:

The strict application of the regulations in question is unreasonable given the development proposal or the measures proposed by the applicant or the property has extraordinary or exceptional physical conditions or unique circumstances which do not generally exist in nearby properties in the same general area and such conditions will not allow a reasonable use of the property in its current zone in absence of relief;

The intent of the landscaping section and the specific regulations in question is preserved, and;

CHAPTER 11—DEFINITIONS

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11-02-179 ELECTRONIC MANUFACTURING

An industrial establishment or area for the purpose of manufacturing electronics. This includes the manufacturing and assembly of small electronic appliances.

11-02-180 ELECTROPLATING

The process of plating or coating objects with a metal through electrolysis or an industrial establishment or where such processing occurs.

11-02-181 ENAMELING, LACQUERING, OR GALVANIZING OF METAL

The process of bonding a glassy substance, usually opaque, to the surface of metal through the process of fusion or an industrial establishment or area where such processing occurs.

11-02-182 ENCROACHMENT LINES

Limits of obstruction to flood flows. These lines are generally parallel to the stream. The lines are established by assuming the area landward (outside) of the encroachment lines may be ultimately developed in such a way it will not be available to convey flood flows. The stream channel and adjoining floodplains between these lines will be maintained as open space and will be adequate to flood heights, such increase under any condition not exceeding one-half (1/2) foot.

11-02-183 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally sensitive areas include, but are not limited to, wetlands, biological resources, habitats, streams, including ephemeral and intermittent, lakes, rivers, springs ~~Waters of the State~~, national parks, archaeological/historic sites, natural heritage areas, tribal lands, drinking water sources, intakes, marinas/boat ramps, and wildlife areas.

11-02-184 EQUAL DEGREE OF ENCROACHMENT

Equal degree of encroachment is determining the loss of hydraulic carrying capacity due to encroachment on each side of the floodplain such that the loss of capacity on one side equals the loss of capacity due to encroachment on the other. Determination of the equal degree of encroachment on the floodplain shall be performed along a significant reach of the stream.



Oil and Gas Facility Permit (OGF) - Application Checklist

Application submittals must include all documents on this checklist. Please use the reference guide included in this packet for more information on each submittal item.

All applications shall be submitted electronically to epermitcenter@adcogov.org. If a submittal is too larger to email as an attachment, the application may be sent as an unlocked OneDrive link. Alternatively, the application may be delivered on a flash drive to the One-Stop Customer Service Center. Once a complete application has been received, fees will be invoiced and payable online at: <https://permits.adcogov.org/CitizenAccess/>.

1. Conceptual Review Summary and Alternative Site Analysis
2. Neighborhood meeting summary
3. Development Application
 - Operations Plan
 - Emergency Preparedness and Response Plan
 - Transportation Plan
 - Noise Mitigation Plan
 - Lighting Mitigation Plan
 - Odor Mitigation Plan
 - Dust Mitigation Plan
 - Visual Aesthetics Plan
 - Community Outreach Plan



Cumulative Impacts Plan

Water and Wildlife Protection Plan

Engineering Documents

Surface Owner Documentation

Other Documentation as determined by the Director of Community and
Economic Development Department

Signed Oil and Gas Worker Safety Compliance Statement

4. Application fees (see table below)

Application Fees	Amount	Due
Oil and Gas Facility Permit	\$2,600	After complete application
Tri-County Health	\$245	After complete application

Appendix A:

Oil and Gas Facility Permit (OGF) – Guide to Development Application Submittal

All development application submittals shall comprise of one (1) electronic copy (emailed or delivered on a USB). **Application submittals that do not conform to these guidelines will not be accepted.**

General Format:

- All applications shall be submitted electronically or delivered to the One-Stop Customer Service Center on a flash drive.
- All documents submitted to the County are subject to the Colorado Open Records Act (CORA), C.R.S. § 24-72-201, et seq. All documents that may be subject to an exemption of CORA must be identified. The County does not guarantee confidentiality of documents. No plans or information within shall contain copyright restrictions or public use restrictions.

Operations Plan:

Cover Sheet:

- Title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township, and range.
- Legal description of the area, date of the drawing, existing zoning of the site, a sheet key, a vicinity map with north arrow (scale of 1" = 2,000' preferred) with an emphasis on the major roadway network within two (2) miles of the proposal.
- All applicable County notes, an approval signature block and a block to insert the COGCC Permit number when approved.

Impact Area Map:

- Map that shows the proposed location of the Oil and Gas Facility, locations of all producing oil and gas wells and other oil and gas operations within the one-mile (1) impact area; locations of all abandoned and shut-in wells within one quarter mile (1/4) radius of the projected track of the borehole; locations of all permitted registered water wells within one-mile (1) of the proposed Oil and Gas Operation; existing improvements within

1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one-mile impact area.

GIS Information:

- The applicant shall submit all geographic information systems (GIS) data for the proposed facility in a format and scale acceptable to the County.
- The GIS data shall include, at a minimum, the outline of the edge of maximum disturbance for the proposed site, the access road, and the location of any proposed sound walls, if applicable.

Drilling Operations Plan:

- Site plan of drilling operations with drilling equipment with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum acceptable to the County.
- The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

Production Plan:

- Site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum acceptable to the County.

- Identify tentative drilling and completion schedules.
- A seed mix ~~shall must~~ be provided for reseeding the well pad.
- Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility; if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

Signage Plan/Sign Detail:

- A dimensioned Signage Plan or Sign Detail shall be included describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs.
- Directional signs for emergency responders and inspectors, along with a 24-hour, 7-days per week contact information to deal with all complaints.

Final Plan:

- Once the review process is complete and staff has determined that all outstanding issues have been resolved, staff will request a final copy of the Oil and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the Community and Economic Development Department.

Emergency Preparedness and Response Plan:

- In accordance with the Emergency Preparedness and Response requirements in Section 4-11-02-03-03(9).
- Emergency Service Providers: The applicant must provide a commitment to serve ("will serve") letter from the authority having jurisdiction for providing emergency services (fire protection and emergency medical services) for that facility, or, where no authority has jurisdiction, from an emergency services provider with the ability to provide such emergency services.

Transportation Plan:

- Plan must be designed and implemented to ensure public safety and maintain quality of life for other users of the County transportation system, adjacent residents, and affected property owners.

- Traffic Impact Study must satisfy the requirements of Adams County Development Standards and Regulations, Chapter 8, and provide:

- Project lifetime truck trip estimates during each phase of operations, both cumulatively and along each proposed access route.
- Map(s) and discussion of each proposed access route, any road weight restrictions, local government jurisdiction(s), access and egress of location, necessary turning radii for equipment, trucks or emergency vehicles, and plans for staging and waiting of vehicles during operations.
- Plan for use of temporary and permanent pipelines, if applicable, for transporting products on or off location (oil, natural gas, produced water, etc.).

Noise Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Ambient Baseline Noise Study:

- Encompass at least five days, one of those days being a weekend.
- Shall measure noise for A-weighted and C-weighted sound pressure levels.

Noise modeling study/noise impact assessment:

- Shall estimate and predict environmental noise levels and impacts during each phase of operations and present both mitigated and unmitigated noise estimates.
- Shall estimate noise levels for reasonably expected or realistic worst-case scenarios.
- Shall present noise estimates for A-weighted and C-weighted sound pressure levels.
- Shall present noise estimates at the proposed facility and cumulatively with ambient background noise levels.
- Shall include a list of equipment and manufacturer's specifications the noise modeling is based on.

- Shall include a low frequency (C-weighted) noise impact analysis and identification of available control measures for low frequency sound.
- Topographic considerations of noise and noise propagation at the proposed site.
- Plan for continuous noise monitoring and measurements at the proposed facility, if applicable, including the placement of equipment and data sharing and reporting.
- Shall include all raw and adjusted noise data upon request from the County.
- Shall include proposed points of compliance for both County and COGCC noise provisions
- Any applicant-proposed mitigation measures to reduce impacts associated with noise.

Lighting Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Methods to ensure adequate lighting for onsite safety.
- Facility lighting type, anticipated location, mounting, height, and orientation during each phase of operations.
- Photometric study indicating impact on surrounding properties and measure of lumens and lumens per square foot of the facility emitted during each phase of operations.
- Cut sheets for all proposed fixtures.
- Any applicant-proposed mitigation measures to reduce impacts associated with light.

Odor Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Type(s) of fluid to be utilized during each phase of drilling.
- All potential odor sources during each phase of operations.
- Planned methods for responding to odor-related complaints.

- Any applicant-proposed mitigation measures to reduce impacts associated with odor.

Dust Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- The amount of total area disturbed for construction, proposed access road coverage type (dirt, gravel, pavement, etc.), and soil type.
- Predominant wind patterns including wind speeds and direction for each scheduled phase of earthmoving operations.
- Any applicant-proposed mitigation measures to reduce impacts associated with dust.

Visual Aesthetics Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Visual Mitigation Plan:

- Listing of all operations' equipment, including required sound walls, equipment heights, proposed colors for all equipment, and whether equipment is observable from any public highway, roadway, or trail.
- Renderings of the proposed facility and the surrounding areas during drilling and production operations.
- Methods for site access and security including proposed fencing, barriers, and screening during each phase of operations.

Landscaping and Berming Plan:

- Proposed landscaping and berming type, height of mature landscaping, location of berming placement, and maintenance and irrigation requirements for planted vegetation throughout the duration of operations, including production.
- Any applicant-proposed mitigation measures to reduce impacts associated with visual aesthetics.

Community Outreach Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Identification of any Disproportionately Impacted Communities, as defined in COGCC rules, within one-half mile (1/2), or greater as determined by the Director of Community and Economic Development, of the proposed site with plans for engagement and a description of measures taken to directly mitigate impacts to those communities.
- Plans for regularly updating residents within one-half mile (1/2), or greater of the proposed site (public meetings, access to information, website creating, meeting notifications, etc.).
- Plans for providing written or digital materials to residents within one-half mile (1/2), or greater including materials in languages other than English.

Cumulative Impacts Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Evaluation and discussion of the cumulative impacts from all reasonably foreseeable development associated with oil and gas activity and other heavy industrial operations within one mile (1) of the proposed site and all incremental increases to the following impacts, at a minimum:
 - **Air Quality:** a qualitative and quantitative evaluation, discussion, and emission estimate for air pollutants during all pre-production operations and for the first year of production from the proposed site.
 - **Public health and welfare:** a qualitative or quantitative evaluation of short-term and long-term cumulative impacts to noise, light, odor, and dust.

Quantitative evaluation of total hazardous air pollutant emissions estimated during pre-production operations and for the first year of production from the proposed site.
 - **Traffic:** a quantitative and qualitative evaluation and discussion of short-term and long-term cumulative impacts

associated with traffic to and from the proposed site.

- **Water resources:** an identification of all potential contaminant migration pathways including distances from the proposed site to the nearest downstream riparian corridors, wetlands, surface waters, and environmentally sensitive areas.

Qualitative evaluation of potential impacts to public water systems and intakes.

Qualitative evaluation of anticipated volume of surface and groundwater to be used and plans for the reduction, reuse, and recycling of water for all operations.

- **Wildlife, Ecosystems, and Soil :** the identification and listing of all high priority habitats and total acreage of surface disturbance within those habitats.

A quantitative evaluation and measurement of total topsoil disturbance necessary for the proposed site and qualitative evaluation of impacts on ecosystems and vegetative communities as a result of surface disturbance from the proposed site.

Plans for short-term and long-term revegetation of disturbed areas. Plans and volume estimates for bringing in inert fill from offsite.

- For proposed locations within one (1) mile of any Disproportionately Impacted Communities, this plan should also discuss any cumulative impacts, if any, to those communities and plans for avoiding, mitigating, and offsetting such impacts.

- Plans for addressing, mitigating, and offsetting cumulative impacts, including specific measures proposed by the applicant.

Water and Wildlife Protection Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Water Supply:

- Proof of adequate water supply. Operator shall identify a water resource lawfully

available for industrial use, including oil and gas development, to be utilized by Operator and its suppliers.

Water Quality Plan:

- Details on water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies.

Natural Resources Evaluation:

- Identification of the location, size, and status of any wetlands, Colorado Parks and Wildlife classified high priority habitats, other wildlife habitats (non-eagle habitats/nests, prairie dog burrows, etc.), wildlife movement corridors, floodplains, surface waters, tributaries, intermittent and ephemeral streams, drainage canals, and groundwater wells.
- Plans for consultation and engagement with Colorado Parks and Wildlife.
- Any applicant-proposed mitigation measures to reduce impacts to water resources and wildlife.

Natural Resource Conservation Overlay (NRCO):

- If the Oil and Gas Facility is located in the NRCO, a Resource Review will be required

Substantially Equivalent Protections Plan (optional):

For locations that do not meet setback requirements in Adams County Development Standards and Regulations Chapter 4: Plan should demonstrate how the Oil and Gas Facility will provide substantially equivalent protections that are equal to or more effective at protecting public health, safety, welfare, the environment and wildlife resources in the form of:

- Planned mitigation and Best Management Practices.
- Implementation of best available control measures and technologies.
- How the proposed Oil and Gas Facility is compatible with the surrounding area.
- The extent to which the proposed Oil and Gas Facility will mitigate, avoid, or offset cumulative impacts.

Engineering Documents:

The following technical engineering documents are required by the Community and Economic Development unless otherwise waived:

Construction Plans:

- If applicable, plans for the proposed Oil and Gas Operation's public improvements including road plan and profile sheets, storm drainage improvement plans and other public improvements, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Pavement Design Report:

- If applicable, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 7).

Grading Erosion and Sediment Control:

- If applicable, as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Drainage study/technical drainage letter/plan:

- If applicable, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Floodplain Use Permit:

- The applicant must obtain a Floodplain Use Permit, in accordance with the latest version of the Adams County Development Standards and Regulations, if the proposed Oil and Gas construction disturbance or operation encroaches into the 100-year floodplain, or the access is crossing a major drainage way, as defined by the latest version of the Adams County Development Standards and Regulations (Chapter 9).

~~Natural Resource Conservation Overlay (NRCO):~~

- ~~• If the Oil and Gas Facility is located in the NRCO, a Resource Review will be required.~~

Surface Owner Documentation:

- Documentation as to whether the surface owner and others with interest in the property have authorized the proposed OGF.

**Additional documentation as determined by the
Director of Community and Economic
Development Department:**

- Community and Economic Development may require additional information to process an OGF Permit application. In addition to the items required on the check list, the Director of Community and Economic Development may require additional information deemed necessary to evaluate particular applications.

DRAFT

Summary of Public & Referral Agency Comments: PLN 2021-00004; Oil & Gas Regulation Amendments				Comments received as of: June 30, 2021
Topic Area	Comment(s)	Stakeholder(s)	AdCo Staff Response & Recommendations	
Setbacks	Requested added clarity in the rules about exceptions/waivers to setback requirements to allow permitting closer than 2,000-feet.	Local Government(s), COGCC, Industry, Resident Group(s), AdCo CEDD, Resident(s), Environmental Group(s)	Staff is proposing to expand the substantially equivalent language in Chapter 4 and add a Substantially Equivalent Report submission to the Development Application Guide for second draft. Staff is proposing to move the setback waiver requirements to Chapter 2 of DSR for alignment with other land use processes.	
	Suggested added clarity and flexibility allowing for administrative waivers to setbacks in more instances	Industry	Staff is proposing added clarity in Chapter 4 for the granting of Administrative Waivers for setbacks for second draft. Staff is not proposing additional changes in the final draft.	
	Suggested added clarity on how the County will measure setbacks	Industry	Staff is proposing added clarity in Chapter 4 to the measurement of setbacks being from the edge of maximum disturbance for second draft. Staff is further proposing further clarification for the definition of disturbance area for the final draft to align with COGCC definition of Oil and Gas Location.	
	Requested added clarity in the determination of Environmentally Sensitive Areas (ESA) and provide those maps to applicants	Industry	Staff is proposing to amend the definition of ESA in Chapter 11 to include Waters of the State. Will work with GIS to create public layers for this item. Staff will further clarify this intention for the final draft. Staff is further proposing changes to clarify our intention for the determination of ESA.	
	Requested setbacks be increased to 2,500-feet+ based on scientific studies and CDPHE Report	Environmental Groups / Resident(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.	
	Requested no exceptions be allowable for any setback requirements	Resident(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.	
	Requested AdCo take up reverse setbacks now and increase them to 2,500-feet	Environmental Groups / Resident(s)	AdCo has previously adopted reverse setback provisions and will be proposing additional revisions to this topic in Phase II of the oil and gas amendments, with BoCC direction.	
	Commented on the ability of AdCo to review administrative waiver requests even with resident/landowner consent. Request for administrative waivers of water well setback with Public Water Supplier support.	Industry	Staff is proposing minor edits to Chapter 4 to the final draft to clarify this point.	
	Commented on the perception of differing substantially equivalent protections determinations in AdCo and COGCC rules	Industry	Staff proposing to relocate these provisions to Chapter 2 for clarification as criteria for waiver processes for setback provision.	
	Requested the County measure setbacks from wellheads and/or production equipment rather than edge of disturbance.	Industry	Staff reviewed comment and are proposing no changes to this item, at this time.	
	Requested setbacks be left at current County standard of 1,000-feet	Resident(s) / Mineral Owner(s)	Staff has reviewed this comment and are proposing 2,000-foot setbacks for alignment with COGCC standards.	
Community Outreach, Disproportionately Impacted Communities & Notices	Requested notice of application radius be extended to 1 mile+	Environmental Group(s) / Resident(s)	Staff is proposing expanding the resident notice for OGFs to 1 mile within Chapter 2, Chapter 4 and the Development Application Guide	
	Requested AdCo should facilitate, organize, and run all required neighborhood meetings.	Environmental Group(s) / Resident Group(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.	
	Requested AdCo require neighborhood meetings past the completion of the first wellbore.	School Districts	Staff is proposing revisions to Chapter 4 to require additional neighborhood meetings in some instances.	
	Requested additional and specific protections for Disproportionately Impacted Communities.	Neighborhood Group(s) / Resident(s)	Additional identification and outreach requirements already being proposed in current draft rules. Staff is proposing reference to disproportionately impacted communities as part of the cumulative impacts evaluation.	
	Request for expanded public comment for applications in Disproportionately Impacted Communities, required hearings for those applications, and specific approval criteria unique to such communities	Neighborhood Group(s) / Resident(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.	
	Comments regarding proposed notice to landowners and residents prior to commencing plugging and abandonment work will delay work and disincentive such in AdCo. Request to build in exceptions when 7 days is not operationally possible. Request to notify once a Form 6 is approved by COGCC.	Industry	Staff is proposing edits to the final draft that clarifies the County will require Operators to notify land owners or residents after a COGCC approval of a Form 6 for plugging and abandonment.	
	Comments regarding concern with increasing resident and landowner notification past 2,000-feet as required in COGCC rules	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.	
	Comments regarding the requirement to expand community/neighborhood meetings and inviting all residents within 1 mile of the site. Comment requesting flexibility for instances where there is not a substantial update to provide.	Industry	Staff reviewed this comment and believes this is already allowable in AdCo's proposed provisions under 4-11-02-03-03.20.c. The Director of CEDD may allow for a mail format in the event there are no substantial updates, for example.	
	Requests that all notices as required in ACDS&R also include mineral owners.	Industry / Resident(s) / Mineral Owner(s)	Staff reviewed this comment and are proposing no changes to this item, at this time. AdCo does not regulate mineral rights, nor does it maintain a database of mineral rights owners or require proof of mineral rights for OGF applications. Staff contends notice to mineral owners is the responsibility of the applicant and the County welcomes public input from all interested residents and groups.	

Summary of Public & Referral Agency Comments: PLN 2021-00004; Oil & Gas Regulation Amendments			Comments received as of: June 30, 2021
Topic Area	Comment(s)	Stakeholder(s)	AdCo Staff Response & Recommendations
Noise & other Nuisance Impacts	Suggested flexibility in proposed noise modelling requirements to allow noise studies after permitting.	State Agency / Industry	Staff proposing revisions to Chapter 4 to add clarity to the noise requirements and is proposing updates the Development Application Guide to clarify the requirements.
	Requested clarity on the applicability of this setback relative to COGCC noise standards. Presented concerns over enforcement of complaints generally.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time. AdCo Staff enforce regulations with certified Oil and Gas Inspectors
	Requested clarity on AdCo's requirement for third-party/consultant process for noise data and modeling. Request to allow Operators to submit contractors or consultants for consideration.	Industry	Staff is proposing edits to Chapter 4 to clarify this topic further for second draft. Staff proposing changes to specifically allow Operators to submit contractors for consideration in the final draft.
	Requested we remove language allowing speciated sampling in response to an odor complaint and other nuisance type complaints.	Industry	Staff is proposing minor edits to draft regulations in Chapter 4 regarding compliance with and responses to odor-related complaints for second draft.
	Request for specific off-ramps or exceptions to noise requirements	Industry	This is already built into AdCo's regulations with waivers available for all performance standards and regulations on a site-specific basis.
	Request for a provision in AdCo rules allowing the County to require Operators comply with a lower maximum noise levels beyond what is required by COGCC rules.	Neighborhood Group(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Comments about the legality and application of noise provisions on oil and gas operations compared to other industrial and commercial operations.	Industry / Resident(s) / Mineral Owner(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.
Cumulative Impacts, Air Quality & Environmental Impacts	Requested the BoCC consider cumulative impacts as part of any approval or denial, including GHGs	Environmental Group(s)	Staff is proposing adding direct reference to cumulative impacts under substantially equivalent protections language.
	Requested AdCo cumulative impacts requirements align with COGCC standards.	Industry	This is already addressed in the current draft rules. Staff is proposing minor edits to clarify this further in the second draft.
	Requested AdCo require continuous monitoring at all OGFs. Monitoring should require resident notification for any pollutant increases.	Environmental Group(s) / Resident(s)	Amendments to air quality monitoring are not being proposed in this round of amendments. Additionally, air quality monitoring is required for all sites statewide beginning May 1.
	Question regarding cumulative impacts to wildlife resources over time. Request to require annual check-ins with CPW.	CPW	Staff reviewed this comment and believes this is already addressed in the proposed AdCo regulations and Development Application Guide. Staff intends to communicate with CPW regularly on changes to habitats, etc. within the County.
	Comments on differences in AdCo groundwater sampling requirements compared to COGCC requirements. Specifically requesting only 4 maximum sample locations required.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	General comments about applying the strongest protections possible for air, soil, water, etc.	Neighborhood Group(s) / Resident(s)	Staff reviewed this comment and believe current proposals appropriately address protections for all resources.
	Comments regarding requirement for recycling of water and proof of water rights.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Requested AdCo halt permitting due to non-attainment status of Front Range region	Environmental Group(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.
Financial Assurance	Requested stronger requirements for funding of cleanup and well closure. Also, for higher per-well amounts for bonding and environmental liability insurance.	Environmental Group(s) / Resident(s)	AdCo has already adopted Financial assurance provisions. Additionally, AdCo is a stakeholder in this ongoing state rulemaking process on this topic and will be proposing amendments to this topic in Phase II.
	Comment that requiring financial liability insurance is cost prohibitive and unnecessary and unreasonable.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Request to add discussion of force majeure event to Financial Assurance provisions.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
Enforcement, Fees & Reporting	Requested AdCo have more/increased monetary fines for violations and spills.	Environmental Group(s) / Resident(s)	AdCo has robust enforcement included in our current rules and in the COGCC rules. No additional changes are being proposed at this time.
	Request for added flexibility for an Operator to make repairs to roadways after 10 days with approval of AdCo	Industry	Staff reviewed this comment add modified the rule for clarification. Staff believes County regulations already allow flexibility for extreme circumstances such as inclement weather
	Request to reserve a certain percentage of fines/penalties for habitat protection that is owned or maintained by AdCo in consultation with CPW	CPW	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Request for an oil and gas inspection fee schedule	Industry	This is already provided and publicly available.
	Comments about the need for reporting and 72 hour repair for all LDAR detected leaks outside the EPA and AQCC requirements.	Industry	Staff are proposing changes in the final draft for further alignment with AQCC Regulations regarding LDAR leaks and repairs.
	Requested that one-well completion not permanently vest an OGF Permit	COGCC / AdCo CEDD	Staff is proposing to modify the permit expiration term requirements in Chapter 2.

Summary of Public & Referral Agency Comments: PLN 2021-00004; Oil & Gas Regulation Amendments			Comments received as of: June 30, 2021
Topic Area	Comment(s)	Stakeholder(s)	AdCo Staff Response & Recommendations
Permit Expirations	Commented about the change of permit term expiration from second draft. Suggested the addition of renewal language to regulations after lapse of primary term. Request to add reference to COGCC CAPs. Specific proposals for renewal after 3 years and every 6 months.	Industry / Resident(s) / Mineral Owner(s) / Neighborhood Group(s)	Staff and County Attorney's office has reviewed this comment and are proposing no changes to this item, at this time.
Drainage / ROWs	Opposes allowing the usage of drainage culverts or ROW for temporary water lines	AdCo Public Works	Staff is proposing to modify language in Chapter 4 that prevents usage of drainage culverts and ditches for temporary water lines
	Comment opposing the change prohibiting the use of County drainage culverts for layflat water lines	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
Alternative Site Analysis	Requested added clarity in determining a distinctly unique site	Industry	Staff is proposing to slightly modify the language to clarify the intent for distinct alternative locations.
	Requested justification for at least three potential sites for an ASA and requires consideration of loss of mineral development as part of the review. Including that the 3 location minimum be waivable on a site-specific basis.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Questions regarding required distance between alternative sites as it relates to disconnected or fragmented landscapes for wildlife	CPW	Staff reviewed this comment and are proposing no changes to this item, at this time. Staff intends to consult with CPW during the conceptual review and ASA process.
	Request for expanded requirements for ASA including cumulative impacts and other studies prior to an application submittal.	Neighborhood Group(s)	Staff reviewed and considered this comment and believe proposals already address this item. The Director of CEDD may request any plan necessary during the ASA process.
Development Application Guide	General comments about County jurisdiction on regulation topics and notice for updates to the Development Application Guide. Request for a stakeholder process for changes to the Development Application Guide	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Questions regarding the confidentiality of documents / CORA requirements	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time. CORA statutes explain this further.
General & Other Comments	Hearing Process / Determination of affected person status	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	General comments on conformance with state regulations	Industry, AdCo CEDD, Resident(s)	Staff has made appropriate changes to Chapter 2 and 4 where appropriate for conformance with state rules
	Request to add direct reference to COGCC Rule 301.f regarding consultation with the COGCC in AdCo preapplication.	Industry	Staff is proposing language in Chapter 2 to clarify AdCo's intent to consult with COGCC where applicable and allowable.
	Request to define wildlife or wildlife resources in AdCo regulations	CPW	Staff is proposing edits to adopt COGCC's definition of Wildlife Resources to the final draft.
	Commented that the requirement for additional AdCo permits for remediation will delay cleanup of a spill	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Comment on applying AdCo OGF provisions to operations and abandonment activities as downhole.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Comments on the applicability of Comprehensive Plan for OGF permitting and which version of the Comp Plan applies for these amendments.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time. AdCo will use the Comp Plan adopted at the time of application. The applicant should demonstrate conformance with Comp Plan in the application materials.
	Request to allow mineral rights owners to request a rezoning of the surface. Request a general reference to mineral rights owners be included throughout ACDS&R	Industry / Resident(s) / Mineral Owner(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Comments regarding reference to applicable zoning district requirements be added to Chapter 2	Industry	Staff reviewed this comment and believes this is already addressed in Section 3-07-01 of AdCo regulations.
	Request to add flexibility for the Operator to make repairs to spill containment and berming after a 1" or greater rain event inspection.	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Residents requested the County conduct a financial assessment on the potential economic impact of the proposed regulations.	Resident(s) / Mineral Owner(s)	Staff reviewed this comment and are proposing no changes to this item, at this time.
	Request to use the term "childcare" rather than daycare for consistency with state rules.	TCHD	Staff reviewed this comment and are proposing no changes to this item, at this time. County regulations define daycare in Chapter 11.
	Comments regarding changes to the landscaping requirements for added clarification. "All plant material shall be kept in a healthy growing condition at all times."	Industry	Staff reviewed this comment and are proposing no changes to this item, at this time.

From: [Pamela Baker](#)
To: [Gregory Dean](#); [Eva Henry](#); [Chaz Tedesco](#); [Emma Pinter](#); [Steve O'Dorisio](#); [Lynn Baca](#)
Subject: Concern Regarding 2021 Proposed Amendments From Pamela Baker
Date: Monday, June 7, 2021 4:21:37 PM

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Pamela Baker and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a

critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Pamela Baker

You can respond to me directly at: pam@mthart.net

Street Address: 1245 East Colfax Ave

Street Address Line 2: Suite 304

City: Denver

State / Province: Colorado

Postal / Zip Code: 80218

It is critical that you understand the importance of this matter to me.

I represent HF Investment Company - the owner of property in Adams County

From: [Gregory Dean](#)
To: [Pam Baker](#)
Cc: [Eva Henry](#); [Emma Pinter](#); [Steve O'Dorisio](#); [Lynn Baca](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Proposed oil and gas regulations
Date: Monday, June 7, 2021 4:33:00 PM

Ms. Baker,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities proposed in Adams County and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled and completed. If you are already receiving royalty payments for leased minerals, nothing in these draft regulations should impact that. However, the County always welcomes and considers comments and feedback from all interested residents and groups. Further, the current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules in the most recent draft that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protection measures in place.

The exact text of the most recent draft of the proposed changes, released on May 19, 2021, are located at this website: <https://www.adcogov.org/regulation-amendments>. The County continues to conduct robust stakeholder engagement and public outreach throughout this process to solicit input from groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics included on that webpage that should help address many of your specific concerns are:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate

Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet

- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Pam Baker <pam@mthart.net>

Sent: Monday, June 7, 2021 4:19 PM

To: Gregory Dean <GDean@adcogov.org>

Cc: Eva Henry <EHenry@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>

Subject: Proposed oil and gas regulations

Please be cautious: This email was sent from outside Adams County

Dear Greg, Eva, Chaz, Emma, Steve, and Lynn:

We are reaching out today as a landowner that will be impacted by the proposed 2021 oil and gas regulation amendments. We currently rent our land to the Little Valley Wholesale Nursery operation and have royalties from oil and gas mineral rights we own on the land. The developers, Great Western Operating Company, have been good stewards of the land which has allowed the production of the minerals with minimal disruption and no effect on the agricultural aspect of the Nursery operation.

We believe the Adams County 2021 Oil and Gas regulation amendments are essentially a ban on the development of minerals and have an immediate negative impact to our real property rights. The Adams County Voters overwhelmingly voted down Proposition 112 less than three years ago which we believe shows that the voters believe the current Adams County oil and gas regulations protect public health, safety, welfare, and the environment without the need for Amendment. The 2021

Amendments are in direct opposition to the majority of voters in Adams County.

We stand to lose potential future royalty payments if the regulation amendments are implemented. This, in turn, effects the return on investment in the land and the economic input into Adams County.

Please consider the rights of landowners and vote against the proposed regulation amendments.

Thank you for your consideration,
Pam

Pamela Baker, Manager
HF Investment, LLC
1245 E Colfax Ave Suite 304
Denver Co 80218
303-322-7775 Office
303-929-0611 Cell

From: [Gregory Dean](#)
To: [Willb Homesweet](#)
Subject: RE: Against proposed Oil and Gas Facilities regulations
Date: Monday, June 7, 2021 2:37:00 PM

Mr. Bliss,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact draft language of the proposed changes can be found here:

<https://www.adcogov.org/regulation-amendments>

Additionally, the County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules, specifically the 2,000-foot setback proposal
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Willb Homesweet <willb73@hotmail.com>

Sent: Monday, June 7, 2021 2:22 PM

To: Gregory Dean <GDean@adcogov.org>

Subject: Against proposed Oil and Gas Facilities regulations

Please be cautious: This email was sent from outside Adams County

Dear Sirs,

I'm against the proposed changes to the Adams County Oil and Gas Facilities regulations.

These regulations would harm mineral owners and mineral development companies. I'm such a mineral owner.

In my case, and in every case I see around the county, the developers operate with the greatest safety and respect for all neighbors. It's obvious that the current Adams County regulations are sufficient to protect the county and its residents.

I'm especially disappointed with the undemocratic regulatory push in this case. We just had a statewide vote on very similar regulations, and Adams county voters overwhelmingly rejected it.

The proposed regulations show a massive ignorance of (or worse, a contempt for) business development. E.g., the proposed limitation to 3 year permits is far too short to allow reasonable risk developments. This would make Adams county a typical third world type political risk that scares out both existing and new developments.

Finally, these proposed regulations are attacking an industry that has miraculously kept the

U.S.A. economy afloat. This type of oil and gas extraction is what led our country to recently achieving net energy independence, though that is being lost due to actions like this proposal. With that action our country is being saddled with expensive energy, which makes common people poorer, and which makes us vulnerable to another OPEC like energy cartel attack.

Sincerely,

Will Bliss

12460 Brighton Rd

Brighton, CO 80601

From: [Gregory Dean](#)
To: katy@mekusukey.com
Cc: [Lynn Baca](#); [Steve O'Dorisio](#); [Chaz Tedesco](#); [Emma Pinter](#); [Eva Henry](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Katy Alven
Date: Thursday, June 3, 2021 9:37:00 AM

Ms. Alven,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Katy Alven <noreply@formresponse.com>

Sent: Thursday, June 3, 2021 7:48 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Katy Alven

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Katy Alven and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Katy Alven

You can respond to me directly at: katy@mekusukey.com

Street Address: 201 S Mekusukey Ave

City: Wewoka

State / Province: OK

Postal / Zip Code: 74884

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: Harleyguy@q.com
Cc: [Steve O'Dorisio](#); [Lynn Baca](#); [Emma Pinter](#); [Eva Henry](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Jim Baca
Date: Monday, June 7, 2021 2:01:00 PM

Mr. Baca,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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o: 720.523.6891 | gdean@adcogov.org

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From: Jim Baca <noreply@formresponse.com>

Sent: Monday, June 7, 2021 1:12 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Jim Baca

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Jim Baca and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Jim Baca

You can respond to me directly at: Harleyguy@q.com

Street Address: 105 Gaviota Ave

City: Brighton

State / Province: CO

Postal / Zip Code: 80601

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: markbebo800@gmail.com
Cc: [Chaz Tedesco](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Eva Henry](#); [Emma Pinter](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Mark Bebo
Date: Tuesday, June 8, 2021 1:50:00 PM

Mr. Bebo,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Mark Bebo <noreply@formresponse.com>

Sent: Tuesday, June 8, 2021 1:42 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Mark Bebo

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Mark Bebo and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Mark Bebo

You can respond to me directly at: markbebo800@gmail.com

Street Address: 6805 Elmwood Ave

City: Cheyenne

State / Province: WY

Postal / Zip Code: 82007

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: jillbelleau@yahoo.com
Cc: [Eva Henry](#); [Chaz Tedesco](#); [Emma Pinter](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Jill Belleau
Date: Thursday, June 3, 2021 9:36:00 AM

Ms. Belleau,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

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accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Jill Belleau <noreply@formresponse.com>

Sent: Wednesday, June 2, 2021 6:56 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Jill Belleau

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Jill Belleau and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

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As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Jill Belleau

You can respond to me directly at: jillbelleau@yahoo.com

Street Address: 8182 E 157th Ct

City: Thornton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

I realize this is a form letter, but I strongly disagree that this legislation represents the rural people of Adams County. We moved here to have a country life. First, the property was rezoned by our area to high density and then the commissioners have steadily taken away support for the agricultural and 4H programs we were drawn to this area for. If everyone would not be so greedy on the development and continued population explosion here, we would not need this type of interference. I hope you consider our concerns. This legislation is a strong overreach of our real property rights. My family homesteaded in Colorado and politicians are destroying the rural life we have known for years.

From: [Gregory Dean](#)
To: tdbelleau@gmail.com
Cc: [Steve O'Dorisio](#); [Lynn Baca](#); [Chaz Tedesco](#); [Eva Henry](#); [Emma Pinter](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Todd Belleau
Date: Thursday, June 3, 2021 9:35:00 AM

Mr. Belleau,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

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accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Todd Belleau <noreply@formresponse.com>

Sent: Wednesday, June 2, 2021 6:50 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Todd Belleau

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Todd Belleau and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Todd Belleau

You can respond to me directly at: tdbelleau@gmail.com

Street Address: 123 S. 1st Avenue
City: Brighton
State / Province: CO
Postal / Zip Code: 80601

It is critical that you understand the importance of this matter to me.

I realize this is a form letter, but oil and gas is very complicated and as a member of a family that homesteaded in Colorado, I am strongly opposed to legislation that impacts my real property rights. So many people have moved in and do not understand how Colorado works. Please do not pass this. Save our state. I do not want to be dependent on the government and resent any of these types of legislation that is special interest oriented.

From: [Gregory Dean](#)
To: blumclinton@comcast.net
Cc: [Lynn Baca](#); [Eva Henry](#); [Steve O'Dorisio](#); [Emma Pinter](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Clinton Blum
Date: Wednesday, June 9, 2021 3:04:00 PM

Mr. Blum,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Clinton Blum <noreply@formresponse.com>

Sent: Wednesday, June 9, 2021 2:56 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Clinton Blum

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Clinton Blum and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

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As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Clinton Blum

You can respond to me directly at: blumclinton@comcast.net

Street Address: 6692 S. Hill Way

City: Littleton

State / Province: Colorado

Postal / Zip Code: 80120

It is critical that you understand the importance of this matter to me.

Please do not vote for these regulations.

From: [Gregory Dean](#)
To: burns150@pm.me
Cc: [Chaz Tedesco](#); [Steve O'Dorisio](#); [Eva Henry](#); [Lynn Baca](#); [Emma Pinter](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Ryan Burns
Date: Monday, June 7, 2021 12:49:00 PM

Mr. Burns,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Ryan Burns <noreply@formresponse.com>

Sent: Monday, June 7, 2021 12:29 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Ryan Burns

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Ryan Burns and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Ryan Burns

You can respond to me directly at: burns150@pm.me

Street Address: 9553 E 150th Ave

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

As a single income homeowner, I rely on mineral payments to support my family. Please don't silence the votes of the people through bureacratic subterfuge

From: [Gregory Dean](#)
To: kathychristensen3585@msn.com
Cc: [Lynn Baca](#); [Emma Pinter](#); [Eva Henry](#); [Steve O'Dorisio](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Kathryn Christensen
Date: Monday, June 7, 2021 3:52:00 PM

Ms. Christensen,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Kathryn Christensen <noreply@formresponse.com>

Sent: Monday, June 7, 2021 3:22 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Kathryn Christensen

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Kathryn Christensen and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Kathryn Christensen

You can respond to me directly at: kathychristensen3585@msn.com

Street Address: 9823 E 150th Ave

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: mikechristensen3585@msn.com
Cc: [Emma Pinter](#); [Steve O'Dorisio](#); [Chaz Tedesco](#); [Eva Henry](#); [Lynn Baca](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Michael Christensen
Date: Monday, June 7, 2021 3:52:00 PM

Mr. Christensen,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Michael Christensen <noreply@formresponse.com>

Sent: Monday, June 7, 2021 3:23 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Michael Christensen

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Michael Christensen and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

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Thank you for your consideration,

Michael Christensen

You can respond to me directly at: mikechristensen3585@msn.com

Street Address: 9823 E 150th Ave

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: glynherrington@gmail.com
Cc: [Emma Pinter](#); [Chaz Tedesco](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Eva Henry](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Kenneth Clark Estate by Glynda Clark Clark
Date: Monday, June 7, 2021 8:11:00 AM

Ms. Clark,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Kenneth Clark Estate by Glynda Clark Clark <noreply@formresponse.com>

Sent: Saturday, June 5, 2021 1:47 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Kenneth Clark Estate by Glynda Clark Clark

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Kenneth Clark Estate by Glynda Clark Clark and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Kenneth Clark Estate by Glynda Clark Clark

You can respond to me directly at: glynherrington@gmail.com

Street Address: 1916 S Perry Park Rd

City: Sedalia

State / Province: Co

Postal / Zip Code: 80135

It is critical that you understand the importance of this matter to me.

It would be a huge disservice to the mineral owners who have owned these rights for years, as well as the residents of the state of Colorado who would lose their rights to the use of these essential minerals.

Not to mention the loss of hundreds of jobs in Adams county if this is passed.

From: [Gregory Dean](#)
To: patty_cline@comcast.net
Cc: [Emma Pinter](#); [Eva Henry](#); [Steve O'Dorisio](#); [Lynn Baca](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Patricia Cline
Date: Friday, June 4, 2021 8:28:00 AM

Ms. Cline,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to

accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Patricia Cline <noreply@formresponse.com>

Sent: Friday, June 4, 2021 8:26 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Patricia Cline

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Patricia Cline and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Patricia Cline

You can respond to me directly at: patty_cline@comcast.net

Street Address: 15340 Fulton St.

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: billcran1@msn.com
Cc: [Chaz Tedesco](#); [Emma Pinter](#); [Steve O'Dorisio](#); [Lynn Baca](#); [Eva Henry](#); [Katie Keefe](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From William Cranford
Date: Friday, June 4, 2021 8:02:00 AM

Mr. Cranford,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. As Commissioner Pinter correctly pointed out, the current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to

accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: William Cranford <noreply@formresponse.com>

Sent: Thursday, June 3, 2021 4:36 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From William Cranford

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is William Cranford and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

William Cranford

You can respond to me directly at: billcran1@msn.com

Street Address: 9050 E. 148th Cir.

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

Do not violate the wishes of Colorado and Adams County voters who voted overwhelmingly to defeat Prop 112 and keep all existing regulations in place.

From: Gregory Dean
To: "ronnalf@aol.com"
Cc: [Eva Henry](#); [Emma Pinter](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Ronna FINLEY
Date: Monday, June 7, 2021 11:08:00 AM

Ms. Finley,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Ronna FINLEY <noreply@formresponse.com>

Sent: Monday, June 7, 2021 10:58 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Ronna FINLEY

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Ronna FINLEY and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Ronna FINLEY

You can respond to me directly at: ronnalf@aol.com

Street Address: 2000 w 120th ave building 1 Suite 4A

City: Westminster

State / Province: CO

Postal / Zip Code: 80234

It is critical that you understand the importance of this matter to me.

My family has been involved in mineral rights since long before I was born. Having been involved, I have learned the immense safety precautions they have incorporated into their practices. While I do understand that some do not like drilling, others do. There are ways to meet in the middle. We do not need to be dependent on other countries for our oil. Please consider how many jobs this actually creates. One of my closest friends is an Adams county school teacher, and her husband lost his job in oil and gas when Covid hit. Please consider all of the people stopping production can affect.

From: [Gregory Dean](#)
To: [Clarissa Atkinson](#)
Cc: [Eva Henry](#); [Emma Pinter](#); [Steve O'Dorisio](#); [Chaz Tedesco](#); [Lynn Baca](#)
Subject: RE: new regulations
Date: Monday, June 7, 2021 8:09:00 AM

Ms. Atkinson,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact text of the proposed changes can be found at this website: <https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Clarissa Atkinson <clarissa.w.atkinson@gmail.com>

Sent: Saturday, June 5, 2021 6:38 AM

To: Gregory Dean <GDean@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Fwd: new regulations

Please be cautious: This email was sent from outside Adams County

----- Forwarded message -----

From: **Clarissa Atkinson** <clarissa.w.atkinson@gmail.com>

Date: Fri, Jun 4, 2021 at 8:15 AM

Subject: new regulations

To: <ehenry@adcogov.org>

Dear Ms Henry

As a mineral rights owner, I applaud your efforts to regulate mining in Adams County. Please do all you can to control the dangerous and harmful practices of Great Western and other companies. I inherited these mineral rights, am totally opposed to fracking, but find that due to Colorado law, I cannot refuse to allow it on my "property."

Please! Consider the environment and the planet before the "property rights" of owners.

Thank you for your work,

Clarissa Atkinson

--

Clarissa W. Atkinson

New email address: clarissa.w.atkinson@gmail.com

(Please delete the old Yahoo address from your contacts)

--

Clarissa W. Atkinson

New email address: clarissa.w.atkinson@gmail.com

(Please delete the old Yahoo address from your contacts)

From: [Gregory Dean](#)
To: [Dan Brown](#)
Cc: [Eva Henry](#); [Emma Pinter](#); [Lynn Baca](#); [Chaz Tedesco](#); [Steve O'Dorisio](#); [Katie Keefe](#)
Subject: RE: Oil & Gas Setbacks et al
Date: Friday, June 4, 2021 8:00:00 AM

Mr. Brown,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

I encourage you to read the exact draft language of the proposed changes here:

<https://www.adcogov.org/regulation-amendments>

Additionally, you may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, and a summary of all referral comments received during the first draft of amendments at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted COGCC statewide rules
- Administrative Waivers of setbacks by land owners in many instances
- Staff's other proposed waivers/exception criteria for setbacks and other performance standards
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Dan Brown <dbrown@rockiesminerals.com>

Sent: Friday, June 4, 2021 6:47 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio

<SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Oil & Gas Setbacks et al

Please be cautious: This email was sent from outside Adams County

All-

My name is Dan Brown, managing partner with RMA energy. We are a fairly large mineral owner in Weld & Adams county. It has come to my attention that this board intends to halt all oil and gas exploration in Adams county via setback regulation. I have a few questions below I would like you to consider.

1. What are you going to do when you get sued by every mineral owner for stealing their property rights through regulation? You will owe hundreds of millions if not billions of dollars in lost revenue to working interest and mineral owners.
2. How are you going to make up for the budget shortfall that will inevitably come from no longer receiving production taxes from oil and gas?

Finally many of us are simply sick and tired of this radical agenda that has been going on in Colorado and America lately. You fools try to demonize oil and gas for some political sport. We literally moved our business out of Colorado to Texas because of this very type of thing.

Since it is clear what your agenda is as a board, I can assure you that you will be receiving a bill from us and all the other mineral owners for the revenue you are stealing from us. The price is going to be steep.

Dan Brown

Managing Partner

RMA Energy, LLC

RMA Appalachia, LLC

Rockies Minerals Acquisitions, LLC

777 Taylor St., Suite 1055

Fort Worth, TX 76102

Office: 303-218-9626 Ext 701

Direct: 248-933-2588

rockiesminerals.com

dbrown@rockiesminerals.com

CONFIDENTIALITY / PRIVILEGE NOTICE

This communication and any attachment(s) are confidential and/or privileged, and are for the sole use of the addressee(s). If you receive this transmission in error, you are advised that any unauthorized review, use, disclosure, or distribution is strictly prohibited. In such event, please contact the sender by return email and destroy all copies of the original message and any attachment(s). Thank you.

From: [Gregory Dean](#)
To: [Leonard Dietz](#)
Cc: [Chaz Tedesco](#); [Eva Henry](#); [Steve O'Dorisio](#); [Emma Pinter](#); [Lynn Baca](#); [Matthew Gorenc](#)
Subject: RE: Oil and Gas comments
Date: Wednesday, June 9, 2021 8:32:00 AM

Mr. Dietz and Family,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page:

<https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting in the County.

The exact text of the amendments can be found at: <https://www.adcogov.org/regulation-amendments>. Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

-----Original Message-----

From: Leonard Dietz <lvdiet57@gmail.com>

Sent: Tuesday, June 8, 2021 9:26 PM

To: community@gwp.com; Gregory Dean <GDean@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Lynn Baca <LBaca@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>

Subject: Oil and Gas comments

Please be cautious: This email was sent from outside Adams County

We the named below own mineral rights in Adams County. We want our minerals developed and any governmental regulations preventing development is an immediate impact to our real property rights.

We feel like our voice is being forgotten in this process; less than 3 years ago Adams County voted down proposition 112.

We see the new regulations as essentially a ban on development in areas where we own minerals. We feel that the current Adams County oil and gas regulations protect public health, safety, welfare and environment.

We stand to lose potential future royalty payments if the regulations, as written, are implemented which in turn effects any return investment or input into Adams County.

As a nation and county all minerals need to be developed.

We need to help with local jobs and not be dependent on foreign oil.

What I have read all minerals need to be developed within our entire country.

We need all the oil, gas, solar and wind energy we can produce.

How much income will Adams County loose in royalty payments if new regulations are passed?

Carol Dietz

Judy Dietz

Leonard Dietz

Sent from my iPad

From: [Gregory Dean](#)
To: [Welles Fitzpatrick](#)
Subject: RE: Two quick questions
Date: Tuesday, June 8, 2021 10:26:00 AM
Attachments: [image004.png](#)

Thanks for the information Welles, I am very interested how this merger will impact Adams County as Extraction specifically has a lot in our jurisdiction. To answer your questions:

1. If an Operator can get all landowners or residents within a particular setback to sign off on the location the waiver can be approved administratively without a public hearing (in most instances). If an Operator can not get approval from all residents (or chooses to not attempt such) then the BoCC can still approve the permit after a public hearing. This happens quite often in many land use cases where surrounding residents oppose something and the BoCC approves it, usually with added protection measures that address the concerns raised by residents. The notion that an Operator will need EVERY landowner within the setback to agree is incorrect and not consistent with typical land use policies across the state. The administrative waiver, which was adopted by AdCo in September 2019, is designed to apply to more rural portions of the County where a larger agricultural parcel boundary may be within 2,000-feet of a proposed OGF, but the physical home is more than 2,000-feet, as an example. This aligns with the new 'informed consent' requirement in the COGCC rules.
2. That is correct, going forward an oil and gas well must be in production in order to be held by the County permit. All the regulation changes are proposed to apply prospectively to new Oil and Gas Facilities and will not impact existing sites (except where required by state agency rule).

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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Brighton, CO 80601

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From: Welles Fitzpatrick <wfitzpatrick@principleenergyllc.com>

Sent: Tuesday, June 8, 2021 10:08 AM

To: Gregory Dean <GDean@adcogov.org>

Subject: Two quick questions

Please be cautious: This email was sent from outside Adams County

Greg,

I hope all is well, I was going to email you yesterday but figured you were super busy with the newest merger in the basin. I attached a couple wall street reports on the off chance it's of interest. I know you're probably still jammed, but any help would be greatly appreciated!

I had two quick questions on the proposed rules:

1. As I read page 4-146 of the new regs ([link](#)) under General Provisions sec 4b seems to point to "veto power" of one renter, but then 4c implies that the Board of County Commissioner can in fact issue the permit if it sees fit; can the BoCC "over rule" one renter/owner that wants to hold up a project?

"For Oil and Gas Facilities that do not meet the above setback requirements: A waiver may be granted by the Board of County Commissioners after a public hearing if the Oil and Gas Facility is deemed to provide substantially equivalent protections to public health, safety, welfare, the environment, and wildlife resources that are equal to or more effective to satisfy the criteria of approval. The criteria for determining substantially equivalent protections may include, but are not limited to... The level of consent or waivers obtained from primary resident(s), landowners"

2. One item that has confused me in the new rules on 2-93 is the targeting of the practice of using top holes to hold permits. Am I reading it correctly that a top hole will no longer hold a permit, it actually has to be on production? And lastly are old OGFs from Adams "grandfathered" and could be held by top holes?

"The approving authority shall specify the term of the OGF Permit as three (3) years. If, at the expiration of the three (3) year period, a well is not completed or has not commenced production operations as defined by the COGCC Rules and Regulations, the approval of that well shall lapse. For any wells for which approval has lapsed, the applicant shall be required to apply for a new OGF Permit in accordance with these regulations"

Much thanks as always,
Welles



Welles Fitzpatrick
Chief Investment Officer
800 Gessner Rd., Ste. 1110
Houston, TX 77024
Office: 1-877-714-8773, Ext.3413
Fax: 1-866-767-4044

From: [Carolyn McVey](#)
To: [Gregory Dean](#); [Eva Henry](#); [Chaz Tedesco](#); [Emma Pinter](#); [Steve O'Dorisio](#); [Lynn Baca](#)
Subject: Concern Regarding 2021 Proposed Amendments From Carolyn McVey
Date: Wednesday, June 9, 2021 10:18:52 AM

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Carolyn McVey and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a

critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Carolyn McVey

You can respond to me directly at: halmcvey@gmail.com

Street Address: 426 Via Ventana Drive

City: Mesquite

State / Province: Nevada

Postal / Zip Code: 89027

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: halmcvey@gmail.com
Cc: [Emma Pinter](#); [Chaz Tedesco](#); [Steve O'Dorisio](#); [Lynn Baca](#); [Eva Henry](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Carolyn McVey
Date: Monday, June 7, 2021 11:14:00 AM

Ms. McVey,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

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From: Carolyn McVey <noreply@formresponse.com>

Sent: Monday, June 7, 2021 11:08 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Carolyn McVey

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Carolyn McVey and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Carolyn McVey

You can respond to me directly at: halmcvey@gmail.com

Street Address: 426 Via Ventana Drive

City: Mesquite

State / Province: Nevada

Postal / Zip Code: 89027

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: letterly3d@ida.net
Subject: RE: 2021 Amendments to Adams County's Oil and Gas Regulations
Date: Thursday, June 10, 2021 10:40:00 AM

Ms. Gunnerson,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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o: 720.523.6891 | gdean@adcogov.org

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From: letterly3d@ida.net <letterly3d@ida.net>
Sent: Thursday, June 10, 2021 10:25 AM
To: Gregory Dean <GDean@adcogov.org>
Subject: 2021 Amendments to Adams County's Oil and Gas Regulations

Please be cautious: This email was sent from outside Adams County

June 6, 2021

Proposed regulations will hinder on my property rights

Dear Adams County Commissioner Greg Dean, Adams County Oil and Gas Liaison:

I am a mineral owner in Adams County and have been for several decades. I am writing [today](#) to express concern with the proposed 2021 Amendments to the County's oil and gas regulations. I whole-heartedly support developing minerals responsibly and in compliance with local and state regulations. This will become more difficult, given the proposed Adams County regulations for oil and natural gas development.

The proposed Adams County regulations, as currently drafted, are too restrictive and could prohibit the development of my property rights. Adams County voters overwhelmingly **voted down** Proposition 112 three years ago, which would have required a 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, that would have cost jobs and tax revenue. Voters wisely understood to vote against it.

Property rights are not limited to the surface owners. I strongly encourage you to consider my rights as a mineral interest owner and keep regulations that are sensible and balanced - respecting both surface and subsurface property owners.

The proposed regulations will severely impact the value of my mineral property. If

enacted as written, the setback provisions alone could eliminate new development and limit tax revenue in the County. As you know, the value of mineral interests is directly tied to royalties associated with oil and gas development. If operators are prohibited from developing minerals, then the value of my property declines. Regulations preventing development will have negative cost jobs and tax revenue.

I consider the proposed Adams County oil and gas regulations to be a ban on economic growth. If these new regulations are implemented as written, I will lose royalty payments which will limit my involvement in Adams County.

I ask that you remember the incredible benefits of energy production in Adams County during the past 50 years. I hope you will promote energy resource extraction as a critical part of the County and Colorado's state economy.

Thank you for your attention to these issues.

Respectfully,

Peggy Gunnerson
919 Swan Valley Hwy
Ririe, ID 83443

From: [Gregory Dean](#)
To: bigstep36@hotmail.com
Cc: [Lynn Baca](#); [Chaz Tedesco](#); [Steve O'Dorisio](#); [Eva Henry](#); [Emma Pinter](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Tomas Garza
Date: Friday, June 11, 2021 8:15:00 AM

Mr. Garza,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

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From: Tomas Garza <noreply@formresponse.com>

Sent: Friday, June 11, 2021 6:53 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Tomas Garza

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Tomas Garza and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

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Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Tomas Garza

You can respond to me directly at: bigstep36@hotmail.com

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: atk1rdr@aol.com
Cc: [Lynn Baca](#); [Steve O'Dorisio](#); [Eva Henry](#); [Emma Pinter](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Michael Hall
Date: Tuesday, June 8, 2021 10:03:00 AM

Mr. Hall,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

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From: Michael Hall <noreply@formresponse.com>

Sent: Tuesday, June 8, 2021 9:48 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Michael Hall

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Michael Hall and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Michael Hall

You can respond to me directly at: atk1rdr@aol.com

Street Address: 2532 Little Thompson Dr

City: Berthoud

State / Province: Colorado

Postal / Zip Code: 80513

It is critical that you understand the importance of this matter to me.

The oil and gas industry is vital to the economic health of Colorado and Adams County. The voters of the State showed that extreme regulation of the industry was not favored by the majority of the population. Reasonable regulation is certainly important but extreme regulation is likely to affect the industry and individual rights of mineral owners. For example I recently purchased some mineral rights in Adams county. I will suffer a personal financial loss if the current extreme regulations are passed. I'm not a voter in Adams County but am a property owner. I hope that the rights of mineral owners in Adams county will be represented in your considerations. Thank you.

From: [Gregory Dean](#)
To: hayden.dave247@gmail.com
Cc: [Lynn Baca](#); [Chaz Tedesco](#); [Emma Pinter](#); [Eva Henry](#); [Steve O'Dorisio](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From David Hayden
Date: Monday, June 7, 2021 8:17:00 AM

Mr. Hayden,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: David Hayden <noreply@formresponse.com>

Sent: Sunday, June 6, 2021 7:32 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From David Hayden

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is David Hayden and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

David Hayden

You can respond to me directly at: hayden.dave247@gmail.com

Street Address: 5222 Brome ct.

City: Erie

State / Province: CO

Postal / Zip Code: 80516

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: mjmark@usa.com
Cc: [Emma Pinter](#); [Chaz Tedesco](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Eva Henry](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Mark Johnson
Date: Tuesday, June 8, 2021 7:54:00 AM

Mr. Johnson,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Mark Johnson <noreply@formresponse.com>

Sent: Monday, June 7, 2021 11:49 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Mark Johnson

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Mark Johnson and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Mark Johnson

You can respond to me directly at: mjmark@usa.com

Street Address: 11051 E 155th PL

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: John.joyce@msn.com
Cc: [Emma Pinter](#); [Lynn Baca](#); [Eva Henry](#); [Steve O'Dorisio](#); [Chaz Tedesco](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From John Joyner
Date: Thursday, June 3, 2021 9:36:00 AM

Mr. Joyner,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. As Commissioner Pinter correctly pointed out, the current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to

accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: John Joyner <noreply@formresponse.com>

Sent: Wednesday, June 2, 2021 6:55 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From John Joyner

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is John Joyner and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

John Joyner

You can respond to me directly at: John.joyce@msn.com

Street Address: 14610 Akron St
City: Brighton
State / Province: CO
Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: pckempton@outlook.com
Cc: [Eva Henry](#); [Emma Pinter](#); [Chaz Tedesco](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Paul Kempton
Date: Tuesday, June 8, 2021 7:53:00 AM

Mr. Kempton,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Paul Kempter <noreply@formresponse.com>

Sent: Monday, June 7, 2021 7:02 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Paul Kempter

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Paul Kempter and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Paul Kempter

You can respond to me directly at: pclkempter@outlook.com

Street Address: 100 n 5th av

City: Brighton

State / Province: Co

Postal / Zip Code: 80601

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: krislee@skybeam.com
Cc: [Eva Henry](#); [Chaz Tedesco](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Emma Pinter](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Kristina Lee
Date: Thursday, June 3, 2021 9:35:00 AM

Ms. Lee,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Kristina Lee <noreply@formresponse.com>
Sent: Wednesday, June 2, 2021 5:11 PM
To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>
Subject: Concern Regarding 2021 Proposed Amendments From Kristina Lee

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Kristina Lee and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

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As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Kristina Lee

You can respond to me directly at: krislee@skybeam.com

Street Address: 15800 ULSTER ST

City: THORNTON

State / Province: CO

Postal / Zip Code: 806027543

It is critical that you understand the importance of this matter to me.

Please put this to vote to see what the community wants. Why always making rules beyond our control?

From: [Gregory Dean](#)
To: leefamily@skybeam.com
Cc: [Emma Pinter](#); [Eva Henry](#); [Steve O'Dorisio](#); [Lynn Baca](#); [Chaz Tedesco](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Scott Lee
Date: Thursday, June 3, 2021 9:35:00 AM

Mr. Lee,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. As Commissioner Pinter correctly pointed out, the current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to

accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Scott Lee <noreply@formresponse.com>

Sent: Wednesday, June 2, 2021 5:10 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Scott Lee

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Scott Lee and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Scott Lee

You can respond to me directly at: leefamily@skybeam.com

Street Address: 15800 Ulster Street

City: BRIGHTON

State / Province: Colorado

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

Please stop punishing these oil and gas companies. We want our own resources in our state, not getting it elsewhere.

From: [Gregory Dean](#)
To: leadfootmike@msn.com
Cc: [Chaz Tedesco](#); [Emma Pinter](#); [Steve O'Dorisio](#); [Eva Henry](#); [Lynn Baca](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Mike Lewis
Date: Thursday, June 3, 2021 9:39:00 AM

Mr. Lewis,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Mike Lewis <noreply@formresponse.com>

Sent: Wednesday, June 2, 2021 9:50 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Mike Lewis

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Mike Lewis and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Mike Lewis

You can respond to me directly at: leadfootmike@msn.com

Street Address: 10521 E. 152nd Ave

City: Brighton

State / Province: Colorado

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: lukybuky@yahoo.com
Cc: [Steve O'Dorisio](#); [Lynn Baca](#); [Chaz Tedesco](#); [Eva Henry](#); [Emma Pinter](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Maleta Mahalic
Date: Friday, June 4, 2021 8:03:00 AM

Maleta Mahalic,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to

accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Maleta Mahalic <noreply@formresponse.com>

Sent: Thursday, June 3, 2021 11:12 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Maleta Mahalic

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Maleta Mahalic and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Maleta Mahalic

You can respond to me directly at: lukybuky@yahoo.com

Street Address: 11319 Flatiron Dr
City: Lafayette
State / Province: Co
Postal / Zip Code: 80026

It is critical that you understand the importance of this matter to me.

Having many life impacting health conditions, I am so dependent on mineral royalties from Oil company helping me to live. Being older also and unable to work due to ALL these issues its absolutely terrifying to think that Political entities could even cause me to end up on the streets due to their actions. I only have mineral rights. No property to live on. Just do the room and board living. I was Barely existing due to disability. But the royalty checks helped me, unbelievably. I was so fortunate to inherit these mineral rights. These Politicians need to know there are people out here really depending on these checks. It CAN be critical and life impacting. I know the oil companies do everything possible to make it safe. Thank you for hearing my comments!!!

From: [Gregory Dean](#)
To: wally.manaugh@gmail.com
Cc: [Chaz Tedesco](#); [Emma Pinter](#); [Eva Henry](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Jacque Manaugh
Date: Tuesday, June 8, 2021 9:32:00 AM

Ms. Manaugh,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*
ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A
Brighton, CO 80601
o: 720.523.6891 | gdean@adcogov.org
www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Jacque Manaugh <noreply@formresponse.com>

Sent: Tuesday, June 8, 2021 9:25 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Jacque Manaugh

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Jacque Manaugh and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules,

then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Jacque Manaugh

You can respond to me directly at: wally.manaugh@gmail.com

Street Address: 7925 Glade Creek Court

City: Dallas

State / Province: TX

Postal / Zip Code: 75218

It is critical that you understand the importance of this matter to me.

Gentlemen: I've been in the oil and gas industry for over 40 years and believe that although there's a few bad operators out there, most operators have good intentions with respect to landowner concerns and compensate them accordingly when damage does occur. I believe the major problems that occur with drilling are few and far between and the restrictions being proposed in Adams County will decrease economic incentive for operators to continue drilling and decrease the lucrative tax base on oil and gas production that benefits Adams County. Some regulation is always needed, but not to the point it puts a stranglehold on operators such that it no longer benefits them to drill in Adams County. I appreciate you listening and hope you consider the above as you move forward with the proposed regulations.

From: [Gregory Dean](#)
To: midwayleasing@comcast.net
Cc: [Steve O'Dorisio](#); [Emma Pinter](#); [Chaz Tedesco](#); [Eva Henry](#); [Lynn Baca](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From D. McCall
Date: Tuesday, June 8, 2021 10:28:00 AM

D.McCall,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: D. McCall <noreply@formresponse.com>

Sent: Tuesday, June 8, 2021 10:13 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From D. McCall

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is D. McCall and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

D. McCall

You can respond to me directly at: midwayleasing@comcast.net

Street Address: 703 Osuna Rd. NE

Street Address Line 2: Ste. 6

City: Albuquerque

State / Province: NM

Postal / Zip Code: 87113

It is critical that you understand the importance of this matter to me.

From: Gregory Dean
To: ["scotthampel@aol.com"](mailto:scotthampel@aol.com)
Cc: [Lynn Baca](#); [Chaz Tedesco](#); [Emma Pinter](#); [Eva Henry](#); [Steve O'Dorisio](#); [Matthew Gorenc](#)
Subject: RE: Expressing my opposition to Proposed Amendments to Adams County Oil and Gas Regulations
Date: Tuesday, June 8, 2021 4:26:00 PM

Mr. Hampel,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

To address some of your specific comments: The 2,000-foot setback from residences and schools being proposed by the County aligns the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide after a year-long rulemaking process. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protection measures in place.

Additionally, the Adams County Development Standards and Regulations have noise requirements in place all industrial and commercial operations, based on the size, nature, timing, and intensity of the operation: including allowable maximum noise levels, restricted hours of operations, and requirements for noise abatement protocols to protect surrounding residents, this is not entirely unique to oil and gas operations. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership, does not have a database of mineral owners, and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

3 year permit terms have been in place in Adams County since 2018 and were in fact longer than state permits terms, until January 2021. Also once a well is drilled and completed by the Operator the County permit approval is permanently vested. The draft regulations are being proposed to apply prospectively on only new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page:

<https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

The exact text of the amendments can be found at: <https://www.adcogov.org/regulation-amendments>. Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: scotthampel@aol.com <scotthampel@aol.com>

Sent: Tuesday, June 8, 2021 3:18 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; sodorisio@adcogov.org; Lynn Baca <LBaca@adcogov.org>

Subject: Expressing my opposition to Proposed Amendments to Adams County Oil and Gas Regulations

Please be cautious: This email was sent from outside Adams County

Adams County Commissioners

Greg Dean

Eva Henry

Chad Tedesco

Emma Pinter

Steve O'Dorisio

Lynn Baca

I am writing this email to urge you to vote down/oppose/block the Proposed Text Amendments to Adams County Oil and Gas Regulations.

The fact that the Adams County Commissioners is even considering these proposed amendments is very troubling to me as a citizen and resident of Adams County

I am opposing changes to Adams County Oil and Gas Regulations for these reasons.

- In 2018, the voters of Colorado defeated election measures outlined in Proposition 112 that impact oil and gas production in Colorado. As an Adams County Commissioner, why are you examining an issue that was passed by voters in 2018? Governor Polis took an oath of office to uphold our laws. Not only has he failed to do this and put this issue in front of county commissioners, the entire "backdoor" procedure to circumvent the vote of the electorate and citizens of Colorado is shameful.

- There has been limited or no effort to reach out to mineral rights holders in Adams County who will be directly impacted by this change; why are you considering a vote on this issue without making a legitimate effort to inform oil and gas mineral right holders?

- Enacting these new regulations will have a detrimental effect on our state and local economies, significantly reduce jobs, and return us to foreign oil dependence? Why are you considering such measures when our county, state and country are just starting to emerge from the Covid-19 pandemic? Additionally, regulations of this nature will increase the cost of the end consumers in terms of transportation, heating, and electrical bills. Why do you want to do this?

- Enacting a 2000-foot setback virtually eliminates oil and gas production in our county and state. It has been proven over and over again that the oil and gas development being conducted in our state and county has been done safely, cleanly and ethically. Attempts by our Governor, Adams County commissioners, and other counties as well, to restrict oil and gas development to force customers to move to the unreliable green energy is unacceptable. While I agree that "green energy" will emerge over time to help eliminate the need for fossil fuels, these types of political moves that control the rights of property owners is an unacceptable solution to our long term energy needs.

- Imposing Noise requirements as "Pseudo Setback" - not only is this discriminatory against the oil and gas industry as other industries do not have to comply with these regulations, these are unreasonable measures especially in rural setting where development is taking place

- Placing a 3-year expiration date is also imposing regulations against the will of the people, (conflicts directly with the voter results of proposition 112, and property owners who have sold oil/mineral rights to development companies.

As Adams County Commissioners, you need to hear the voices of Adams County citizens and avoid pandering to elected state officials who are attempting to ignore Proposition 112 by using sneaky methods to reverse the result of a 2018 voter issue

I urge you to oppose these proposed regulations.

Scott Hampel
Henderson, CO

From: [Gregory Dean](#)
To: [SHELLIE MANTER](#)
Subject: RE: oil and gas proposal
Date: Thursday, June 3, 2021 1:34:00 PM

Ms. Manter,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: SHELLIE MANTER <csmanter@comcast.net>

Sent: Thursday, June 3, 2021 1:20 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: oil and gas proposal

Please be cautious: This email was sent from outside Adams County

As a mineral owner I FULLY support the proposal to oil and gas set back etc regulations that are being considered. Let our children remember that WE did the right thing.

From: [Gregory Dean](#)
To: [Mary Gervais](#)
Subject: RE: Oil and Gas Proposals
Date: Tuesday, June 8, 2021 7:55:00 AM

Ms. Gervais

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Mary Gervais <marvgarv@hotmail.com>

Sent: Monday, June 7, 2021 8:48 PM

To: Gregory Dean <GDean@adcogov.org>

Subject: Oil and Gas Proposals

Please be cautious: This email was sent from outside Adams County

Dear Gregory Dean,

I strongly support and applaud the proposed changes for the County's Development Standards regarding Oil & Gas Facilities. The draft seems well researched and thought out. Keeping Adams County residents safe is of the utmost importance. With oil and gas companies forcing poisonous chemicals into the earth, it is reasonable to assume the chemicals will seep into the ground water. Noise and air pollution from drilling areas near our homes and schools must be kept to a minimum. I hear local news coverage of Weld County residents who have issues from the noise and truck traffic so close to their homes and schools. They are unhappy and their lives have been seriously

disrupted. I would hate to see that happen in Adams County.

Thanks for your help in maintaining a safe Adams county for us to reside in.

I appreciate you and what you're doing.

Mary Gervais

From: [Gregory Dean](#)
To: [K Kiel](#)
Cc: [Emma Pinter](#); [Eva Henry](#); [Chaz Tedesco](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Matthew Gorenc](#)
Subject: RE: Oil and gas regulations
Date: Monday, June 7, 2021 2:27:00 PM

Mr. and Ms. Kielsmeier,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact draft language of the proposed changes can be found here:

<https://www.adcogov.org/regulation-amendments>

Additionally, you may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, and a summary of all referral comments received during the first draft of amendments at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's other proposed waivers/exception criteria for setbacks and other performance standards
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

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From: K Kiel <knurse2008@gmail.com>

Sent: Monday, June 7, 2021 2:18 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Oil and gas regulations

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners

Please do not add your names and reputations to the long list of governmental agencies (like Boulder County) that take away real property rights, ignore their citizens, go against development in areas where there may be oil and gas, and let's face it, take away the amount we receive from payments. Amounts we turn around and SPEND in Adams County.

Our friends and neighbors wouldn't live in Adams County if we didn't already feel the oil and gas regulations are protecting us. We feel safe.

Please don't mess up a good thing.

Sincerely,

Joe and Kate Kielsmeier

From: [Gregory Dean](#)
To: [Penny Letterly](#)
Subject: RE: Proposed regulations will hinder on my property rights
Date: Monday, June 7, 2021 8:21:00 AM

Ms. Letterly,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Penny Letterly <pcletterly@gmail.com>

Sent: Sunday, June 6, 2021 2:25 PM

To: Gregory Dean <GDean@adcogov.org>

Subject: Proposed regulations will hinder on my property rights

Please be cautious: This email was sent from outside Adams County

June 6, 2021

Dear Adams County CommissionerGreg Dean,

I am a mineral owner in Adams County and have been for several decades. I am writing today to express concern with the proposed 2021 Amendments to the County's oil and gas regulations. I whole-heartedly support developing minerals responsibly and in compliance with local and state regulations. This will become more difficult, given the proposed Adams County regulations for oil and natural gas development.

The proposed Adams County regulations, as currently drafted, are too restrictive and could prohibit the development of my property rights. Adams County voters overwhelmingly **voted down** Proposition 112 three years ago, which would have required a 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, that would have cost jobs and tax revenue. Voters wisely understood to vote against it.

Property rights are not limited to the surface owners. I strongly encourage you to consider my rights as a mineral interest owner and keep regulations that are sensible and balanced - respecting both surface and subsurface property owners.

The proposed regulations will severely impact the value of my mineral property. If enacted as written, the setback provisions alone could eliminate new development and limit tax revenue in the County. As you know, the value of mineral interests is directly tied to royalties associated with oil and gas development. If operators are prohibited from developing minerals, then the value of my property declines. Regulations preventing development will have negative cost jobs and tax revenue.

I consider the proposed Adams County oil and gas regulations to be a ban on economic growth. If these new regulations are implemented as written, I will lose royalty payments which will limit my involvement in Adams County.

I ask that you remember the incredible benefits of energy production in Adams County during the past 50 years. I hope you will promote energy resource extraction as a critical part of the County and Colorado's state economy.

Thank you for your attention to these issues.

Respectfully,
Allen Letterly
36870 Coalbank Rd
Eaton Co 80615

From: [Gregory Dean](#)
To: "Marshall Hall"
Cc: [Steve O'Dorisio](#); [Chaz Tedesco](#); [Emma Pinter](#); [Lynn Baca](#); [Eva Henry](#); [Matthew Gorenc](#)
Subject: RE: Regarding Proposed Oil & Gas Amendments
Date: Monday, June 7, 2021 10:49:00 AM

Mr. Hall,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact draft language of the proposed changes can be found here:

<https://www.adcogov.org/regulation-amendments>

Additionally, you may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, and a summary of all referral comments received during the first draft of amendments at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's other proposed waivers/exception criteria for setbacks and other performance standards
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Marshall Hall <marshallhall7@gmail.com>

Sent: Monday, June 7, 2021 9:20 AM

To: Lynn Baca <LBaca@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>

Cc: Gregory Dean <GDean@adcogov.org>

Subject: Regarding Proposed Oil & Gas Amendments

Please be cautious: This email was sent from outside Adams County

Commissioners,

I write this note as a member of the oil and gas industry, 30 years young, schooled in Golden, and a former resident of Colorado. I also presented the Ivey pad to several of you in 2017 as a member of Ward Petroleum before Great Western bought the project.

I also write this note as someone who can empathize with your task and has nothing but respect for public officials. You are responsible to listen to the voice of citizens and voters who are required to hold you to doing the right thing. As you undoubtedly saw with COVID, that is not an easy thing to do. My request is simple, be patient and let your current rules work.

To continually rewrite the rules has so many unfortunate effects. Economy aside, any time a rule continues to change it becomes more difficult to adhere or understand the new changes, no matter how clear. The obvious example is a speed limit changing along a highway; you can see where I can take that analogy. But what about the psychological implications on those citizens this law is deemed to protect? If Adams County continues to change the rules, won't confusion reign? How often does staff receive comments or concerns where the citizen has to learn that the rules have changed. How frustrating must that be? What would people do if Amazon changed their return policy suddenly and often? They would lose faith in the rock solid benefit of being able to buy without touching. The same applies for not only homeowners looking to purchase property or a home but of course those investing in the energy security that Adams County can provide.

Throughout history vocal groups tend to lead change, and that's a good thing. Ending slavery, universal suffrage, etc. started as a mission for a few and grew until those basic rights were granted. We look back now on those moments when historic laws were finally passed and ask, why did it take so long? I'm not asking you to stop trying to improve and be better but I am asking you to recognize that the rules as they stand in Adams County really well. Those vocal groups have been listened to and listened to well. You are honoring the balance between energy security, environmental stewardship, public health, and the local economy but you are not honoring a commitment to seeing it pay off over time with continual amendments.

I want Adams County to strike a balance and be an example of good sound rulemaking, but they cannot continue to be rewritten. Again, I want laws to be updated, I want change to happen where it needs to but ask yourself are these rules really needed to strike a balance between the community and responsible energy development? Or has that balance already been struck?

I am happy to continue any conversation or discussion. I am happy to be a part of this industry that provides so much value to the world. Are we perfect? No. But are we better than we were 10 years ago, 5 years ago, 2 years ago? Yes, and we will continue to get better.

Sincerely and respectfully,

Marshall Hall P.E.

Red Wolf Operating

From: [Gregory Dean](#)
To: [Maria Petrocco](#)
Cc: [Emma Pinter](#); [Lynn Baca](#); [Chaz Tedesco](#); [Steve O'Dorisio](#); [Eva Henry](#); [Matthew Gorenc](#)
Subject: RE: Proposed oil and gas regulations
Date: Friday, June 4, 2021 2:08:00 PM
Attachments: [image004.png](#)

Ms. Petrocco,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process.

The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis, without waivers from every landowner within the setback, with certain added protections.

I encourage you to read the exact text of the most recent draft of the proposed changes, released on May 19, 2021, which are located at this website: <https://www.adcogov.org/regulation-amendments>. The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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From: Maria Petrocco <maria@petroccolaw.com>

Sent: Friday, June 4, 2021 1:23 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Proposed oil and gas regulations

Please be cautious: This email was sent from outside Adams County

Please accept the attached letter for consideration on the above-referenced matter.

Thank you.

Maria Petrocco

Law Offices of Maria Petrocco

8690 Wolff Court #200

Westminster, CO 80031

Phone (720) 216 -5175

Cell: (720) 732-9521

To pay online: 

Law Offices of Maria Petrocco
8690 Wolff Ct. #200
Westminster, CO 80031

Maria M. Petrocco
Licensed in Colorado and Wyoming

June 4, 2021

Sent Via E-mail

Greg Dean, Oil & Gas Liaison gdean@adcogov.org
Eva Henry, Commissioner ehenry@adcogov.org
Chaz Tedesco, Commissioner ctedesco@adcogov.org
Emma Pinter, Commissioner epinter@adcogov.org
Steve O'Dorisio, Commissioner sodorisio@adcogov.org
Lynn Baca, Commissioner lbaca@adcogov.org

RE: Proposed Adams County Oil & Gas Regulations

Dear Mr. Dean and Commissioners,

If Adams County truly wants to protect the health and welfare of their citizens, they must be less stringent in the standards applied to this industry. Adams County needs every form of energy; wind, solar and oil and gas development. One is not exclusive of the other. In order to cut down methane emissions and utilized clean energy, you need petroleum products to make the integral parts of the wind farms and solar farms. You also need the petroleum products to get those solar panels and wind farm parts to their destination.

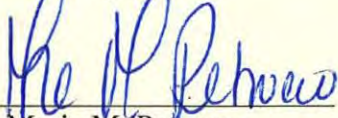
A 2000 -foot setback which can only be waived with full consent of those residing within the setback is almost nearly impossible to obtain. This blanket setback does nothing more than give power to certain individuals who are basing their dissent on emotions as opposed to solid scientific facts.

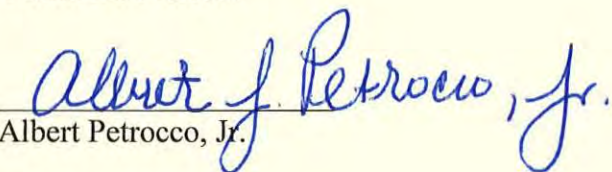
The drill pads now existing in Adams County do not meet this setback and have not posed any risk to the citizens of Adams County. Adams County proposed regulations

will affect us. We have owned minerals in Adams County since 1971 and depend upon those revenue as an income source. These proposed regulations are a taking of our property rights without due process. Allow the operators to work with the oil & gas liaison to develop rules and regulations that serve the residents while allowing the mineral owners to reap the benefits of their property. The proposed regulations are not balanced to consider the competing interests of both the mineral owner and residents.

Thank you in advance for your time and consideration to this matter.

Sincerely yours,


Maria M. Petrocco


Albert Petrocco, Jr.

From: [Gregory Dean](#)
To: [Cathy Rose](#)
Cc: [Chaz Tedesco](#); [Steve O'Dorisio](#); [Eva Henry](#); [Lynn Baca](#); [Emma Pinter](#); [Matthew Gorenc](#)
Subject: RE: Proposed Adams County Regulations for Oil and Natural Gas Developments
Date: Monday, June 7, 2021 2:58:00 PM

Ms. Rose,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process.

The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis, without waivers from every landowner within the setback, with certain added protection measures in place. In the Adams County Development Standards and Regulations, all industrial and commercial operations have noise restrictions in place based on the size, nature, timing, and intensity of the operation: including allowable maximum noise levels, restricted hours of operations, and requirements for noise abatement protocols to protect surrounding residents.

The exact text of the most recent draft of the proposed changes, released on May 19, 2021, are located at this website: <https://www.adcogov.org/regulation-amendments>. The County continues to conduct robust stakeholder engagement and public outreach throughout this process to solicit feedback and comments with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics included that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate

Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet

- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Cathy Rose <cathyr3708@msn.com>

Sent: Monday, June 7, 2021 2:37 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Proposed Adams County Regulations for Oil and Natural Gas Developments

Please be cautious: This email was sent from outside Adams County

I hope that someone will actually read this and give it some serious thought!!!

I am writing you today to express my concern with the 2000 ft set back and requirement that 100% of property owners/renters would have to approve of anything less.

The only thing that I am aware of that requires 100% agreement is a jury trial. Even that can be overturned with a simple majority. In a democracy the majority wins. The way it stands with this proposal is a dictatorship.

When you were elected did you get 100% of the votes? When Joe was elected did he get 100% of the votes? Any of our house or senate members get 100%? No, 49.9% of us have to live with it even if we do not like it as majority rules.. How can you let the possibility of 1% rule over 99%???

If 1 person (tree hugger) voted no, this could affect tens or hundreds of mineral rights owners, like ourselves. The rights we have are in the range of 75 plus years.

What other business or industry have noise restrictions like you are proposing?

One last comment even the US Supreme Court (where this will probably end up due the Millions and millions of dollars involved) operates on the majority rules which is what this proposal should do also. A hand full of people like your selves should not make up the rules. The people of the state voted against this but dictator Polis butted in and did what he wanted. That to us is a dictator. Please let democracy prevail.

It would be nice to hear back by means other than a form letter. Thank you.

Cathy Rose, Trustee Timm Family Trust.

Sent from [Mail](#) for Windows 10

From: [Cathy Rose](#)
To: [Gregory Dean](#)
Subject: RE: Proposed Adams County Regulations for Oil and Natural Gas Developments
Date: Monday, June 7, 2021 7:41:23 PM
Attachments: [BA5970F330604B97B9AC501291D509F3.png](#)

Please be cautious: This email was sent from outside Adams County

You basically beat around the bush on your answers which most politicians do. Answer the ones you want to and avoid the ones you don't want to answer.

.

I know that you are busy but if you can and have time answer each question instead of sending us to a web site that the general public can not understand.

Point me in the direction of what can be done if all owners do not vote yes to allow less than 2000 ft? I have read some of this and I can't find anything on it.

Do you agree or disagree that after the people of Colo voted down setback requirements that dictator Polis can tell the people basically kiss my ass I do what I want? Your standards are following his decision. That is 100% not democracy.

We know that we are probably pissing into the wind and nothing will be done for mineral owners but the minority bitchrers will win. Venting at least makes use feel better.

Sent from [Mail](#) for Windows 10

From: [Gregory Dean](#)
Sent: Monday, June 7, 2021 03:23 PM
To: [Cathy Rose](#)
Subject: RE: Proposed Adams County Regulations for Oil and Natural Gas Developments

Ms. Rose,
Which of your comments were not addressed in my response? I am happy to elaborate on any specific points in the draft regulations but also encourage you to read the exact text and review what has already been put together by County Staff that address many of the common questions we receive.

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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p.m.

From: Cathy Rose <cathyr3708@msn.com>
Sent: Monday, June 7, 2021 2:59 PM
To: Gregory Dean <GDean@adcogov.org>
Subject: RE: Proposed Adams County Regulations for Oil and Natural Gas Developments

Please be cautious: This email was sent from outside Adams County

It looks like a cookie cutter form letter. we were hoping for more. So disappointing.

Sent from [Mail](#) for Windows 10

From: [Gregory Dean](#)
Sent: Monday, June 7, 2021 02:53 PM
To: [Cathy Rose](#)
Cc: [Chaz Tedesco](#); [Steve O'Dorisio](#); [Eva Henry](#); [Lynn Baca](#); [Emma Pinter](#); [Matthew Gorenc](#)
Subject: RE: Proposed Adams County Regulations for Oil and Natural Gas Developments

Ms. Rose,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process.

The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis, without waivers from every landowner within the setback, with certain added protection measures in place. In the Adams County Development Standards and Regulations, all industrial and commercial operations have noise restrictions in place based on the size, nature, timing, and intensity of the operation: including allowable maximum noise levels, restricted hours of operations, and requirements for noise abatement protocols to protect surrounding residents.

The exact text of the most recent draft of the proposed changes, released on May 19, 2021, are located at this website: <https://www.adcogov.org/regulation-amendments>. The County continues to conduct robust stakeholder engagement and public outreach throughout this process to solicit

feedback and comments with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics included that should help address many of your specific concerns include:

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- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Cathy Rose <cathyr3708@msn.com>

Sent: Monday, June 7, 2021 2:37 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Proposed Adams County Regulations for Oil and Natural Gas Developments

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I hope that someone will actually read this and give it some serious thought!!!

I am writing you today to express my concern with the 2000 ft set back and requirement that 100% of property owners renters would have to approve of any thing less.

The only thing that I am aware of that requires 100% agreement is a jury trial. Even that can be overturned with a simple majority. In a democracy the majority wins. The way it stands with this proposal is a dictatorship.

When you were elected did you get 100% of the votes? When Joe was elected did he get 100% of the votes? Any of our house or senate members get 100%? No, 49.9 % of us have to live with it even I we do not like it as majority rules.. How can you let the possibility of 1% rule over 99%???

If 1 person (tree huger) voted no, this could affect tens or hundreds of mineral rights owners, like ourselves. The rights we have are in the range of 75 plus years.

What other business or industry have noise restrictions like you are proposing?

One last comment even the US Supreme Court (where this will probley end up due the Millions and millions of dollars involved) operates on the majority rules which is what this proposal should do also. A hand full of people like your selves should not make up the rules. The people of the state voted against this but dictator Polis butted in and did what he wanted. That to us is a dictator. Please let democracy prevail.

It would be nice to hear back by means other than a form letter. Thank you.

Cathy Rose, Trustee Timm Family Trust.

Sent from [Mail](#) for Windows 10

From: [darleen poole](#)
To: [Gregory Dean](#)
Subject: Proposed Text Amendments To Adams County Oil & Gas Regulations
Date: Tuesday, June 8, 2021 10:14:54 AM

Please be cautious: This email was sent from outside Adams County

Dear Mr Dean,

My name is Darleen Poole and I own mineral rights in Adams County that I inherited from my Father

I oppose the Proposition 112

Great Western is working very hard to develop the natural gas and have always gone above and beyond to do their job to the safety of the land and the people and I would like them to continue.

The Proposition 112 would cost tens of thousand of jobs and hundreds of millions in tax revenue.

Please do all you can to STOP this Proposition from going thru.

Thank you for your time and feel free to contact me with any questions you may have

Sincerely,

Darleen Poole
200 Elm Street
Evanston, Wy 82930

(307) 679-7497

From: [Gregory Dean](#)
To: [Janice Norgren](#)
Subject: RE: Adams Co. Oil restrictions
Date: Tuesday, June 8, 2021 9:31:00 AM

The Norgrens,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process to solicit input with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules, specifically the 2,000-foot setback proposal
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:
<https://www.adcogov.org/regulation-amendments>.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Janice Norgren <jmnorgren@comcast.net>

Sent: Tuesday, June 8, 2021 8:05 AM

To: Gregory Dean <GDean@adcogov.org>

Subject: Adams Co. Oil restrictions

Please be cautious: This email was sent from outside Adams County

Dear County Commissioner Dean:

These are our concerns about the Adams County proposed oil regulations:

- We want our minerals developed and any governmental regulations preventing development is an immediate impact to our real property rights;
- Our voices are being forgotten in this process;
- We see the new regulations as essentially a ban on development in areas where we own minerals;
- We feel that the current Adams County oil and gas regulations already protect public health, safety, welfare, and the environment; and,
- We stand to lose potential future royalty payments if these regulations, as written, are implemented which in turn effects any return investment or economic input into Adams County.

It's time our voices be heard.

Thank you,
Janice & Steve Norgren
Adams County residents since 2000.

From: [Gregory Dean](#)
To: [Bob Stewart](#)
Cc: [Emma Pinter](#); [Eva Henry](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Adams County Oil & Gas Regulations
Date: Wednesday, June 9, 2021 3:10:00 PM

Mr. Stewart,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

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From: Bob Stewart <surfsidemasonry@gmail.com>

Sent: Wednesday, June 9, 2021 3:04 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Adams County Oil & Gas Regulations

Please be cautious: This email was sent from outside Adams County

Hello,

We just received a letter from Great Western Operating Company notifying us about an upcoming proposal to increase setbacks from property lines, increase noise restrictions and add 3-year expiration dates on permits.

We are FOR everything you are proposing! We had absolutely no legal protection from the oil and gas industry coming in and drilling for minerals under our home.

We were told by Great Western Operating Company that " This is what we're doing and if you do not agree, you won't earn anything but we are still taking your minerals...period." They're bullies. Taking someone's property without their consent is theft. They will also take your land if you do not consent to it. Again... theft.

Please help and stand your ground to support your constituents. Big oil = Big bullies that will ruin our way of life on the Front Range.

Sincerely,
Bob Stewart

--

Bob Stewart
Owner
Surfside Masonry, LLC
(303) 619-1147

From: [Gregory Dean](#)
To: [Frank Schwertfeger](#)
Subject: RE: Adams County Oil and Gas Regulations
Date: Thursday, June 3, 2021 1:31:00 PM

Mr. Schwertfeger,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. The draft regulations are proposed to apply prospectively only to all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. Operators currently hold several valid permits from Adams County and the State that will be unimpacted by these proposed amendments.

Further, the current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections for public health, safety, welfare, the environment, and wildlife resources.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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-----Original Message-----

From: Frank Schwertfeger <fschwertfeger@me.com>

Sent: Thursday, June 3, 2021 11:00 AM

To: Gregory Dean <GDean@adcogov.org>

Subject: Adams County Oil and Gas Regulations

Please be cautious: This email was sent from outside Adams County

It has been brought to my attention that Adams County may be considering new setback restrictions for oil and gas exploration and or production of the same.

As a land owner and a resident of Adams County, I am totally opposed to a set back regulation of 2,000' or more from property lines of residences and platted residential lots.

This proposal will force an unusual amount of increased drilling activity in order for the drilling industry trying to make site completions prior to the restrictions being implemented. It will also apply to county residents that may own and live on rural property taking away a land owners decisions on their own land.

The new proposals will also cost the county an amount of tax revenue that over a period of time could be quite substantial.

Businesses operated under existing regulations have business plans for years in advance which includes equipment needed to fulfill the needs of growth and hiring of personnel to meet future demands. Government intervention with additional restrictions will curb the expansion and most likely would lead to the down sizing of operations which will by nature require fewer employees which leads to fewer tax dollars.

As a conservative business person and a land owner in Adams County, I would encourage, you, the commissioners of Adams County, to vote against any of the purposed drilling restrictions. The support of fossil fuel today is also contributing support to other energy sources of the future.

Respectfully submitted from:

Frank Schwertfeger
12244 Wheeling Ct
Henderson, CO 80640
303-478-6522

Sent from my iPhone

From: [Gregory Dean](#)
To: [Debbie McCauley](#)
Cc: [Eva Henry](#); [Chaz Tedesco](#); [Emma Pinter](#); [Lynn Baca](#); [Steve O'Dorisio](#); [Matthew Gorenc](#); [Katie Keefe](#)
Subject: RE: Amendments to Adams County Oil and Gas Regulations
Date: Wednesday, June 2, 2021 11:34:00 AM

Ms. McCauley,

Thank you for reaching out to Adams County with your comments on the draft text amendments to the County's Oil and Gas Regulations. Your comments will be included as part of the public record for this case and considered by Staff, the Planning Commission, and the Board of County Commissioners during the upcoming hearings on these proposed changes.

As it pertains to your specific question about the existing Schaefer LD Pad, the draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities proposed in Adams County and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled and completed. If you are already receiving royalty payments for leased minerals, nothing in these draft regulations should impact that. Additionally, the County only regulates surface impacts and our regulations generally do not apply to downhole/subsurface wells. Further, there are provisions in the County's current rules that will allow a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site specific basis with certain added protections for public health, safety, welfare, the environment and wildlife resources.

Please let me know if you have any additional questions or comments on the draft regulations or any other oil and gas related matter,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

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From: Debbie McCauley <dlmccauley@cablone.net>
Sent: Wednesday, June 2, 2021 10:47 AM
To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>
Subject: Amendments to Adams County Oil and Gas Regulations

Please be cautious: This email was sent from outside Adams County

In regards to your proposed oil and gas regulations, I thoroughly object. The 2000 foot setback from property lines of residences and platted residential lots, noise requirements and permit regulations will create a ban on development in our area.

The Schaefer property in section 24 address 13295 E. 136th Ave. has been in the Schaefer family since 1907. It has been bought and paid for by two generations. The farm was the family income and now that we are older our source of income has been

the mineral production and you are trying to take this away. We have ownership and the right to decide how our property is used.

Proposition 112 was voted down by the people and your job is to listen to the people.

Elaine Schaefer

13295 E. 136th Ave.

Brighton, CO 80601

The above message is being sent by my daughter, Debra (Schaefer) McCauley on my behalf. I do not have e-mail.

From: [Gregory Dean](#)
To: craighnelson@icloud.com
Cc: [Steve O'Dorisio](#); [Emma Pinter](#); [Chaz Tedesco](#); [Lynn Baca](#); [Eva Henry](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Craig Nelson
Date: Friday, June 11, 2021 8:14:00 AM

Mr. Nelson,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Craig Nelson <noreply@formresponse.com>

Sent: Thursday, June 10, 2021 1:10 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Craig Nelson

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Craig Nelson and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Craig Nelson

You can respond to me directly at: craighnelson@icloud.com

Street Address: 19 Raffles Court

City: Petaluma

State / Province: CA

Postal / Zip Code: 94954

It is critical that you understand the importance of this matter to me.

Good People,

The current regulations seem fair to residents and mineral rights owners alike, and should be retained, rather than changed, especially in overly restrictive directions such as single surface rights owner veto power and the three year permit expiration, which inhibits, even prohibits, good phasing plans. I hope you will consider these ideas in making your decisions.

Thanks for your time.

From: [Gregory Dean](#)
To: garrpatterson76@hotmail.com
Cc: [Lynn Baca](#); [Chaz Tedesco](#); [Emma Pinter](#); [Steve O'Dorisio](#); [Eva Henry](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Garr Patterson
Date: Thursday, June 3, 2021 9:35:00 AM

Mr. Patterson,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. As Commissioner Pinter correctly pointed out, the current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to

accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Garr Patterson <noreply@formresponse.com>

Sent: Wednesday, June 2, 2021 5:12 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Garr Patterson

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Garr Patterson and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Garr Patterson

You can respond to me directly at: garrpatterson76@hotmail.com

Street Address: 1676 S Logan Pass

City: Andover

State / Province: KS

Postal / Zip Code: 67002

It is critical that you understand the importance of this matter to me.

Frustrating to know that your basically taking our property rights away. I would hope that if these rules go further, we along with all other other royalty owners will bring suit against Adams County for lost income. These rules have been defeated already through elections! Why are you ignoring our property rights?

From: [Gregory Dean](#)
To: sprescott@hrodlaw.com
Cc: [Lynn Baca](#); [Steve O'Dorisio](#); [Emma Pinter](#); [Eva Henry](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Estate of Don Finley Personal Representative, Ronna Finley
Date: Monday, June 7, 2021 11:44:00 AM

Mr. Lewis-Prescott,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Estate of Don Finley Personal Representative, Ronna Finley <noreply@formresponse.com>

Sent: Monday, June 7, 2021 11:32 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Estate of Don Finley Personal Representative, Ronna Finley

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Estate of Don Finley Personal Representative, Ronna Finley and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules,

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As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Estate of Don Finley Personal Representative, Ronna Finley

You can respond to me directly at: sprescott@hrodllaw.com

Street Address: 3600 S Yosemite Street
Street Address Line 2: Suite 500
City: Denver
State / Province: CO
Postal / Zip Code: 80237

It is critical that you understand the importance of this matter to me.

This letter is submitted by legal counsel on behalf of Ronna Finley, Personal Representative for the Estate of Donald Finley, owner of mineral and overriding royalty rights in Adams County.

From: [Gregory Dean](#)
To: sarah@boulderauto.com
Cc: [Steve O'Dorisio](#); [Lynn Baca](#); [Eva Henry](#); [Emma Pinter](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Sarah Quillen
Date: Monday, June 7, 2021 4:34:00 PM

Ms. Quillen,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Sarah Quillen <noreply@formresponse.com>

Sent: Monday, June 7, 2021 4:21 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Sarah Quillen

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Sarah Quillen and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

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Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Sarah Quillen

You can respond to me directly at: sarah@boulderauto.com

Street Address: 15955 Jackson St.

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

There are many residents in Adams County who feel that this is a complete over-reach, and is an attempt to re-write an election where this type of action was voted down. There will be consequences for legislators who think that they have the right to usurp what the voting public has very clearly supported at the ballot box.

From: [Gregory Dean](#)
To: Marty.rosenbaum@hotmail.com
Cc: [Chaz Tedesco](#); [Steve O'Dorisio](#); [Eva Henry](#); [Emma Pinter](#); [Lynn Baca](#); [Katie Keefe](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Melissa Rosenbaum
Date: Thursday, June 3, 2021 9:35:00 AM

Ms. & Mr. Rosenbaum,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Melissa Rosenbaum <noreply@formresponse.com>

Sent: Wednesday, June 2, 2021 6:22 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Melissa Rosenbaum

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Melissa Rosenbaum and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

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As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Melissa Rosenbaum

You can respond to me directly at: Marty.rosenbaum@hotmail.com

Street Address: 8528 Colonial Dr
City: Lone Tree
State / Province: CO
Postal / Zip Code: 80124

It is critical that you understand the importance of this matter to me.

Radical changes in laws and regulations serve no one's interests. There should always be a phase in period to study the impacts both intended and most importantly unintended. Phasing in allows course correction. Singling out the oil and gas industry in this confiscatorial way is just flat wrong. You harm not just "big oil" but also thousands of people whose jobs and income depend on energy development and production. Go back and draft something responsible.

From: [Gregory Dean](#)
To: mkeelyrunge@gmail.com
Cc: [Lynn Baca](#); [Emma Pinter](#); [Eva Henry](#); [Chaz Tedesco](#); [Steve O'Dorisio](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Mary Runge
Date: Wednesday, June 30, 2021 10:04:00 AM

Ms. Runge,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the final draft of proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Information about the amendment process including summary of public comment, Staff's responses, hearing information and more can be found at the County's [Oil & Gas Information Page](#).

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Mary Runge <noreply@formresponse.com>

Sent: Wednesday, June 30, 2021 1:00 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Mary Runge

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Mary Runge and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental

regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Mary Runge

You can respond to me directly at: mkeelyrunge@gmail.com

Street Address: P O Box 4344
City: Greenwood Village
State / Province: Co
Postal / Zip Code: 80155-4344

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: msands@silverheelsinvestments.com
Cc: [Steve O'Dorisio](#); [Lynn Baca](#); [Emma Pinter](#); [Eva Henry](#); [Chaz Tedesco](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Matthew Sands
Date: Thursday, June 3, 2021 12:56:00 PM

Mr. Sands,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County mirrors the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to

accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Matthew Sands <noreply@formresponse.com>

Sent: Thursday, June 3, 2021 10:59 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Matthew Sands

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Matthew Sands and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Matthew Sands

You can respond to me directly at: msands@silverheelsinvestments.com

Street Address: 1208 S Gaylord St
City: Denver
State / Province: CO
Postal / Zip Code: 80210

It is critical that you understand the importance of this matter to me.

As the president of the Colorado Chapter of the National Association of Royalty Owners and a mineral owner myself, I am very concerned with the potential implications of the proposed oil and gas regulations in Adams County. As an expert witness and consultant in the area of mineral valuation, I have seen many examples where issues around the potential development timing of a mineral tract have had a direct impact on the value of that property. Limiting future development of mineral rights will have a direct impact on the value of the impacted property. The Takings Clause of the 5th Amendment of the U.S. Constitution reads, "nor shall private property be taken for public use without just compensation." It is important that you consider whether Adams County will be able to fulfill its constitutional obligation to compensate mineral owners fairly under these circumstances. Instead, I ask that you engage mineral owners in a dialogue and give them a voice in the process and do not impose restrictions that will result in a government taking without just compensation.

From: [Gregory Dean](#)
To: dewey@waynes-electric.com
Cc: [Eva Henry](#); [Chaz Tedesco](#); [Steve O'Dorisio](#); [Lynn Baca](#); [Emma Pinter](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From Von Stelljes
Date: Thursday, June 10, 2021 10:37:00 AM

Mr. Stelljes,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Von Stelljes <noreply@formresponse.com>

Sent: Thursday, June 10, 2021 8:21 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From Von Stelljes

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is Von Stelljes and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

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As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

Von Stelljes

You can respond to me directly at: dewey@waynes-electric.com

Street Address: 15625 Riverdale Road

City: Brighton

State / Province: CO

Postal / Zip Code: 80602

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: stone-david@att.net
Cc: [Lynn Baca](#); [Emma Pinter](#); [Eva Henry](#); [Steve O"Dorizio](#); [Chaz Tedesco](#); [Matthew Gorenc](#)
Subject: RE: Concern Regarding 2021 Proposed Amendments From David Stone
Date: Wednesday, June 9, 2021 8:27:00 AM

Mr. Stone,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

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The exact text of the proposed changes can be found at this website:

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Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: David Stone <noreply@formresponse.com>

Sent: Tuesday, June 8, 2021 7:04 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Concern Regarding 2021 Proposed Amendments From David Stone

Please be cautious: This email was sent from outside Adams County

Dear Adams County Commissioners and staff,

My name is David Stone and I am a mineral owner in Adams County. **I am writing today to express my concern with the proposed 2021 Amendments to the County's oil and gas regulations.** I support developing minerals responsibly and in compliance with local and state regulations and this will become increasingly difficult to do given the proposed Adams County regulations around oil and natural gas development.

Less than 3 years ago, Adams County voters overwhelmingly voted down Proposition 112 which would have required a minimum 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, potentially costing tens of thousands of jobs and hundreds of millions in tax revenue. The proposed Adams County regulations, as currently drafted, could effectively ban development of our real property rights.

I strongly encourage you to consider the rights of the mineral interest owners in this process. The rights of both surface AND mineral rights need to be considered. We request a seat at the table in the drafting of these rules. I ask that you also include mineral interest owners in the well permitting review process. Property rights are not limited to just the surface and input must include owners of both surface and sub-surface rights. A single property owner should not have veto power over the rights of hundreds or thousands of other property owners. Instead, a balanced approach should be used that takes input from the majority of surface and subsurface property owners.

As a mineral interest owner, these proposed regulations will directly impact the value of my property. If enacted as written, the setback provisions alone could eliminate new development in parts of Adams County. As you know, the value of mineral interests are directly tied to existing and future royalties associated with oil and gas development. If operators are prohibited from responsibly developing minerals in accordance with state rules, then the value of my property will be adversely affected. This could be seen to some as a

taking of private property without due process of law or just compensation.

As a Mineral Owner, I want my minerals developed responsibly and any governmental regulations preventing development will have an immediate impact to my real property rights.

Again, I feel that the existing Adams County oil and gas regulations adequately protect public health, safety, welfare, and the environment. **I see the new regulations as essentially a ban on development in areas where I own minerals. If these new regulations are implemented as written, I stand to lose potential future royalty payments which in turn will directly impact my ability to invest or provide additional input into Adams County.**

Thank you for your attention to these issues that impact all of us. I ask that you also consider the benefits of energy production in Adams County, and see energy resource extraction as a critical part of the County and Colorado's state economy. By working together, we can and should safely and responsibly produce the resources we all rely on.

Thank you for your consideration,

David Stone

You can respond to me directly at: stone-david@att.net

Street Address: 4412 Bridle Path

City: YUKON

State / Province: OK

Postal / Zip Code: 73099

It is critical that you understand the importance of this matter to me.

From: [Gregory Dean](#)
To: [Carin Ortega](#)
Cc: [Steve O'Dorisio](#); [Lynn Baca](#); [Chaz Tedesco](#); [Eva Henry](#); [Emma Pinter](#); [Matthew Gorenc](#)
Subject: RE: New oil and gas regulations in Adams County
Date: Wednesday, June 9, 2021 8:47:00 AM

Ms. Ortega,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. These proposed amendments are unrelated to Proposition 112 and instead associated with changes to the County's land use authority granted under Senate Bill 19-181, which was passed by the legislature in April 2019. The County's proposals align with those recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) after a year-long public process and which became effective statewide on January 15, 2021.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership, does not have a database of mineral owners for notification, and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and

feedback from all interested residents and groups. Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

The exact text of the amendments can be found at: <https://www.adcogov.org/regulation-amendments>. Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Carin Ortega <renovabigail@gmail.com>

Sent: Wednesday, June 9, 2021 1:36 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: New oil and gas regulations in Adams County

Please be cautious: This email was sent from outside Adams County

Dear Liason Dean et al;

As an Adams County resident and land owner I am **greatly opposed** to the new proposed regulations affecting oil and gas exploration and production being considered by the Adams County Commissioners.

The whole state of Colorado overwhelmingly voted down similar regulations in the last general election as Proposition 112. There is absolutely NO REASON for Adams County to be imposing similar regulations without the consent of all the mineral rights owners being affected by the proposed regulations. We as mineral rights owners were not even specifically notified by the county that our rights will be affected by these backdoor regulations. In fact, we would not even know of this proposal if other oil production companies had not notified us.

The regulations will strangle oil production and development in our area and will directly affect us in loss of revenue and the regulations amount to a seizure of our property rights. This is unconscionable!

Fossil fuel production in no way prevents the development of renewable energy sources which are

currently nowhere near sufficiently capable of supplying even current, much less future, energy needs of this community, state and nation.

I will not support anyone who votes to impose these regulations on mineral rights holders and energy production companies. Every County Commissioner should uphold the vote already taken by popular vote in a general election instead of trying to impose unwanted policy through back door administrative regulations. Please vote these textual changes down!

Thank you,

Carin Ortega
P O Box 1354
Brighton, CO 80601
720-373-3508

From: Gregory Dean
To: ["Eleanor Shakin"](#)
Subject: RE: Oil and Gas Regulations
Date: Friday, June 4, 2021 12:55:00 PM

Ms. Shakin,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

Please let me know if you have any other questions or comments,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Eleanor Shakin <eleanorshakin@gmail.com>
Sent: Friday, June 4, 2021 12:53 PM
To: Gregory Dean <GDean@adcogov.org>
Subject: Oil and Gas Regulations

Please be cautious: This email was sent from outside Adams County

I wish to register that I am **in favor** of the proposed regulations.

Thank you,

Eleanor Shakin

From: [Gregory Dean](#)
To: [Christine Smith](#)
Cc: [Matthew Gorenc](#); [Katie Keefe](#); [Emma Pinter](#)
Subject: RE: Plea for Consideration
Date: Wednesday, June 2, 2021 8:49:00 AM

Ms. Smith,

Thank you for reaching out to Adams County with your comments on the draft text amendments to the County's Oil and Gas Regulations. Your comments will be included as part of the public record for this case and considered by Staff, the Planning Commission, and the Board of County Commissioners during the upcoming hearings on these proposed changes.

As it pertains to your specific question about your property in Henderson, the draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities proposed in Adams County and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled and completed. If you are already receiving royalty payments for your leased minerals, nothing in these draft regulations should impact that. Additionally, the County only regulates surface impacts and our regulations generally do not apply to downhole/subsurface wells. Further, as Commissioner Pinter correctly pointed out there are provisions in the County's rules that will allow a surface owner to waiver a setback in many instances and Staff has proposed numerous exceptions to setbacks that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site specific basis with certain added protections for public health, safety, welfare, the environment and wildlife resources.

Please let me know if you have any additional questions or comments on the draft regulations or any other oil and gas related matter,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Christine Smith <christine@metropolisenterprisestrategies.com>

Sent: Wednesday, June 2, 2021 8:20 AM

To: Emma Pinter <EPinter@adcogov.org>

Cc: Matthew Gorenc <MGorenc@adcogov.org>; Gregory Dean <GDean@adcogov.org>; Katie Keefe <KKeefe@adcogov.org>

Subject: Re: Plea for Consideration

Please be cautious: This email was sent from outside Adams County

Commissioner Pinter,

The issue for me is that the well that retracts the oil/gas from my property is located about a mile and a half away, siphoning the energy resource from a distance from most of the properties it utilizes. I have no control over the location of that well head. It seems the oil and gas industry has reduced the impact they have had on the environment by consolidating their wells and using technology to have the reach they need underground.

Thank you so much for reading my letter and considering my dilemma. I really appreciate your consideration and response.

Christine

Christine Smith
Metropolis Enterprise Strategies
3021 Wyecliff Way
Highlands Ranch, CO 80126
Tel. 720.524.4837
Cell: 303.915.0240
www.metropolisenterprisestrategies.com

On Tue, Jun 1, 2021 at 2:22 PM Emma Pinter <EPinter@adcogov.org> wrote:

Christine,

Thank you so much for reaching out. I believe that all out proposed regulations allows for a property owner to waive set backs on their own property.

I have copied staff on this email to try and get more clarification if there is a situation I am unaware of.

Is there more details you could provide about your concerns for your property?

~Emma

Emma Pinter
Adams County Commission
ADAMS COUNTY, COLORADO
4430 South Adams County Parkway, 5th Floor, Suite C5000A Brighton, CO 80601

O: 720-523-6867
C: 720.239.2053

pronouns she/her/hers

Neighborhood Groups:

<http://www.adcogov.org/neighborhood-groups>

Adams County Service A-Z:

<http://www.adcogov.org/a-z-services>

From: Christine Smith <christine@metropolisenterprisestrategies.com>

Sent: Monday, May 31, 2021 11:20:34 AM

To: Emma Pinter <EPinter@adcogov.org>

Subject: Plea for Consideration

Please be cautious: This email was sent from outside Adams County

Commissioner Pinter,

Please see my letter, attached.

Thank you,

Christine

Christine Smith

12300 Oakland

Henderson, CO 80640

Tel. 720.524.4837

Cell: 303.915.0240

From: [Gregory Dean](#)
To: [Lyle Sharp](#)
Cc: [Chaz Tedesco](#); [Emma Pinter](#); [Lynn Baca](#); [Eva Henry](#); [Steve O'Dorisio](#); [Matthew Gorenc](#)
Subject: RE: Proposed Amendments to Adams County Oil and Gas Regulations
Date: Wednesday, June 9, 2021 12:20:00 PM

Mr. Sharp,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

Firstly, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership, does not have a database of mineral owners for notification, and does not require proof of mineral rights by an applicant as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents, property owners, and groups. Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet
- Applicability of County's proposed changes only to new Oil and Gas Facilities and not existing sites

The exact text of the amendments can be found at: <https://www.adcogov.org/regulation-amendments>. Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Lyle Sharp <lsharp1538@comcast.net>

Sent: Wednesday, June 9, 2021 12:01 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Proposed Amendments to Adams County Oil and Gas Regulations

Please be cautious: This email was sent from outside Adams County

Adams County Commissioners:

I am a surface and mineral rights owner in Adams County.

I am writing in regards to the latest proposal to amend Adams County's oil and gas regulations.

First of all, why were mineral rights owners not asked for their input, concerns or questions regarding the proposed changes to the county's oil and gas regulations?

Mineral rights owners are property owners and are stakeholders in resource development and to exclude us indicates a total lack of openness and transparency on the part of Adams County. It is almost as if Adams County feels it does not need to concern itself with the rights of mineral owners.

In reviewing the proposed amendments it is clear that Adams County is effectively curtailing mineral rights owners ability to access their property. The amendments are in effect a confiscation of real property. Mineral rights are not some nebulous, theoretical concept. Rather they are real, as real as farm land, as real as a building or someone's home. Thus, Adams County cannot take mineral rights away. Yet that is exactly what the proposed amendments are designed to do. The amendments will make it virtually impossible for mineral rights owners to have access to their property.

Therefore, I am writing to let Adams County know of my opposition to this latest attempt of property confiscation.

My hope is that mineral rights owners in Adams County have had enough of being targeted for ideological reasons and as a group will come together to actively and strongly fight these heavy handed, under the table tactics so common in the history of

Adams County government.

Regards

Lyle Sharp

From: [Gregory Dean](#)
To: [MaryAnn Sundby](#)
Subject: RE: Proposed regulations will hinder oil and gas development in Adams County
Date: Monday, June 7, 2021 8:20:00 AM

Ms. Sundby,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The 2,000-foot setback from residences and schools being proposed by the County aligns with the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership or leases and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

The draft regulations are proposed to apply prospectively on all new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protections.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources for all future Oil and Gas Facility siting.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: MaryAnn Sundby <msundby@q.com>

Sent: Sunday, June 6, 2021 3:16 PM

To: Gregory Dean <GDean@adcogov.org>

Subject: Proposed regulations will hinder oil and gas development in Adams County

Please be cautious: This email was sent from outside Adams County

Dear Mr. Dean, Adams County Oil and Gas Liaison

I am a mineral owner in Adams County and have been for several decades. I am writing today to express concern with the proposed 2021 Amendments to the County's oil and gas regulations. I whole-heartedly support developing minerals responsibly and in compliance with local and state regulations. This will become more difficult, given the proposed Adams County regulations for oil and natural gas development.

The proposed Adams County regulations, as currently drafted, are too restrictive and could prohibit the development of my property rights. Adams County voters overwhelmingly **voted down** Proposition 112 three years ago, which would have required a 2500-foot setback for new oil and gas development. Prop 112 was an effective ban on oil and natural gas development in Colorado, that would have cost jobs and tax revenue. Voters wisely understood to vote against it.

Property rights are not limited to the surface owners. I strongly encourage you to consider my rights as a mineral interest owner and keep regulations that are sensible and balanced - respecting both surface and subsurface property owners.

The proposed regulations will severely impact the value of my mineral property. If enacted as written, the setback provisions alone could eliminate new development and limit tax revenue in the County. As you know, the value of mineral interests is directly tied to royalties associated with oil and gas development. If operators are prohibited from developing minerals, then the value of my property declines. Regulations preventing development will have negative impact, costing jobs and tax revenue.

I consider the proposed Adams County oil and gas regulations to be a ban on economic growth. If these new regulations are implemented as written, I will lose royalty payments - which will limit my involvement in Adams County.

I ask that you remember the incredible benefits of energy production in Adams County during the past 50 years. I hope you will promote energy resource extraction as a critical part of the County and Colorado's state economy.

Thank you for your attention to these issues.

Respectfully,

MaryAnn Sundby
2061 June Court
Castle Rock, CO 80104

msundby@q.com

From: [Gregory Dean](#)
To: [Douglas Woolverton](#)
Cc: [Eva Henry](#); [Chaz Tedesco](#); [Emma Pinter](#); [Steve O"Dorisio](#); [Lynn Baca](#); [Matthew Gorenc](#)
Subject: RE: Proposed Regulation Changes - Opposition Expressed
Date: Wednesday, June 9, 2021 11:38:00 AM

Mr. Woolverton,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

To address some of your specific comments: The 2,000-foot setback from residences and schools being proposed by the County aligns the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide after a year-long rulemaking process. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protection measures in place.

Additionally, the County implements noise requirements for all industrial and commercial operations, based on the size, nature, timing, and intensity of the operation: including allowable maximum noise levels, restricted hours of operations, and requirements for noise abatement protocols to protect surrounding residents, this is not entirely unique to oil and gas operations. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership, does not have a database of mineral owners, and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

3 year permit terms have been in place in Adams County since 2018 and were in fact longer than state permits terms, until January 2021. As long as the well is drilled and completed by the Operator within that 3 years, the County permit approval is permanently vested. The draft regulations are being proposed to apply prospectively on only new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page:

<https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

- How Adams County's proposals align with recently adopted (January 2021) COGCC statewide rules
- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet

The exact text of the amendments can be found at: <https://www.adcogov.org/regulation-amendments>. Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

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From: Douglas Woolverton <dougwool@aol.com>

Sent: Wednesday, June 9, 2021 10:36 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Proposed Regulation Changes - Opposition Expressed

Please be cautious: This email was sent from outside Adams County

6/8/21

To all persons addressed herein:

Greg Dean – Adams County Oil and Gas Liaison – gdean@adcogov.org

Eva Henry, Chair of the Board – District 1 – ehenry@adcogov.org

Chaz Tedesco – District 2 – ctedesco@adcogov.org

Emma Pinter – District 3 – epinter@adcogov.org

Steve O'Dorisio – District 4 – sodorisio@adcogov.org

Lynn Baca – District 5 – lbaca@adcogov.org

Referencing our property at:

**12360 Levi Cir.
Henderson, CO 80640**

And referencing proposed regulations/requirements regarding:

*** 2,000 foot setback from property lines of residences and platted residential lots**

*** Noise requirements that the county described as a “pseudo-setback”**

*** Three year hard expiration date on all permits**

- We want our minerals developed and any governmental regulations preventing development is an immediate impact to our real property rights;
- Our voice is being forgotten in this process;
- We see the new regulations as essentially a ban on development in areas where we own minerals;
- We feel that the current Adams County oil and gas regulations protect public health, safety, welfare, and the environment; and,
- We and others stand to lose potential future royalty payments if the regulations, as written, are implemented which in turn effects any return investment or economic input into Adams County.

Respectfully submitted,

Doug & Barb Woolverton
12360 Levi Cir.
Henderson, CO 80640
dougwool@aol.com

From: [Douglas Woolverton](#)
To: [Gregory Dean](#)
Subject: Re: Proposed Regulation Changes - Opposition Expressed
Date: Wednesday, June 9, 2021 1:16:38 PM

Please be cautious: This email was sent from outside Adams County

Mr. Dean, Just one more comment at this time. I am very opposed to the COGCC appointments and their apparent mission. The current COGCC commissioners were personally appointed by Gov. Jared Polis after he was elected to office in the same year that **voters sent a strong message that they want a robust oil and natural gas industry in the state.**

Doug Woolverton
12360 Levi Cir.
Henderson, CO 80640
dougwool@aol.com

On Jun 9, 2021, at 11:38 AM, Gregory Dean <GDean@adcogov.org> wrote:

Mr. Woolverton,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

To address some of your specific comments: The 2,000-foot setback from residences and schools being proposed by the County aligns the 2,000-foot setback recently adopted by the Colorado Oil and Gas Conservation Commission (COGCC) and which became effective on January 15, 2021 statewide after a year-long rulemaking process. The current County rules allow for a surface owner to waive a setback in many instances and Staff has proposed numerous additional exceptions to the County's setback rules that would allow the Board of County Commissioners to permit an Oil and Gas Facility closer than 2,000-feet on a site-specific basis with certain added protection measures in place.

Additionally, the County implements noise requirements for all industrial and commercial operations, based on the size, nature, timing, and intensity of the operation: including allowable maximum noise levels, restricted hours of operations, and requirements for noise abatement protocols to protect surrounding residents, this is not entirely unique to oil and gas operations. Additionally, the County only regulates surface impacts and our rules generally do not apply to downhole operations or

mineral rights related issues, those are directly regulated by the COGCC. As such, the County does not have a mechanism to track mineral rights ownership, does not have a database of mineral owners, and does not require proof of mineral rights as part of the County permit process. However, the County always welcomes and considers comments and feedback from all interested residents and groups.

3 year permit terms have been in place in Adams County since 2018 and were in fact longer than state permits terms, until January 2021. As long as the well is drilled and completed by the Operator within that 3 years, the County permit approval is permanently vested. The draft regulations are being proposed to apply prospectively on only new Oil and Gas Facilities and will not impact any Oil and Gas Facility that has already been permitted by the County and/or drilled.

The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>. Topics that should help address many of your specific concerns include:

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- Newly established co-equal regulatory framework between COGCC and Adams County; requiring permits from both agencies in order to operate
- Staff's proposed waivers/exception criteria for setbacks and other performance standards that would allow permitting closer than 2,000-feet

The exact text of the amendments can be found at:

<https://www.adcogov.org/regulation-amendments>. Please let me know if you have any additional questions,



Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*
ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A
Brighton, CO 80601

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From: Douglas Woolverton <dougwool@aol.com>

Sent: Wednesday, June 9, 2021 10:36 AM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio <SODorisio@adcogov.org>; Lynn Baca <LBaca@adcogov.org>

Subject: Proposed Regulation Changes - Opposition Expressed

Please be cautious: This email was sent from outside Adams County

6/8/21

To all persons addressed herein:

Greg Dean – Adams County Oil and Gas Liaison – gdean@adcogov.org

Eva Henry, Chair of the Board – District 1 – ehenry@adcogov.org

Chaz Tedesco – District 2 – ctedesco@adcogov.org

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*** Three year hard expiration date on all permits**

- We want our minerals developed and any governmental regulations preventing development is an immediate impact to our real property rights;
- Our voice is being forgotten in this process;
- We see the new regulations as essentially a ban on development in areas where we own minerals;
- We feel that the current Adams County oil and gas regulations protect public health, safety, welfare, and the environment; and,
- We and others stand to lose potential future royalty payments if the regulations, as written, are implemented which in turn effects any return investment or economic input into Adams County.

Respectfully submitted,

Doug & Barb Woolverton

12360 Levi Cir.

Henderson, CO 80640

dougwool@aol.com

From: [Gregory Dean](#)
To: [Harv Teitelbaum](#)
Subject: RE: Comment from a GW stakeholder SUPPORTING Adams County's Development Standards regarding Oil & Gas Facilities
Date: Monday, June 7, 2021 12:50:00 PM

Mr. Teitelbaum,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

The exact text of the proposed changes can be found at this website:

<https://www.adcogov.org/regulation-amendments>. Additionally, the County's Oil and Gas Information Page (www.adcogov.org/oil-and-gas-information) will provide more information about the amendment process including a summary of Staff's proposals, stakeholder engagement, and future updates on hearings, etc.

Please let me know if you have any additional questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

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From: Harv Teitelbaum <harv.teitelbaum@gmail.com>

Sent: Monday, June 7, 2021 11:43 AM

Subject: Comment from a GW stakeholder SUPPORTING Adams County's Development Standards regarding Oil & Gas Facilities

Please be cautious: This email was sent from outside Adams County

Dear Mr. Dean, Planning Commission, and County Commissioners,

As a Great Western Petroleum stakeholder I, presumably along with all other stakeholders, was contacted, encouraged, and provided with talking points by which to oppose Adams County's proposed Development Standards regarding Oil & Gas Facilities. You are no doubt receiving batches of nearly identical oppositional Comments from these stakeholders.

I am writing to let you know that, after considering the now overwhelming preponderance of scientific evidence attesting to the significant health, safety, and welfare risks to people, pets,

wildlife, and the environment presented by fracking and fracking related activities (FFRA), I wholeheartedly support restrictions to FFRA, even though they may negatively affect my investment returns.

Foremost among these risks are those to expectant mothers and young children. These include increased rates of infant mortality, perinatal mortality, low-weight and premature births, and early childhood cancers, such as leukemia. Statistical evidence of this last has been found in research by Dr. Lisa McKenzie at distances up to 10 miles from high density fracking operations.

We also know that on the more general end of experienced harms are conditions such as nosebleeds, asthma attacks, headaches, dizziness, stress, anxiety, and sleep deprivation. These last are directly tied to the intrusively excessive noise and light pollution coming from FFRA, arguing persuasively in favor of your proposed noise regulations. Furthermore, the incessant tanker truck traffic, along with the noxious odors frequently experienced by community residents contribute to the increased hospitalizations found in research studies of fracked counties.

I could go on about the scientific research and all the known health consequences experienced by those living within 2500' of FFRA, but I wanted to turn to one set of GW's basic talking points, that pertaining to even scientifically-justified regulations being a "takings":

In short no, they're not. As detailed by attorney and former state legislator Mike Foote, DU law professor Kevin Lynch, and LOGIC's Deputy Director Andrew Forkes-Gudmundson, **"Even the most zealous advocates of property rights agree that government has the power to prevent activity on private property from creating a nuisance to its neighbors. Regulations that restrict uses of property in order to prevent nuisances are thus immune from takings liability. The combination of industrial-scale fracking activity in close proximity to residential neighborhoods is a classic example of a nuisance, and the Colorado law of nuisance would readily apply to this context."**

GW also does not like the "hard and fast" nature of your setbacks regs. This relates to the old, flawed COGCC rules that provided for some setbacks and restrictions, but then allowed for waivers, exemptions and exceptions granted solely at the discretion of the Director who rarely, if ever, declined to grant such. Having actual regulations in practice, and not just in theory, is something the industry has never had to deal with, to the historical and continuing detriment of Colorado families.

Thank you for striving to protect the health, safety, and welfare of ADCO and CO citizens. While the science argues for 2500' setbacks at a minimum, 2000' is a realistic effort. I applaud and support you for these efforts.

Sincerely,
Harv Teitelbaum

From: [Gregory Dean](#)
To: [Winn](#)
Cc: [Steve O'Dorisio](#); [Chaz Tedesco](#); [Eva Henry](#); [Lynn Baca](#); [Emma Pinter](#)
Subject: RE: Proposed Adams County Regulations for Oil and Natural Gas Developments
Date: Monday, June 7, 2021 8:15:00 AM

Mr. Winn,

Thank you for reaching out to Adams County with your comments on the proposed amendments to the County's oil and gas regulations. Your comments will be included as part of the official public record for this case and incorporated into Staff's recommendations. These comments will also be considered by the Planning Commission and the Board of County Commissioners during the upcoming hearings on these proposed changes.

I encourage you to read the exact text of the most recent draft of the proposed changes, released on May 19, 2021, which are located at this website: <https://www.adcogov.org/regulation-amendments>. The County continues to conduct robust stakeholder engagement and public outreach throughout this process with groups and individuals with varying perspectives, including Operators, industry, residents, environmental groups, technical experts, and others. You may find more information about these proposed amendments, including a summary of the stakeholder process, recordings of Staff led public meetings, copies of Staff's presentations on various rounds of proposals made to the Board of County Commissioners and the public, a summary of all referral comments received during the first draft of amendments, and future updates at the Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>.

Staff believes these proposals are necessary and reasonable and will balance private property rights for surface owners and mineral rights owners with appropriate protections required for public health, safety, welfare, the environment, and wildlife resources that will allow for future Oil and Gas Facility siting.

Please let me know if you have any additional questions or wish to provide comments on specific provisions in the draft regulations,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

From: Winn <liberty5@q.com>

Sent: Saturday, June 5, 2021 3:32 PM

To: Gregory Dean <GDean@adcogov.org>; Eva Henry <EHenry@adcogov.org>; Chaz Tedesco <CTedesco@adcogov.org>; Emma Pinter <EPinter@adcogov.org>; Steve O'Dorisio

<SODorisio@adcogov.org>; lbaca@adco.gov.org

Subject: Proposed Adams County Regulations for Oil and Natural Gas Developments

Please be cautious: This email was sent from outside Adams County

To Whom It May Concern,

The proposed regulations for Oil and Natural Gas developments are bullshit. Where do you people keep coming up with these ideas? It seems as if you are using your ill knowledge bonded with the lack of science from the activists. You are governing on politics and fear mongering.

Mineral interests are real property and are taxed. Be careful, your anti-actions may fall within the illegal taking category. **How**, you will ask? Your rules will deny the Energy Company. Therefore, your rules are denying the Mineral Owner of their rights and potential value of their investment.

Somebody before you, before me and before all of us, came up with property rights; please stop chicken shitting around with the topic.

Yes, we want the Energy Companies to be responsible. We want everybody to be responsible. Even our elected officials.

Thank you. Dennis A Winn Phone # 970-824-2049

June 9, 2021

Community and Economic Development Department
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601-8216
c/o Gregory Dean

Submitted via email to GDean@adcogov.org.

To Adams County:

We would like to begin with a land acknowledgement. We acknowledge that the land called Adams County is the traditional territory of the Ute, Cheyenne, and Arapaho Peoples. We also acknowledge the 48 contemporary tribal nations that are historically tied to the lands that make up the state of Colorado, and that these sacred lands have been violated and polluted. We honor the Elders past, present, and future, and those who have stewarded this land throughout generations. We also recognize that government, academic and cultural institutions were founded upon and continue to enact exclusions and erasures of Indigenous Peoples. May this acknowledgement demonstrate a commitment to working to dismantle ongoing legacies of oppression and inequities and recognize the current and future contributions of Indigenous communities throughout this region. Acknowledgement is the first step to accountability.

Please note that supporting strong regulations is not an endorsement of continued oil and gas operations in an severely impacted community that is already experiencing disproportionate health and environmental impacts.

A large body of academic literature has characterized serious effects on human health and life expectancy from air pollution, including a recent¹ study that identified air pollution as a contributor to 8.8 million deaths annually, identifying it as “one of the main global health risks.” Additionally, exposure to air pollution has been linked to higher rates of mortality from viral infectious diseases². In light of this evidence, and the serious threats posed by fracking to the stability of our climate, the only responsible course of action is for Adams County to impose the most stringent regulations possible on oil and gas extraction. Adams County already has many residents who live in disproportionately impacted communities. Regulations that only do the minimum required by the state are not sufficient to protect Adams county residents, especially when considering the cumulative impacts of oil and gas activity that is already taking place in Adams County.

¹ Lelieveld, J., et al. “Loss of Life Expectancy from Air Pollution Compared to Other Risk Factors,” March 2020, <https://academic.oup.com/circulation/advance-article/doi/10.1093/cvr/cvaa025/5770885>

² Cui, Y., et al. “Air pollution and case fatality of SARS in the People's Republic of China: an ecologic study”, 2003, <https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-2-15>

Public Health

- Setbacks: (4-11-02-03-03-03) We appreciate that Adams County is using a more protective standard of maximum disturbance measurement when looking at setbacks rather than the COGCC standard, and has extended the setback in the most recent draft, but the County can and should go farther to protect residents. Numerous studies have linked fracking to harm to human health, including an increased risk of congenital heart defects among children born to women living near oil and gas operations in Colorado³, with the risks increasing with the density of oil and gas activities within a 10-mile radius⁴; and reduced cognitive performance has been identified in infants born to mothers living within 8,500 ft. of a fracking well⁵. Based on a review of existing scientific literature, Wong (2017)⁶ concluded that, “a 2,500-foot setback recommendation is on the lower end of the range of distances where research has determined harmful health and quality of life impacts of toxic emissions and exposures.” Therefore, Adams County regulations should be revised to require a setback of at least 2,500 ft. between oil and gas operations and any structure intended for human occupancy, open space, water sources, including ground water under the direct influence of surface water wells, and should not have any provisions for waivers or variances.
- A setback requirement that is more rigorous than the 2,000’ setback (with many potential exceptions) that is present in the regulations adopted by the COGCC, is essential. The CDPHE study on which the 2,000’ setback requirement is based identified deleterious health effects within 2,000’ of oil and gas operations, and did not consider health effects outside of that radius.
- The County should also include reverse setbacks in their regulations of 2,500 ft. Reverse setbacks are as important to protecting public health and safety.

Permitting Process

- In order to protect Adams County residents, and given the number of bankruptcies experienced by oil and gas companies, the County should take into account the financial solvency of an oil and gas company before granting a permit.⁷

³ McKenzie, L., et al., “Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado”, April 2014, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3984231/>

⁴ McKenzie, L., et al., “Congenital heart defects and intensity of oil and gas well site activities in early pregnancy,” November 2019, <https://www.sciencedirect.com/science/article/pii/S0160412019315429?via%3Dihub>

⁵ Hill, E., “Shale gas development and infant health: Evidence from Pennsylvania”, September 2018, <https://www.sciencedirect.com/science/article/abs/pii/S0167629617304174>

⁶ Wong, N. “Existing scientific literature on setback distances from oil and gas development sites”, June 2017, https://www.stand.la/uploads/5/3/9/0/53904099/2500_literature_review_report-final_jul13.pdf

⁷

<https://www.houstonchronicle.com/business/energy/article/More-than-100-oil-and-gas-companies-filed-for-15884538.php>

- The County should add a required amount of financial assurances that not only includes oil and gas companies but extends all conditions (from assurances to liability) to all affiliated entities and subcontractors. The extension of requirements for financial assurances and liability to affiliates and sub-contractors is particularly important in the light of current market conditions and the precarious financial state of many fracking companies operating in Colorado. Insurance requirements should be implemented on a per well basis. Studies have found that the cost of soil remediation alone for oilfield sites in Colorado ranges from \$13,000 to \$73,000, while intensive remediation of groundwater pollution can cost more than \$1 million.⁸
- (2-01-06 Step 6: Notice) Notice shall be sent by the applicant to all property owners and current residents **within a full mile** at a minimum, or greater. Lighting, noise, truck traffic, and emissions affect residents, schools and businesses much further than the notification of the half mile radius.
- County should determine the location and run the neighborhood meetings with a question and answer style format which would better allow participation of impacted residents.
- During each meeting and notice provided the operator shall provide clear instructions on how to make nuisance and health complaints to the operator, county and relevant state agencies.

Climate and Air Quality

- Prohibit permitting while the Front Range remains in non-attainment of the National Ambient Air Quality Standard (NAAQS) standards for ozone, and prohibit emissions of air toxics such as benzene: Research has demonstrated that oil and gas operations are a significant contributor⁹ to excessive levels of ozone on the Front Range. Adams County should prohibit permitting altogether while the Front Range remains in nonattainment for ozone, and should extend to emissions of air toxics as well. A threshold for allowable emissions of particulate matter should be defined based on the ample body of scientific evidence assessing the effects of particulate matter on public health.
- In assessing a permit application, the Board of County Commissioners should be required to consider the cumulative effects of the expected greenhouse gas emissions and other air- and water-polluting emissions associated with the permit in the context of the existing pollution burden in the County and the existing global levels of greenhouse gas emissions. The greenhouse gas emissions associated with oil and gas development

⁸ Connor, J., et al. "Nature, Frequency, and Cost of Environmental Remediation at Onshore Oil and Gas Exploration and Production Sites," Summer 2011, http://theamazonpost.com/chevron-ecuador/wp-content/uploads/Connor_etal_Nature_Freq_Remed_Costs_2011.pdf

⁹ CIRES, "Oil and Gas Emissions a Major Contributor to Bad Ozone Days", 11/3/17, <https://cires.colorado.edu/news/oil-and-gas-emissions-major-contributor-bad-ozone-days>

contribute to accelerating climate change, which fundamentally threatens public health, safety, and welfare.

- (4-11-02-03-03 Section 15) In the current draft of the regulation, Adams County may call for site-specific air quality protection measures to eliminate or minimize air emissions depending on the size, location and nature of the facility. **Instead, the county should require that the following are required for every single site without exception:**
 - i. Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during the drilling, completion and production phases of development. The plan **shall** include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall be able to alert the operator, **county and residents** of increases in monitored air pollutant concentrations.
 - ii. Implementation of tankless production techniques.
 - iii. The use of zero emission dehydrators.
 - iv. Use of a pressure-suitable separator and vapor recovery unit (VRU) where applicable.
 - v. Pipeline infrastructure for produced water, natural gas, crude oil and condensate constructed and placed into service prior to the start of any fluid flow from any wellbore.
 - vi. The use of no-bleed continuous and intermittent pneumatic devices. This requirement can be met by replacing natural gas with electricity or instrument air, or routing the discharge emissions to a closed loop-system or process.
 - vii. Automated tank gauging.
 - viii. Flaring shall be eliminated other than during emergencies or upset conditions; all flaring shall be reported to the county **and residents**.
- Require that all electrical power provided to oil and gas operations be supplied by renewables, on an annual basis (i.e. net zero energy for electricity) and require that all on-site equipment be electrically-powered.

Fines and Liability

- The County should reserve the right to revoke a permit for oil and gas operations based on the operator's failure to abide by the conditions of the permit.
- Fines on operators who fail to meet the safety and maintenance requirements. Lack of routine maintenance at oil and gas wells contributes to leaks and increased emissions

which threaten human health and the environment, as well as increased future remediation costs.

- A section should be added to the regulations specifically imposing fines on operators for leaks, spills, explosions and other hazards that the community suffers during their operations.
- (4-11-02-03-03)7.iii.Compliance audits. Written procedures requiring an audit every five years to verify compliance with the procedures and practices developed under the safety management plan, and procedures requiring correction of any deficiencies identified in audit; operator will make results of audit available to inspector upon request.
 - Given the potential for leaks, spills, explosions and other hazards that oil and gas operations present to public health, safety and the environment, a safety audit every 5 years is woefully inadequate and should be conducted every 6 months at minimum and upon community member request.

Land Management

- We appreciate the setbacks from parks and open space that are now included in the regulations. Adams County residents have invested in their open space and currently have an open space sales tax and in the 2020 election the sales tax was extended into perpetuity. Adams County voters don't pay this sales tax to preserve the land for oil and gas development. The county's open space lands are a precious home for wildlife, as well as a destination for outdoor recreation.
- The operator should be required to fully restore the land on which an oil and gas operation is located to its prior state, such that it could continue to be used for its original purposes, such as agriculture or recreation, and to improve the quality of life to our air, water, soil, and communities.

Public Notice

- The notification requirements (in Sec. 2-02-14-05) for nearby landowners after an application for a permit is deemed complete by the county should extend to all residents of the county, through publication in a newspaper in general circulation and on a county website.
- Follow-up and ongoing water testing results should be mandatory, and should be recorded such that they would be available to future owners of the property and/or future users of the water source in question, and test results reporting on flowback and produced water should also be made available to the public.
- Continuous, community air quality monitoring should be mandatory, and all reports from air quality monitoring of oil and gas operations should be available to the public and evidence of leaks and/or spills should also be reported to the public through a county website and any other appropriate channels.

Supporting disproportionately impacted communities

- Regulations need to support disproportionately impacted communities. Community self determination is key to heal from the systemic violence that has been inflicted for generations.
- Accountability and enforcement for real protections for future disproportionately impacted communities should also be forefront in these regulations. Changing regulations will mean nothing if there is no enforcement to protect impacted communities. Restorative justice needs to be authentic justice.

We appreciate your consideration of these important points in protecting the health, safety and welfare of the people of Adams County.

North Range Concerned Citizens
Kristi Douglas, Co-Chair
c3kristi@gmail.com

Spirit of the Sun
Renee Chacon, Youth Program Coordinator
reneemchacon@spiritofthesun.org

350 Colorado
Kate Christensen, Oil and Gas Campaign Coordinator
kate@350Colorado.org



June 9, 2021

Dear Adams County Commissioners and staff,

The League of Oil and Gas Impacted Coloradans (“LOGIC”) appreciates the opportunity to continue its involvement in your process of updating Adams County’s oil and gas regulations. We ask that you continue to consider our April 28, 2021 comment letter previously submitted in response to your first draft, which is attached as a separate document. We also submit new comments as detailed below.

I. Expiration and renewal of OGF permits

Residents, local governments, and state agencies across Colorado are all dealing with the consequences arising from dormant oil and gas permits that do not expire soon enough. Many local governments and the COGCC permits expire after 3 years, but the issue is rarely that simple. The oil and gas location permit can be held simply by drilling (but not completing or producing) a single well on the pad. Individual drilling permits can be held by drilling (but not completing or producing) the well.

As experiences around the Front Range have made clear, this structure creates an unacceptable amount of uncertainty for residents and local government planners alike. The Mae J, Papa Jo, and Yellowhammer wells in unincorporated Weld County on the border of Erie are the clearest and most recent examples of the flaws in this current structure. The Papa Jo location was approved in 2017, the wells were approved and spud in 2017, but not actually completed until early 2021, nearly 4 years later. In the time between the initial drilling and eventual completion, new houses were built much closer, in some cases under 1,000’ from the wells. Nearby residents, many if not all of whom had no idea oil and gas operations would someday commence, suffered the consequences of living so close to large well sites during their most disruptive and dangerous phases.

Though the COVID-19 pandemic contributed to the delay between permit approvals and eventual production, it should not have happened. Unfortunately, neither the state nor the local government had the authority to revisit the permits once they were approved and the drilling process started after residents moved into their homes.

This unfortunate situation is bound to repeat itself as demand for new housing across the Front Range continues to skyrocket. Adams County must learn from this and other similar experiences. We propose this amendment to the term for an Adams County OGF Permit:

2-02-14-05(10)(a) OGF PERMIT REVIEW STEPS

a. Term: The approving authority shall specify the term of the OGF Permit as six (6) months ~~three (3) years~~. ~~If, at the expiration of the six (6) month three (3) year period, a well is not completed or has not commenced production operations as defined by the COGCC Rules and Regulations, the approval of that well shall lapse. Prior to the lapse of the permit, the applicant may apply for an extension of the permit for another six (6) month period. Under no circumstances shall extensions be allowed to exceed more than three (3) years from the initial approval. In deciding to grant the extension, the Director of Community Economic and Development or Board of County Commissioners shall determine if conditions around the proposed development are such that the proposed development may still be conducted in a manner protective of public health, safety, and welfare, the environment, and wildlife resources. This determination will be based on a review of the proposed location for:~~

1. residential building units,
2. schools,
3. high occupancy building units,
4. childcare facilities,
5. any other changes to the built environment

The Director of Community Economic and Development or Board of County Commissioners shall deny an extension request if this review demonstrates that any of the above have been developed within the County's setback distance in 4-11-02-03-03(4). ~~For any wells for which approval has lapsed, the applicant shall be required to apply for a new OGF Permit in accordance with these regulations. the following: provided that at least one well is drilled and completed during the initial three (3) year period following all required State and local approvals of the OGF, such action permanently vests the permitted location for the number of wells contained within the initial permit approval. If wells permitted as part of the initial OGF permit are to be drilled at the multi-well pad location following expiration of the initial three (3) year period, those permit(s) for those wells shall be renewed following the OGF permit process as outlined in these regulations.~~

(the red line language above connotes staff revisions already in the second draft; the green text consists of the LOGIC proposed language).

II. Disproportionately Impacted Communities ("DIC") have already been disproportionately impacted and therefore need more protection

The State and several local governments have recently begun addressing the historic legacy of placing high polluting facilities within disproportionately impacted communities. For example, the Colorado Oil and Gas Conservation Commission ("COGCC") recently adopted rules requiring a specific analysis of cumulative impacts to any DIC within a proposed facility placement outlined in an Oil and Gas Development Plan (Rule 303.a.5.B.ii.dd); additional time

for public comments if a facility is proposed within a DIC (Rule 303.d.1.A.i); an alternative site analysis if the proposed working pad is within 2000 feet of a DIC (Rule 304.b.B.x); a consultation, outreach, an engagement plan for any facility within 2000 feet of a DIC (Rule 304.c.20); and a requirement for specific findings of equivalent public health, safety, and welfare protections if a facility is proposed less than 2000 feet from a DIC (Rule 604.b.4). The COGCC often treats disproportionately impacted communities in the same way as it treats schools and high occupancy residential building units, in many ways practically putting those locations off-limits. We believe Adams County can go even further in protecting these historically marginalized communities. For example:

2-02-14-06 CRITERIA FOR APPROVAL

The Board of County Commissioners or Director of Community and Economic Development, in approving an OGF permit, shall consider:

13. The OGF does not cause an additional burden to a Disproportionately Impacted Community's public health, safety, welfare, environment, or wildlife resources

2-02-14-07-05 CRITERIA FOR APPROVAL

The Board of County Commissioners, in approving a waiver, shall find:

1. Extraordinary hardships or practical difficulties result from strict compliance with these standards and regulations
2. The purpose of these standards and regulations are served to a greater extent by the alternative proposal.
3. The waiver does not have the effect of nullifying the purpose of these standards and regulations.
4. The waiver does not cause an additional burden to a Disproportionately Impacted Community's public health, safety, welfare, environment, or wildlife resources.

III. Mere notification of cumulative impacts is not sufficient to protect residents

Cumulative impacts of multiple oil and gas operations in the same area are profound. Traffic, noise, and air quality are some of the types of impacts that affect residents on an exponential scale. We have seen widespread acknowledgment of those cumulative impacts with the new COGCC and some local government rules, but the mere submission of a report outlining those cumulative impacts does little to curb the effects. Adams County should make it clear that an analysis of those cumulative impacts will commence and its result could derail the approval of any permit. For example:

2-02-14-06 CRITERIA FOR APPROVAL

The Board of County Commissioners or Director of Community and Economic Development, in approving an OGF permit, shall consider:

14. The cumulative impacts of the OGF do not negatively affect public health, safety, welfare, the environment, or wildlife resources.

IV. Adherence to COGCC noise regulations does not protect the community

Noise complaints, particularly tied to the pre-production phases of development, are among the most prevalent issues in affected communities. This is especially true during the nighttime hours, when a lack of sleep from the noise can have far-reaching health effects. Operator compliance with existing COGCC noise limits has not stopped numerous noise issues from occurring and we urge Adams County to build in the potential for stronger protections. Doing so would not be breaking new ground as several local jurisdictions already have language in their codes allowing for the imposition of more protective noise standards. For example, Boulder County's zoning regulations indicate that "specific noise limitations will be assessed and imposed for each proposed oil and gas facility or operation." (§ 12-1000(O)). Weld County's Charter requires operator adherence with the COGCC noise regulations, but it also indicates that "the hearing officer may require operators to comply with a lower maximum permissible noise level in consultation with the Colorado Department of Health and Environment, or Colorado Parks and Wildlife." (§ 21-5-435(1)(c)). The COGCC itself has a provision that allows its Director to intervene and require an operator to perform additional mitigation measures if its actions are a threat to public health, safety, and welfare. Rule 901.a. All three of these examples show it is well within governmental authority to go beyond existing COGCC regulations to protect residents from unreasonable noise.

LOGIC proposes Adams County add a provision to its code similar to Weld County:

4-11-02-03-03 GENERAL PROVISIONS

14. Noise. The Operator shall control noise levels as follows:

c. The Operator shall conform to COGCC Regulations for noise level. The Director of Community Economic and Development or Board of County Commissioners may require operators to comply with a lower maximum permissible noise level to adequately protect public health, safety, welfare, the environment, and wildlife resources.

V. Reverse setbacks framework

LOGIC understands that reverse setbacks are likely to be addressed in later revisions to the Adams County regulations. Nevertheless, we would like to include in these comments a proposal that we have developed with consultation from COGCC staff and local governments, along with residents impacted by oil and gas development. It calls for a phased setback based upon the phase of development and safety of the facility. We hope you will keep the proposal in mind as

Adams County moves into its reverse setbacks discussion in the future. Please see the attached document for the details of the proposal.

In conclusion, LOGIC wishes to thank you again for considering the suggestions in this letter. As always, we remain available to answer questions or further discuss specifics of its proposals.

Sincerely,

Sara Loflin
Director

Andrew Forkes-Gudmundson
Deputy Director

Michael Foote
Legal Counsel



April 28, 2021

Dear Adams County Commissioners and staff,

On behalf of the League of Oil and Gas Impacted Coloradans (“LOGIC”), a non-profit organization that elevates the voices of Coloradans living near current and proposed oil and gas operations, we submit the following comments to the County’s initial redraft of its Oil and Gas Facility (“OGF”) permitting processes.

LOGIC very much appreciates Adams County revisiting its rules and the improvements between the existing and proposed new regulations. We also appreciate the positive steps the Colorado Oil and Gas Conservation Commission (“COGCC”) has taken to improve statewide health and safety protections. However, we are confident in telling you the progress is not enough to adequately protect health and welfare. Neighborhood drilling, much of it still the result of pre-Senate Bill 19-181 (“SB 181”) permit approvals, continues to have far-reaching impacts on nearby residents. State and local governments can do better for their residents and SB 181 gives them the tools to do so. Those tools must be fully utilized to be effective, though.

Neighborhoods along the Front Range, including some in Adams County, have been profoundly affected by recent oil and gas operations. Outside of Adams County, residents in Erie are just the latest to report widespread health effects from recent large-scale projects. Three mega-sites just a few hundred feet across the Erie border in Weld County are in various stages of fracking and completions and affecting nearby residents in many ways. Their complaints of excessive noise, headaches, nausea, and nosebleeds fit the typical pattern we have seen across Colorado. Adams County must be prepared to learn from these examples and to adopt new regulations that address these impacts and protect the health, safety, and welfare of its residents, the environment, and wildlife resources.

The residents’ complaints, while anecdotally persuasive on their own, are also backed up by science.¹ Numerous studies in Colorado and around the country, including a recent modeling study conducted for the Colorado Department of Public Health and Environment (“CDPHE”),

¹ See e.g. Concerned Health Professionals of New York & Physicians for Social Responsibility: *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction)* (6th ed., 2019), available at <http://concernedhealthny.org/compendium/>.

confirm what Coloradans close to drilling operations have been concerned about for many years.² Drilling and neighborhoods simply do not mix.

LOGIC has seen many commonalities between affected communities, many of which will be further outlined in this comment letter. At the top of the list are issues with noise, air quality, and lack of effective regulatory enforcement. Unfortunately, there is still a prevalent “nothing we can do” type of response throughout many local governments. The Board of County Commissioners must actively address those areas and others outlined in this letter to the extent that oil and gas operations are allowed within unincorporated Adams County.

Residential drilling is not inevitable. SB 181 elevated public health, safety, and welfare to the highest consideration for governments when considering drilling permits. Oil and gas left unextracted due to health and welfare concerns is no longer considered “waste” and can be justified under necessary and reasonable circumstances. In other words, Adams County can deny permits if an operator proposes drilling in an area that is antithetical to public health and welfare. The County can, and should, deny a permit application if public health and welfare would be negatively affected.

I. The Current Two-Tiered Approach for Permit Consideration Undermines Public Confidence

LOGIC submitted written comments during the County’s 2019 regulation revision process expressing concern about the two-tiered permit consideration process in which applications that meet all regulatory requirements may be approved or denied by the Director of Community and Economic Development without any input or decision by the Board of County Commissioners. The two-tiered process only requires permit approval by the Board of County Commissioners if the requested permit requests a waiver from the rules.

LOGIC’s major concerns about this system continue. Modern oil and gas facilities are large industrial operations with enormous impacts. The exclusion of the Board of County Commissioners from some permitting decisions means the Board plays no formal role in deciding whether the County allows those impacts and undermines public confidence in representative government. Commissioners are elected officials who must take into account the views of their constituents when making decisions more so than County staff, who are career officials without direct accountability to the public. It is easy for career staff who deal routinely with permit applications for new facilities and day-to-day matters on existing facilities to inadvertently become captured by the industry, with whom they must regularly communicate, and overlook the interests of affected communities and the general public.

Further, the two-tiered approach is rare in Colorado. Although some other jurisdictions have adopted a two-tiered approach, these jurisdictions generally distinguish between small, minor facilities that are subject to a less stringent process, and major facilities, which must undergo a

² “Final Report: Human Health Risk Assessment for Oil and Gas Operations in Colorado” Available at https://drive.google.com/file/d/1pO41DJMXw9sD1NjR_OKyBJP5NCb-AO0I/view

more significant review process. *See, e.g.,* La Plata County Code §§ 90-7 & 90-101; Gunnison County Code §§ 1-106(C) and (D). Adams County’s two-tiered approach does not even provide this distinction. A massive, 30-well project could be approved solely by the Director of Community and Economic Development as long as it complied with all applicable regulations, while a much smaller facility could require a hearing before the Board of County Commissioners if it involved a waiver request to just one of the rules.

LOGIC therefore reiterates its suggested revisions to Chapter 2 to require the Board to approve all OGF permits. LOGIC recognizes that the Board does not have the time or expertise to review every technical detail of every OGF permit application. Accordingly, the County should adopt a structure in which the Community and Economic Development Department continues to play an active role in reviewing the OGF permit application at all stages, and then makes a recommendation based on that review to the Board. The structure of staff making a recommendation to the Board is common in Adams County government processes, and should not be a major adjustment for either Adams County staff or the Board itself.

II. The County’s Authority to Deny Permits Should Be Stated More Clearly

While the current regulations codify the County’s ability to deny permits, and county staff has publicly acknowledged its ability to do so if appropriate, the language of certain sections of the regulations do not clearly enunciate that stated intent. For example, § 2-02-14-01 and § 4-11-02-03-03-01 state the purpose underlying each chapter in terms overly biased to the granting of permits. That language could be used against the County if litigation commences after a denied permit. Unequivocal language gives the permit applicant and the decisionmaker clear guidance. LOGIC makes the following suggestions in redline (or purple-line depending on your word processing software) to ensure the County’s ability to deny a permit application is at least on the same level as its ability to grant one:

§ 2-02-14-01 (Purpose)

The purpose of the oil and gas facility regulation is to allow for reasonable development of oil and gas in unincorporated Adams County ~~if while ensuring that those~~ facilities are ~~sited in appropriate areas and utilize best practices to protect protective of~~ the health, safety, and welfare of our residents and the environment and wildlife.

If granted by the County, tThe purpose of an OGF Permit is to regulate the surface land use of oil and gas production in order to protect the public safety, health, welfare and the environment of Adams County and its residents by ensuring that facilities are constructed and operated in accordance with best practices, to provide for sound environmental practices to protect the County’s natural resources, to provide for the orderly siting and development of oil and gas operations, as well as to prevent damage to County roads and bridges. The County will deny applications where the proposed oil and gas operations cannot be conducted in a manner that appropriately protects public health, safety, and welfare, and the environment and wildlife.

The Colorado Oil and Gas Conservation Commission (COGCC), the Colorado Department of Public Health and the Environment (CDPHE) and the federal government have authority to regulate certain aspects of oil and gas mineral extraction. Requirements contained in this section shall not exempt the owner or operator of an oil and gas facility from compliance with the requirements of the COGCC, CDPHE, or any other regulatory authority.

The provisions of these standards and regulations shall apply to the construction, installation, alteration, repair, erection, location, maintenance, operation, re-fracking or recompletions, and abandonment of all new or substantially modified oil and gas facilities within the unincorporated areas of the County. Substantially modified for the purposes of this section means anything requiring a Major Amendment.

§ 4-11-02-03-03-01 (Purpose)

This Section is enacted to protect and promote the health, safety, values, convenience, order, prosperity and general welfare of the current and future residents of the County. It is the County's intent by enacting this Section to protect public health, safety, and welfare, and the environment and wildlife resources during any approved development of oil and gas resources within the unincorporated area of the County; and regulate the surface impacts of any approved oil and gas operations in a reasonable manner to address matters related to the development of those oil and gas resources. ~~facilitate the development of oil and gas resources within the unincorporated area of the County while avoiding or mitigating potential land use conflicts between such development and existing, as well as planned, land uses. It is recognized that under state law the surface and mineral estates are separate and distinct interests in land and that one may be severed from the other. Owners of subsurface mineral interests have certain legal rights and privileges, including the right to use that part of the surface estate reasonably required to extract and develop their subsurface mineral interests from a consenting surface owner, subject to compliance with the provisions of this Section and any other applicable statutory and regulatory requirements. Similarly, owners of the surface estate have certain legal rights and privileges, including the right to have the mineral estate developed in a reasonable manner and to have adverse impacts upon their property, associated with the development of the mineral estate, avoided or mitigated through compliance with this Section.~~

III. Cumulative Impacts Considerations Should Include More Than Reporting Requirements

The cumulative impacts of a proposed new oil and gas location will depend on the size and scope of the new location as well as the footprint of existing oil and gas locations and other industrial facilities in the area. § 4-11-02-03-03-03(21) (General Provisions) requires the Operator to submit its own cumulative impacts assessment, the Operator to “minimize, avoid, mitigate, and

offset cumulative impacts from oil and gas operations to the extent technically feasible,” and to follow the COGCC cumulative impacts rules. These are appropriate requirements but they do not go far enough to address the deleterious effects of oil and gas facility cumulative impacts. The County must also explicitly consider the role of cumulative impacts in its decision of whether to approve or deny a permit application. For example:

§ 2-02-14-06 (Criteria for Approval)

The Board of County Commissioners ~~or Director of Community and Economic Development~~, in approving or denying an OGF Permit, shall consider:

...

3. The siting of the OGF, after evaluation of alternative sites and consideration of cumulative impacts of the proposed OGF, is ~~the most~~ compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare, the environment and wildlife of the County.

§ 2-02-14-05 (OGF Permit Review Steps)³

~~(3)~~ (4) Evaluation criteria. In determining which sites are likely to have the least off-site impact, ~~CED~~ the Community and Economic Development Department ~~may shall~~ consider the following, at a minimum:

- (a) Distance from existing or platted residences, schools, state licensed daycares, high occupancy buildings, active open spaces, environmentally sensitive areas, public drinking water supply areas, or other areas likely to be adversely impacted;
- (b) Traffic impacts and impact to roads, bridges, and other infrastructure;
- (c) Access to water and other operational necessities;
- (d) Whether the site allows for utilization of impact mitigation, such as use of proximate pipelines;
- (e) Noise impacts;
- (f) The impact on the surrounding land;
- (g) The impact on wildlife; ~~and~~
- (h) Impact on nearby environmental resources such as water bodies; ~~and~~;
- (i) Cumulative impacts of each alternative site proposal.

It does not sufficiently protect public health and welfare for an Operator to merely inform the County of its anticipated cumulative impacts. The County must also be able to act upon that information and potentially make a decision to either condition or deny an application based upon those cumulative impacts. The impacts of the same proposed OGF will vary greatly

³ The blue text in this paragraph and hereinafter connote revisions already proposed by County staff. The redline text include LOGIC's suggested revisions.

depending on its location and the County should explicitly state its intent to review (and possibly deny) applications based upon their cumulative impacts.

IV. Alternative Site Analyses Should Not Lead to Approving the “Least Bad” Location

LOGIC greatly appreciates the effort by Adams County to ensure that the operator is submitting multiple distinct potential locations from which the oil and gas resources could potentially be developed. The Alternate Site Analysis requirement is a powerful tool for reducing potential impacts with a proposed site and provides important evaluative criteria for the *relative risks* associated with each location. Yet, we caution that an alternative site analysis leads to the perception that one of the proposed locations is the “safest” and should therefore be approved. In some cases, the safest alternative is the denial of the application. Local governments are fully empowered to deny any application that is not protective of public health and welfare, and local governments are not compelled to approve harmful locations simply because they are the “least bad” of the alternatives. We understand Adams County staff have publicly indicated that an alternate location analysis is not a guarantee of approval, but we urge the inclusion of language within the regulations to clarify that a failure of any alternative site to meet public health and welfare requirements will lead to a denial recommendation. Such clarity is vital to provide transparency to both the residents of Adams County and the regulated community.

Alternate location analysis is also an avenue by which the County can adopt actual substantive protections for Disproportionately Impacted Communities. Identifying these communities and ensuring better communication with them is an important first step, but without substantive protections the regulations fall short of their intended goal. Disproportionately impacted communities are *already disproportionately impacted*. The purpose of identifying these communities must be to prevent further impacts. Informing people that their environmental burden is going to be increased is not enough, even if it is done in someone’s native language.

To address both of these suggestions, we recommend the following redline revisions to § 2-02-14-05 (OGF Permit Review Steps):

(2) Description of potential sites.

...

(b) No potential sites shall be submitted as alternate locations if the proposed site is inside or within 2,500 feet of an identified disproportionately impacted community.

~~(4)~~ (5) Site Selection. The County shall review all proposed locations in order to determine which location(s) best protects public health, safety, welfare, and the environment, and wildlife resources and will choose the location that best satisfies this goal. The Director of Community and Economic Development will determine if any proposed sites meet this goal. If no location satisfies this goal, Operator shall submit three new proposed locations. The County ~~may~~ shall recommend denial of the OGF Permit if it does not believe that any of the

proposed sites meet the siting goal. [Site Selection as part of the Alternative Site Analysis, as outlined above, does not constitute the approval of an OGF application.](#)

V. Provisions Related to Public Health and Welfare Can Improve

LOGIC notes and appreciates several draft improvements to the regulations located in § 4-11-02-03-03-03 (General Provisions), including an increased setback, the imposition of a noise pseudo-setback, and better odor prevention requirements. We believe further refinements to better protect public health and welfare can be made, however. First, LOGIC has consistently advocated across Colorado for a 2,500-foot setback between oil and gas facilities and occupied structures or sensitive areas. We continue to believe the science supports a distance of at least 2,500 feet, including but not limited to these studies:

- **McKenzie et al. (2012)** (Colorado) – air monitoring indicated that living within ½ mile (2,640 feet) of active oil and gas wells was associated with increased risk of respiratory, neurological and reproductive health effects and slightly elevated cancer risk.⁴
- **McKenzie et al. (2014)** (Colorado) – study of 124,842 births found congenital heart and neural tube defects associated with increased density of oil and gas wells within one mile (5,280 feet).⁵
- **Stacy et al. (2015)** (Pennsylvania) – study of 15,451 births found lower birth weight associated with increased oil and gas well density within one mile.⁶
- **Webb, et al. (2016)**— literature review on respiratory risks of unconventional oil and gas development on infants and children found support for adverse respiratory effects at every stage of development. The authors recommended that “at a minimum, one-mile setbacks should be established between drilling facilities and occupied dwellings such as schools, hospitals, and other dwellings where infants and children might spend a substantial amount of time.”⁷

⁴ McKenzie, L. M., Witter, R. Z., Newman, L. S., & Adgate, J. L. (2012). Human health risk assessment of air emissions from development of unconventional natural gas resources. *The Science of the Total Environment*, 424, 79-87. <https://doi.org/10.1016/j.scitotenv.2012.02.018>.

⁵ McKenzie, L. M., Guo, R., Witter, R. Z., Savitz, D. A., Newman, L. S., & Adgate, J. L. (2014). Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado. *Environmental Health Perspectives*, 122(4). <https://doi.org/10.1289/ehp.1306722>.

⁶ Stacy, S. L., Brink, L. L., Larkin, J. C., Sadovsky, Y., Goldstein, B. D., Pitt, B. R., & Talbott, E. O. (2015). Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest Pennsylvania. *PLoS ONE*, 10(6), e0126425. <https://doi.org/10.1371/journal.pone.0126425>.

⁷ Webb, et al., Potential hazards of air pollutant emissions from unconventional oil and natural gas operations on the respiratory health of children and infants, *Review of Environmental Health* (2018).

- **Haley, et al. (2016)**—study concluded that setbacks of up to 1,500 feet in Pennsylvania, Texas and Colorado were not “sufficient to protect public health and safety,” considering blowouts and evacuations, thermal modeling, vapor dispersion and air pollution.⁸
- **Weinberger et al. (2017)** (Pennsylvania) – health assessment records reported sleep disruption, headaches, throat irritation, stress or anxiety, cough, shortness of breath, sinus problems, fatigue, nausea and wheezing within 1 km (3,261 feet) of active well drilling.⁹
- **Whitworth et al. (2017)** (Texas) – study of 158,000 births found significant association between distance and density of oil and gas wells, and preterm birth at ½ mile (2,640 feet) and fetal death at 2 miles (10,560 feet).¹⁰
- **McKenzie et al. (2017)** (Colorado) – study of 87 acute lymphocytic leukemia cases found increased risk among young people (ages 5-24) associated with proximity and density of oil and gas wells within approximately one mile (5,249 feet).¹¹
- **Currie et al. (2017)** (Pennsylvania) – study of 1.1 million births found evidence of low birthweight babies born to mothers within 1 km (3,281 feet) of unconventional oil and gas wells; little evidence of effects observed at 3 km (9,843 feet) and beyond.¹²
- **Hill (2018)** (Pennsylvania) –study of nearly 1.1 million births found increases in low birth weight among babies born to mothers living within 2.5 km (8,202 feet) of oil and gas wells.¹³
- **Whitworth et al. (2018)** (Texas) – Study of nearly 164,000 births found an association between distance and density of wells in the drilling phase within ½ mile (2,640 feet) and preterm births.¹⁴

⁸ Haley, et al. (2016). Adequacy of current state setbacks for directional high-volume hydraulic fracturing in the Marcellus, Barnett, and Niobrara Shale plays. *Environ Health Perspect* 124(9):1323-1333, doi: 10.1289/ehp.1510547.

⁹ Weinberger, B., Greiner, L. H., Walleigh, L., & Brown, D. (2017). Health symptoms in residents living near shale gas activity: A retrospective record review from the Environmental Health Project. *Preventive Medicine Reports*. <https://doi.org/10.1016/j.pmedr.2017.09.002>.

¹⁰ Whitworth, K. W., Marshall, A. K., & Symanski, E. (2017). Maternal residential proximity to unconventional gas development and perinatal outcomes among a diverse urban population in Texas. *PLoS One*; San Francisco, 12(7), e0180966. <http://dx.doi.org/10.1371/journal.pone.0180966>.

¹¹ McKenzie, L. M., Allshouse, W. B., Byers, T. E., Bedrick, E. J., Serdar, B., & Adgate, J. L. (2017). Childhood hematologic cancer and residential proximity to oil and gas development. *PLOS ONE*, 12(2), e0170423. <https://doi.org/10.1371/journal.pone.0170423>.

¹² Currie, J., Greenstone, M., & Meckel, K. (2017). Hydraulic fracturing and infant health: New evidence from Pennsylvania. *Science Advances*, 3(12), e1603021 <https://doi.org/10.1126/sciadv.1603021>.

¹³ Hill, E. L. (2018). Shale gas development and infant health: Evidence from Pennsylvania. *Journal of Health Economics*, 61, 134-150. <https://doi.org/10.1016/j.jhealeco.2018.07.004>.

¹⁴ Whitworth, K. W., Marshall, A. K., & Symanski, E. (2018). Drilling and Production Activity Related to Unconventional Gas Development and Severity of Preterm Birth. *Environmental Health Perspectives*. <https://doi.org/10.1289/EHP2622>.

- **Holder et al. (2019)** (Colorado) – CDPHE study employed emissions data from oil and gas operations in Colorado to estimate exposure to chemicals associated with oil and gas development, such as benzene. Analysis found that emissions from certain stages of development may cause short-term negative health impacts (e.g., headaches; dizziness; respiratory, skin, and eye irritation) from 300 to 2,000 feet away.¹⁵

Second, Adams County can benefit from analyses and processes involved in recently revised rules and regulations from the COGCC, CDPHE, and several local governments. Suggestions related to setback waivers, noise, air emissions, and financial assurances are all substantially similar to those adopted in at least one other jurisdiction. All of the below suggestions will help Adams County adopt more protective regulations than currently proposed.

§ 4-11-02-03-03 (General Provisions)

4. Setbacks: Oil and Gas Facilities shall be at least 2,500 ~~2,000~~ ~~1,000~~ feet from the property line of any existing or undeveloped residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, ~~and~~ environmentally sensitive areas, and designated parks and open spaces. Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

a. ~~Administrative~~ Waiver from Setback Requirements: ~~an administrative~~ waiver may be obtained from the setback requirements if the Operator receives a written waiver with informed consent from each ~~primary adult~~ resident and property owner located within the setback. The written waiver(s) with informed consent shall be included with the setback waiver request submitted to the County.

a.b. ~~No Administrative~~ Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.

c. A setback waiver request shall be considered by the Board of County Commissioners and approved or denied based upon its consistency with public health, safety, welfare, the environment and wildlife resources.

7. Safety Standards:

a. Operator shall implement a safety management plan and maintain a safety management system applicable to all covered processes. Upstream facilities consisting of a standard, repeatable design may be covered with a single safety management plan. The safety management system shall provide for employees and systems to oversee implementation and periodic revision of the plan. The plan shall include the following elements and describe the manner in which each of the following elements will be applied to the covered processes

...

¹⁵ Published at https://drive.google.com/file/d/1pO41DJMXw9sD1NjR_OKyBJP5NCb-AO0I/view. The study “did not rule out the possibility of health impacts at greater distances.”

iii. Employee participation. Plan for ensuring employee and contractor or subcontractor participation in conduct and development of process hazards analysis and access to process hazards analysis;

iv. Training. Written procedures detailing initial and refresher employee and contractor or subcontractor training requirements and documentation of employee training;

c. Incident and accident reporting.

i. Incidents. As soon as practicable, but no more than Within a week three (3) days of any reportable safety event or emergency situation as defined by the COGCC, Operator shall submit a report to the County including the following, to the extent available...

vi. The County will notify the public of all incident reports disclosed by the Operator under this section by publishing the reports on its website.

14. Noise. The Operator shall control noise levels as follows.

c. The Operator ~~must~~ shall follow COGCC Regulations for noise level; however, the County may impose a noise limit of 40 dBA for any operations conducted in a residential area between 10:00 p.m. and 7:00 a.m.

f.g. All noise studies and assessments required by the County shall be completed by a qualified third party county approved sound professional.

15. Air emissions.

a. Air quality action days. Operator shall respond to air quality action day advisories posted by the CDPHE for the front range area by implementing suggested air emission reduction measures ~~as feasible~~ unless technically infeasible. Emissions reduction measures shall be implemented for the duration of an air quality action day advisory and may include measures such as...

(f)(iii) No flaring or venting other than if necessary for safety or during an emergency

(g)(i). Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during all phases of development, including the drilling, completion, and production, and operation, phases of development. The plan may include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5), BTEX, Hydrogen

Sulfide, Carbon Monoxide (CO), and Carbon Dioxide (CO2). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall ~~be able to~~ alert the operator and County of increases in monitored air pollutant concentrations.

22. Transportation and Traffic

a. General: Oil and gas operations shall minimize impacts to the physical infrastructure of the County transportation system and may be subject to vehicle daily or hourly caps as a condition of any OGF approval.

~~28~~ 33. Financial Assurance.

a. Operators shall be required to maintain environmental liability insurance to cover gradual pollution events.

b. Operator shall be required to file and maintain financial assurance equal to at least \$100,000 per well, with any greater amount as determined on a site-specific basis prior to commencing operations; and thereafter during the active life of the facility. In order to assist the County in setting a final financial assurance, the Operator shall disclose information related to the Operator's financial fitness to undertake the proposed oil and gas operations, including materials (audited, where appropriate) such as the following:

- a. Balance sheets for the previous 5 fiscal years;
- b. Operating cash flow statements for the previous 5 fiscal years;
- c. List of long- and short-term debt obligations;
- d. List of undercapitalized liabilities;
- e. Statements necessary to calculate net profit margin, debt ratio, and instant or current solvency ratio;
- f. Certified copies of all current financial assurances filed with the COGCC; and
- g. Tax returns for the prior 5 years.

The operator shall post and maintain a performance bond or other approved financial instrument with Adams County. Should any corrective actions be required by the County in order to protect the health, safety, welfare, and the environment which result from failure of the operator to follow any regulations, standards, or conditions of approval, the performance bond shall be forfeited in an amount sufficient to defray the expense of said actions, including staff time expended by Adams County involved in such corrective actions.

VI. Effective Enforcement is Necessary

Perhaps the greatest frustration from impacted residents involves inaction on complaints they file about nearby oil and gas operations with the COGCC, CDPHE, or local governments. A typical story involves the resident filing a complaint with the COGCC and their local government about loud noises from a wellsite that kept them awake throughout the night. The COGCC may send an inspector a day or two later, but the inspector hears nothing unusual at that time and dismisses the complaint. Someone from the local government may arrive sooner than the COGCC inspector, but the local official does nothing because he believes his “hands are tied.” The Operator claims it is following regulations, and has moved beyond fracking and completions well into production by the time the state or local government pushes through new rules to address the problems plaguing impacted communities.

Enforcement mechanisms are useless unless they have real teeth. LOGIC suggests the following revisions to the County’s inspection and enforcement rules to make them more effective:

§ 4-11-02-03-03-04 (Inspection and Enforcement)

1. Inspection: In recognition of the potential impacts associated with oil and gas facilities, all wells and accessory equipment and structures may be examined by the inspectors of the County at reasonable times to determine compliance with applicable provisions of this chapter, the International Fire Code, the International Building Code, and all other applicable standards in these Regulations. The County reserves the right in its discretion to make spot inspections or to inspect without notice in the event of an issue potentially involving an ~~immediate~~ risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another. For the purpose of implementing and enforcing the provisions of this chapter, the inspector and other authorized personnel have the right to enter upon private property. The County ~~may will~~ use the information collected on the inspections to enforce the requirements of this chapter. The County will report information regarding alleged violations of state and federal rules to the appropriate state and federal officials, and may also report any other inspection information to appropriate state and federal officials. ~~may also report this information to appropriate state and federal officials, including but not limited to information regarding alleged violations of state and federal rules.~~ Operator shall make available to County, upon request, all records required to be maintained by these regulations or to show compliance with these regulations, and the rules and regulations promulgated by the COGCC and the CDPHE, including permits, Air Pollutant Emission Notices (APENs) and other documents required to be maintained by the COGCC, CDPHE and these regulations. The County ~~will shall~~ charge a yearly inspection fee for all Oil and Gas Facilities in the County. Fees for Oil and Gas Facility inspections shall be assessed according to the County’s adopted fee schedule.

2. State Notification of Violations: Adams County will cooperate fully with the State of Colorado by notifying the Oil and Gas Conservation Commission and/or the Department of Public Health and Environment of any and all violations of the Colorado Laws and Regulations.

4. Penalties and Fines: The County has authority under C.R.S. § 29-20-104, as amended, to impose fines for leaks, spills, and emissions. Each violation and each day during which such a violation occurs shall be deemed a separate offense. The following table summarizes the fine schedule for violations of these Development Standards and Regulations:

...

65. County Violations: In addition to the fines outlined above, the County has authority to cite violations under its control pursuant to Section 1-05-06 Criminal Remedies and Enforcement.

6. Resident information: Audio, video, testimonial, or any other relevant evidence regarding a possible violation of the provisions of these Regulations gathered by a resident shall be accepted and considered by the County. A resident may request and receive a hearing with the Board of County Commissioners if public health, safety, welfare, environmental, or wildlife impacts persist after reporting those impacts to the County.

7. Legal Non-conforming: Adams County recognizes that there are oil and gas operations that were legally established prior to the effective date of these regulations that may or may not conform to these regulations. These operations may continue, provided the facility is not substantially modified.

VII. Reverse Setbacks Should Be Strengthened

While setbacks of new oil and gas facilities from existing development receives considerable public attention and consideration, “reverse” or “reciprocal” setbacks between existing oil and gas facilities and forthcoming development are just as important. A family living in a home five hundred feet away from an OGF is no less affected if that home was built before or after the OGF. Accordingly, the same principles of public health and welfare as discussed with setbacks, Section IV *supra*, should apply when considering reverse setbacks, especially during the construction and early production phases of the OGF’s operation.

§ 4-11-02-03-03-05 (Residential Construction Standards) currently allows the Director of Community and Economic Development to impose a 250-foot buffer between an existing oil and gas facility and buildings on platted or unplatted land. This is simply not sufficient, and certainly does not account for circumstances we see occurring more often along the Front Range: permits for large OGFs granted but the facility is not actually constructed until after new homes have been built abutting the OGF area. It also does not account for the impacts from maintenance, routine or otherwise, which may be severe and relatively frequent. Families in these homes, many of whom moved there with no knowledge of the impending oil and gas operation, suffer the same health and quality of life effects as if the OGF was permitted and constructed after their move.

In order to equally protect the health and welfare of every person who may live or work close to an OGF, LOGIC proposes a sliding scale system for reverse setbacks that accounts for the different phases of an OGF's operation. With permitted but not yet constructed facilities, those under construction, pre-production, and the first year of production, the reverse setback should equal the normal setback (i.e. 2,500 feet as recommended by LOGIC or 2,000 feet as currently recommended by County staff). These phases are when the health and welfare of nearby individuals are affected the most. After the first year of production, the reverse setback could be reduced if a relative reduction of OGF impacts can be shown to the satisfaction of the County. Finally, the reverse setback distance could be reduced again, but should be no less than three hundred feet, once each well on a site is plugged and abandoned. The three hundred foot minimum should remain in place indefinitely given the possibility of improper plugging or subsequent unanticipated disturbance of the site in the future.

In conclusion, LOGIC wishes to thank you very much for reviewing this letter. As always, we remain available to answer questions or further discuss specifics of its proposals.

Sincerely,

Sara Loflin
Director

Andrew Forkes-Gudmundson
Deputy Director

Michael Foote
Legal Counsel

Setbacks from Existing Oil and Gas Sites

A Policy Framework

Oil and gas does not belong in neighborhoods. Neighborhoods do not belong near heavy industrial activity. The impacts and surprise of new, neighboring heavy industrial activity are not burdens or risks Colorado residents should be forced to live with, particularly without disclosure.



SB19-181 gave local governments the authority to regulate land use with respect to oil and gas development to protect public health, safety, welfare, the environment and wildlife resources. Local governments also have a responsibility to protect public health and safety when it comes to siting housing development in proximity to oil and gas.

Our goals:

- Adopt reverse setback regulation that protects residents' health, safety, and welfare, the environment, and wildlife resources
- Adopt a reverse setback that is science-based, and accounts for the real impacts associated with oil and gas development at every stage of the oil and gas facility's life cycle
- Allow local governments to plan for expansion and future housing development to meet growth and affordable housing goals
- Account for the potential of future oil and gas development and future housing development

Status	Recommendation	Rationale
Permitted but not constructed facilities	<ul style="list-style-type: none"> For permitted but not constructed facilities, the setback shall match the setback for new oil and gas facilities from existing housing, 2,500'. This setback is not waivable, and not subject to variance. Setback shall not change until at least one year after production begins. Housing Developer shall disclose well location, their phase, and distance to all home buyers within ½ mile. 	<ul style="list-style-type: none"> The most active and 'risky phase' of oil and gas development is permitted and may begin at any point. Colorado residents should not be met with the surprise of an intensive industrial development. Oil and gas does not belong in neighborhoods and neighborhoods do not belong near oil and gas sites.
Pre-production	<ul style="list-style-type: none"> Pre-production includes pad construction, drilling, completion, and flowback, as well as any other interim stage prior to mineral production. The oil and gas operator must submit a written notice to the local government indicating which stage of development the facility is in. Setback for pre-production facilities shall match the setback for new housing and existing oil and gas facilities, 2,500'. Setback shall not change until at least one year after production begins. Housing Developer shall disclose well location, their phase, and distance to all home buyers within ½ mile. 	<ul style="list-style-type: none"> Pre-production includes the most emissions-heavy phases of oil and gas development and Colorado residents should not be met with the surprise of new or incomplete oil and gas development in neighborhoods. These phases also include major, round-the-clock industrial traffic, noise, and light, posing risks to nearby residents.
First year of production	<ul style="list-style-type: none"> This phase begins when an operator submits a notice to the local government asserting that the well has entered the production phase, and continues for one calendar year. The setback for the first year of production shall match the setback for new wells and existing housing, 2,500'. Housing Developer shall disclose well location, their phase, and distance to all home buyers within ½ mile. 	<ul style="list-style-type: none"> The first year of production covers the same scope of issues as pre-production. In the best-case scenario, many of the emissions and "nuisance" impacts will begin to tail off during this period. The potential for catastrophic impacts remains. Fires, explosions, equipment failure, and unintended emissions are still possible, and must be regulated against.

Long-Term Production	<ul style="list-style-type: none"> • This phase begins one calendar year after the operator has submitted notice to the local government that the well has entered production. • The setback for producing facilities shall match the setback for new wells and existing housing, 2,500'. • Housing Developer shall disclose well location, their phase, and distance to all home buyers within ½ mile. • The housing developer may apply to reduce this distance, but in no case shall the setback distance be less than 1,000'. Reduction may be based on: <ul style="list-style-type: none"> • If the oil and gas facility has appropriate protections in place to ensure that the oil and gas facility will not cause adverse impact the health, safety, and welfare of residents in the proposed housing development, • If the operator of the oil and gas facility will not apply to conduct future subsequent activity (as defined in COGCC Rule 312) on the existing oil and gas facility other than routine, non-impactful maintenance. 	<ul style="list-style-type: none"> • Emissions and nuisance impacts are often reduced during the production phase, but not eliminated. • The considerations for a reduction in the reverse setback are designed to eliminate the possibility of future activity on the wellsite that could cause harm.
Shut-in or temporarily abandoned facilities	<ul style="list-style-type: none"> • This phase is defined in COGCC Rules • Neither shutting in nor temporarily abandoning a facility shall be cause for a reduction in the setback distance. • The Housing Developer shall disclose well location, their phase, and distance to all home buyers within ½ mile. 	<ul style="list-style-type: none"> • Shut-in and temporarily abandoned wells may be returned to production, and must carry the same reverse setback provisions as a producing well.
Plugged and abandoned	<ul style="list-style-type: none"> • This phase is defined by COGCC Rules • The setback distance for a plugged and abandoned oil and gas facility shall be 1,000'. • Housing Developer shall disclose well location, their phase, and distance to all home buyers within ½ mile. • The housing developer may apply to reduce this distance, but in no case shall the setback distance be less than 300'. <ul style="list-style-type: none"> ▪ To apply for a reduction in the reverse setback distance, the housing developer must: <ul style="list-style-type: none"> • Provide a report that indicates the adequacy of the equipment or wellbore plug of each plugged and abandoned wellbore <ul style="list-style-type: none"> ○ Requirements of the review process: <ul style="list-style-type: none"> ▪ Contract with an independent consultant approved by the board at their own expense ▪ That consultant will conduct a review of all existing wellbores within the proposed subdivision as required by COGCC Rule 408 to determine if: <ul style="list-style-type: none"> • Any plugged and abandoned wells in/near the proposed subdivision are inadequately plugged and 	<ul style="list-style-type: none"> • Plugged and abandoned wells carry two types of risk: <ol style="list-style-type: none"> 1. Need for future access 2. Casing/plug failure • According to COGCC staff, need for future access necessitates a reverse setback of at least 150' • Casing or plug failure is a much more significant issue. Look to the Davis 43-6 well in Broomfield or the Berthoud Bubble Up for examples of the need for a setback of at 1,000' for plugged and abandoned wells. • The Davis 43-6 failure is currently holding up building permits in Broomfield, as methane

		<p>abandoned and pose a danger to the proposed housing development, AND</p> <ul style="list-style-type: none"> • Any existing wells within the proposed subdivision are not sufficient to withstand future hydraulic fracturing in the vicinity • Describe any corrective action necessary based on the review. • If a housing developer discovers that wells within the proposed subdivision require remedial action, they will undertake such remedial action at their expense. • Local gov may consult with COGCC via technical review board for added expertise to evaluate the reports and the remedial work plan. 	<p>leaks in the soil surrounding the wellbore.</p>
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From: [Shaina Oliver](#)
To: [Gregory Dean](#)
Cc: [Patrice Tomcik](#); [Laurie Anderson](#)
Subject: Written Comment Re: Proposed Oil & Gas Regulations
Date: Wednesday, June 9, 2021 6:59:08 PM

Please be cautious: This email was sent from outside Adams County

Community and Economic Development Department
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601-8216
c/o Gregory Dean

Re: Proposed Oil & Gas Regulations

Submitted via email to GDean@adcogov.org.

To Adams County:

Indigenous Land Acknowledgement: Moms Clean Air Force Colorado Chapter acknowledges the stolen lands of over 574 tribal nations, and that we sit directly on the lands of the Cheyenne, Arapahoe, and Ute Nations, and 45 other tribes that once occupied Colorado.

My name is Shaina Oliver, and I am a Northeast community member of Denver and a Field Organizer for EcoMadres and Moms Clean Air Force in Colorado which is a national organization of 1 million moms, dads, and caregivers united in fighting for all children's right to breathe and play in clean air. I am also an Indigenous Peoples' Rights Advocate and, most importantly, I am an Indigenous mother of four children. My family and I are the descendants of the genocide known as the "Indian Removal Act" known to the Dineh as "The Long Walk of the Navajo".

Historically, policy violations have ravaged Indigenous community's health, wealth, and environmental wellbeing. As a tribal affiliate of the Navajo Nation, I have seen the devastating land and health impacts contributed by coal, uranium, oil, and gas extraction. Because of these disparities, Indigenous people now have the highest rates in asthma, diabetes, heart disease, cancer, leukemia, adverse birth outcomes, and premature deaths than the general population. I myself was born prematurely, low-birth weight, diagnosed with asthma as an infant, and later in life diagnosed with a birth defect. My uncle who lives near an oil and gas site has suffered a heart attack and has undergone heart surgery. In addition, my grandfather suffered from asthma continuously before passing away from leukemia. According to Physicians for Social Responsibility the burdens of health impacts from oil and gas pollution exposures can continue to affect three generations in the future.

Because of systemic environmental violence and racism built into our treaties, laws, policies, and regulations; Black, Brown, Indigenous, and low-income people have been segregated and redlined into communities near polluting industries. We are seeing this reality play out once

again as oil and gas permits are being proposed near Black and Brown communities in Adams County already disproportionately impacted by pollution. This area also includes the Arsenal Refuge where the buffalo have been reintroduced to their lands.

Many residential developments already exist near the proposed sites for oil and gas development with families that have moved here because of the outdoors recreation, beautiful mountains, blue skies, and hoping for good health. A growing body of scientific information supports the association between oil and gas activities and negative impacts to health and the environment. We need an economy that supports protecting our wildlife, water, air, and environment.

Currently, Denver is ranked 8th for poor ozone air quality according to the American Lung Association's State of the Air report. To compound the issue, communities near the Suncor refinery have been repeatedly subjected to the air pollution violations from the Suncor refinery. It is unconscionable that the county would want to add more pollution to the existing poor air quality problems.

It is imperative for Adams County to promulgate strong regulations that protect ground water conservations, wildlife, and communities near proposed oil and gas operation sites of Unincorporated Adams County and Adams County. Under SB 19-181, local governments have the authority to site oil and gas operations a minimum of 2,000 feet from schools, homes, hospitals, water sources and other human occupied buildings. In addition, it is important that there is real-time air quality monitoring of all pollutants of concern near communities. Finally, there needs to be strong enforceable fines with no waivers.

Moms Clean Air Force is asking for Adams County to show leadership on protecting communities and environment for all children of Colorado.

Thank you,

Shaina Oliver, Dineh/Navajo
Indigenous Peoples' Rights Advocate
Field Organizer, EcoMadres/Moms Clean Air Force CO
soliver@momscleanairforce.org

Take Action! [Make Your Voice Heard - Moms Clean Air Force](#)
Join the Force! [State Chapters - Moms Clean Air Force](#)



April 28, 2021

Community and Economic Development Department
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601-8216
c/o Gregory Dean

Submitted via email to GDean@adcogov.org.

To Adams County:

Thank you for taking the time to take these points into consideration when updating oil and gas regulations to protect Adams County residents.

A large body of academic literature has characterized serious effects on human health and life expectancy from air pollution, including a recent¹ study that identified air pollution as a contributor to 8.8 million deaths annually, identifying it as “one of the main global health risks.” Additionally, exposure to air pollution has been linked to higher rates of mortality from viral infectious diseases². In light of this evidence, and the serious threats posed by fracking to the stability of our climate, the only responsible course of action is for Adams County to impose the most stringent regulations possible on oil and gas extraction. Adams County already has many residents who live in disproportionately impacted communities. Regulations that only do the minimum required by the state are not sufficient to protect Adams county residents, especially when considering the cumulative impacts of oil and gas activity that is already taking place in Adams County.

Public Health

- Setbacks: (4-11-02-03-03-03) We appreciate that Adams County is using a more protective standard of maximum disturbance measurement when looking at setbacks rather than the COGCC standard, but the County can and should go farther to protect residents. Numerous studies have linked fracking to harm to human health, including an increased risk of congenital heart defects among children born to women living near oil

¹ Lelieveld, J., et al. “Loss of Life Expectancy from Air Pollution Compared to Other Risk Factors,” March 2020, <https://academic.oup.com/cvadvances/advance-article/doi/10.1093/cvr/cvaa025/5770885>

² Cui, Y., et al. “Air pollution and case fatality of SARS in the People's Republic of China: an ecologic study”, 2003, <https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-2-15>

and gas operations in Colorado³, with the risks increasing with the density of oil and gas activities within a 10-mile radius⁴; and reduced cognitive performance has been identified in infants born to mothers living within 8,500 ft. of a fracking well⁵. Based on a review of existing scientific literature, Wong (2017)⁶ concluded that, “a 2,500-foot setback recommendation is on the lower end of the range of distances where research has determined harmful health and quality of life impacts of toxic emissions and exposures.” Therefore, Adams County regulations should be revised to require a setback of at least 2,500 ft. between oil and gas operations and any structure intended for human occupancy, open space, water sources.

- A setback requirement that is more rigorous than the 2,000’ setback (with many potential exceptions) that is present in the regulations adopted by the COGCC, is essential. The CDPHE study on which the 2,000’ setback requirement is based identified deleterious health effects within 2,000’ of oil and gas operations, and did not consider health effects outside of that radius.
- The County should also include reverse setbacks in their regulations of 2,500 ft. Reverse setbacks are as important to protecting public health and safety.

Permitting Process

- In order to protect Adams County residents, and given the number of bankruptcies experienced by oil and gas companies, the County should take into account the financial solvency of an oil and gas company before granting a permit.⁷
- The County should add a required amount of financial assurances that not only includes oil and gas companies but extends all conditions (from assurances to liability) to all affiliated entities and subcontractors. The extension of requirements for financial assurances and liability to affiliates and sub-contractors is particularly important in the light of current market conditions and the precarious financial state of many fracking companies operating in Colorado. Insurance requirements should be implemented on a per well basis. Studies have found that the cost of soil remediation alone for oilfield sites

³ McKenzie, L., et al., “Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado”, April 2014, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3984231/>

⁴ McKenzie, L., et al., “Congenital heart defects and intensity of oil and gas well site activities in early pregnancy,” November 2019,

<https://www.sciencedirect.com/science/article/pii/S0160412019315429?via%3Dihub>

⁵ Hill, E., “Shale gas development and infant health: Evidence from Pennsylvania”, September 2018, <https://www.sciencedirect.com/science/article/abs/pii/S0167629617304174>

⁶ Wong, N. “Existing scientific literature on setback distances from oil and gas development sites”, June 2017, https://www.stand.ia/uploads/5/3/9/0/53904099/2500_literature_review_report-final_jul13.pdf

⁷

<https://www.houstonchronicle.com/business/energy/article/More-than-100-oil-and-gas-companies-filed-for-15884538.php>

in Colorado ranges from \$13,000 to \$73,000, while intensive remediation of groundwater pollution can cost more than \$1 million.⁸

- (2-01-06 Step 6: Notice) Notice shall be sent by the applicant to all property owners and current residents **within a full mile** at a minimum, or greater. Lighting, noise, truck traffic, and emissions affect residents, schools and businesses much further than the notification of the half mile radius.
- County should determine the location and run the neighborhood meetings with a question and answer style format which would better allow participation of impacted residents.
- During each meeting and notice provided the operator shall provide clear instructions on how to make nuisance and health complaints to the operator, county and relevant state agencies.

Climate and Air Quality

- Prohibit permitting while the Front Range remains in non-attainment of the National Ambient Air Quality Standard (NAAQS) standards for ozone, and prohibit emissions of air toxics such as benzene: Research has demonstrated that oil and gas operations are a significant contributor⁹ to excessive levels of ozone on the Front Range. Adams County should prohibit permitting altogether while the Front Range remains in non-attainment for ozone, and should extend to emissions of air toxics as well. A threshold for allowable emissions of particulate matter should be defined based on the ample body of scientific evidence assessing the effects of particulate matter on public health.
- In assessing a permit application, the Board of County Commissioners should be required to consider the cumulative effects of the expected greenhouse gas emissions and other air- and water-polluting emissions associated with the permit in the context of the existing pollution burden in the County and the existing global levels of greenhouse gas emissions. The greenhouse gas emissions associated with oil and gas development contribute to accelerating climate change, which fundamentally threatens public health, safety, and welfare.
- (4-11-02-03-03-03 Section 15) In the current draft of the regulation, Adams County may call for site-specific air quality protection measures to eliminate or minimize air emissions depending on the size, location and nature of the facility. **Instead, the county should require that the following are required for every single site without exception:**
 - i. Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed

⁸ Connor, J., et al. "Nature, Frequency, and Cost of Environmental Remediation at Onshore Oil and Gas Exploration and Production Sites," Summer 2011, http://theamazonpost.com/chevron-ecuador/wp-content/uploads/Connor_etal_Nature_Freq_Remed_Costs_2011.pdf

⁹ CIRES, "Oil and Gas Emissions a Major Contributor to Bad Ozone Days", 11/3/17, <https://cires.colorado.edu/news/oil-and-gas-emissions-major-contributor-bad-ozone-days>

facility prior to construction and conduct monitoring during the drilling, completion and production phases of development. The plan **shall** include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall be able to alert the operator, **county and residents** of increases in monitored air pollutant concentrations.

ii. Implementation of tankless production techniques.

iii. The use of zero emission dehydrators.

iv. Use of a pressure-suitable separator and vapor recovery unit (VRU) where applicable.

v. Pipeline infrastructure for produced water, natural gas, crude oil and condensate constructed and placed into service prior to the start of any fluid flow from any wellbore.

vi. The use of no-bleed continuous and intermittent pneumatic devices. This requirement can be met by replacing natural gas with electricity or instrument air, or routing the discharge emissions to a closed loop-system or process.

vii. Automated tank gauging.

viii. Flaring shall be eliminated other than during emergencies or upset conditions; all flaring shall be reported to the county **and residents**.

- Require that all electrical power provided to oil and gas operations be supplied by renewables, on an annual basis (i.e. net zero energy for electricity) and require that all on-site equipment be electrically-powered.

Fines and Liability

- The County should reserve the right to revoke a permit for oil and gas operations based on the operator's failure to abide by the conditions of the permit.
- A section should be added to the regulations specifically imposing fines on operators who fail to meet the safety and maintenance requirements. Lack of routine maintenance at oil and gas wells contributes to leaks and increased emissions which threaten human health and the environment, as well as increased future remediation costs.
- A section should be added to the regulations specifically imposing fines on operators for leaks, spills, explosions and other hazards that the community suffers during their operations.
- (4-11-02-03-03-03)7.iii.Compliance audits. Written procedures requiring an audit every five years to verify compliance with the procedures and practices developed under the safety management plan, and procedures requiring correction of any

deficiencies identified in audit; operator will make results of audit available to inspector upon request.

- Given the potential for leaks, spills, explosions and other hazards that oil and gas operations present to public health, safety and the environment, a safety audit every 5 years is woefully inadequate and should be conducted every 6 months at minimum and upon community member request.

Land Management

- Oil and gas operations should be prohibited on open space. Adams County residents have invested in their open space and currently have an open space sales tax and in the 2020 election the sales tax was extended into perpetuity. Adams County voters don't pay this sales tax to preserve the land for oil and gas development. The county's open space lands are a precious home for wildlife, as well as a destination for outdoor recreation. Therefore oil and gas activity on open space should be prohibited.
- The operator should be required to fully restore the land on which an oil and gas operation is located to its prior state, such that it could continue to be used for its original purposes, such as agriculture or recreation .

Public Notice

- The notification requirements (in Sec. 2-02-14-05) for nearby landowners after an application for a permit is deemed complete by the county should extend to all residents of the county, through publication in a newspaper in general circulation and on a county website.
- Follow-up and ongoing water testing results should be mandatory, and should be recorded such that they would be available to future owners of the property and/or future users of the water source in question, and test results reporting on flowback and produced water should also be made available to the public.
- Continuous air quality monitoring should be mandatory, and all reports from air quality monitoring of oil and gas operations should be available to the public and evidence of leaks and/or spills should also be reported to the public through a county website and any other appropriate channels.

Thank you for taking the time to protect the public health, safety, welfare and environment for Adams County residents!

Kate Christensen
Oil and Gas Campaign Coordinator 350 Colorado
kate@350Colorado.org

Adams County Oil and Gas Regulations Update April 2021

Mr. Greg Dean and Staff Members,

The ACCDAN Team wants to thank you for the time and work you are putting into the current updating of Adams County's oil and gas regulations. Many of your recommendations show that you are genuinely concerned for the public's health, safety, and welfare, and for our beautiful countryside, wildlife, and natural resources. As you know, more and more citizens are recognizing the importance these regulations will play in the quality of life we experience here in Adams County. Today, our reality is one of growing concern over climate change, living with regular poor air quality, and the fear of drought. The recent growth in large scale oil and gas facilities near our homes, our children's schools, and the parks, open space, and businesses we frequent is only exacerbating these worries. The fiasco over Great Western's Ivey site was an eye-opener to the thousands of residents living in its shadow. It is our hope that the new regulations will halt any more harm to those who call Adams County home while still allowing for "reasonable development of oil and gas."

We hope you will strongly consider the following changes and additions:

CHAPTER 2

2-02-14-01

For the health and safety of residents, it is vital that new regulations apply to the "maintenance," "repair," and "abandonment" of older existing wells. As a result of the Ivey site, many neighborhoods were adversely affected by the noise, emissions, light, and truck traffic caused by workover rigs, sometimes just a few hundred feet from their homes. These smaller sites are OGFs and continue to impact public health, safety, and the environment.

2. Neighborhood Meeting: Because many on the ACCDAN Team have talked with hundreds of impacted residents and have firsthand experience with Operator meetings, we find that the only way to ensure the community receives unbiased information is if the meeting is led by a County official with the Operator and his team available to answer questions. Since this meeting also includes impacted schools and businesses, perhaps a better heading would be "Community Meeting." Bringing heavy industry into an urban environment can be life-changing, therefore your oversight is crucial to ensure that you hear, firsthand, the voices of impacted Adams County residents, school boards, and businesses. Because many citizens may be unable to physically attend, the meeting must be recorded, and a summary posted on the County's website, in a local newspaper, and a school newsletter in the case that a school will be impacted by the proposed OGF. The quickest way to lose a citizen's trust is to hand the keys over to the Operator and let them tell the community what they will do to "mitigate" our concerns.)

6. Notice: *ACCDAN has found the lack of communication with soon-to-be impacted citizens is profound and must be remedied to maintain vibrant and growing communities.* To fully inform and grasp any concerns from your citizens, the County must be involved in the notification process of residents, businesses, and school districts. We recommend direct written notification

of proposed OGF and pipeline infrastructure no less than a 2-mile radius from development, for often, children are bused and do not live within ½-mile of their school, and owners and employees of businesses generally drive to work from another geographic area, yet they spend a great percentage of time in these environments. A general notification on the County website, local newspaper, and school newsletter can reach those living outside the 2-mile written notification area. This notification should contain both County and Operator names, contact information, the size and number of wells proposed, the date, location, and time of the “Community Meeting,” and where a record or summary of the meeting can be accessed.

Regarding the “posted notice...for all OGF Permits,” the only sure way to inform the public is to utilize signage in accordance with County regulations as addressed in your “off premise” advertising regulation (4-16-04 p. 4-241) that allows for 300 square foot signs. If a proposed Starbucks gets a 10x30 foot sign, so should an industrial OGF!

7. ACCDAN supports the recommendations submitted by several other groups regarding the necessity of public hearings for ALL OGF permits.

2-02-14-07

ACCDAN strongly urges the County to NOT allow waivers. After attending a Study Session, an ACCDAN member overheard an API representative laugh and say to his cohorts that they will be asking for waivers on every application.

2-02-14-07-05 and 2-02-14-07-06

While we realize the Board of Adjustment has the authority to approve changes to regulated land use on a case-by-case basis, we feel that this is a slippery slope when/if current staff and BOCC changes.

CHAPTER 4

4-11-02-03-03-03 General Provisions

2. Signage: See 2-02-14-01

4.a. Add tenants or renters to "written waiver" requirement.

6. a. Add impact fees for seismic (thumper) trucks that do meet the weight restrictions on public roads.

7. a. iii. and iv. Add contract workers under "Employee participation" and "training."

c. i. Incidents: Requires notification to LGD. Should be made public.

v. Notification not just to surface owner/tenant but to all residents, businesses, and school districts within 2 miles.

8. Spill Prevention and Containment.

a. Change "minimize" to prevent.

9. Chemical Handling Requirements.

a. More transparency needed. In the last line, omit "upon request", then add "and posted on the County website."

10. Emergency Preparedness Response

b. x. Plan must be in place and posted on County website and include all potentially impacted people, not just "neighbors" and "schools."

11. c. Who determines economic or technical feasibility? Operator? County? The transportation of produced water should also include safety measures.

12. b. Omit the word "reduce" and stick with "eliminate."

15. Air Emissions: Who checks to see if the Operator is complying?

a. i.-vi. seems to be an admission of emissions!!!

a. Omit the word "feasible."

b. Add vi. to require immediate notification to the public of all air quality action days, leaks, and flaring deemed to be unsafe. Install an alarm system (like those used for tornado warnings) to alert public to shelter in place, e.g. children on playgrounds and outdoor workers.

g. All sites should be required to utilize measures defined in i.-viii.

g. v. Consider dangerous aspects of increased pipeline infrastructure. There should be some limits.

16. Odors

d. Is it clear that compressor stations and pipelines are considered "oil and gas facilities"?

20. Community Outreach: See 2-02-14-01

a. "Quarterly neighborhood meetings" should start prior to site approval. Because the County has land use authority, they should be responsible for mailing notices to the public within 2-mile of the proposed site, and posting in local newspaper, school newsletter, and on County website.

c. County should determine the meeting location and run the meeting. A summary of the meeting should be posted on the County website or sent to all impacted residents, businesses, school districts.

Format must include an audience style Q&A session.

21. Cumulative Impacts

ACCDAN strongly urges that the County, not the Operator, be responsible to "evaluate and address the potential cumulative impacts," and to "minimize, avoid, mitigate, and offset cumulative impacts." As you know, that is what the COGCC and the County gave Great Western the authority to determine how to address potential cumulative impacts and determine how to mitigate those impacts they couldn't avoid.

21. a. Change "may" to will.

21. d. iv. Include seismic trucks

23. Water and Wildlife Protection

a. Add vii to add transparency regarding how water is obtained by Operators and amount of usage?

24. Flammable Material

Add a requirement that herbicides cannot be used to clear "dry grass or weeds" within 1000' of a water source.

30. c. Again, the County has land use authority but it's not clear who determines these setbacks. Because they are part of oil and gas production, a requirement for public input on pipelines that will impact homes, businesses, and schools must be added.

4-11-02-03-03-04 Inspection and Enforcement

1. Change the word "may" to "will" as in: "The County will use the information collected on the inspections...." and "The County will also report this information..."

4. Make second fine for Major Class 3 offense a \$75,000.

7. Operations "established prior to the effective date of these regulations" must comply to new regulations. Safe is safe! Also, this would be unfair to new Operators.

8. a. Add "members of the public" to the right of an Operator to request a hearing before the BOCC. Then, change "contest" to "address."

4-11-02-03-03-05 Residential Construction Standards

1. a. Change from 250' to 2000'.

1. f. NO waivers.

2. For crying out loud, use their line "This section is enacted to protect and promote the health, safety, morals, convenience..." throughout the regulations.

Finally, all changes should be reflective of the community's concern around the health and safety issues so clearly demonstrated by the Ivey site's pre-January 15 approval. How can the County avert another Ivey fiasco?

Thank you.

The ACCDAN TEAM



April 28, 2021

Dear Adams County Commissioners and staff,

On behalf of the League of Oil and Gas Impacted Coloradans (“LOGIC”), a non-profit organization that elevates the voices of Coloradans living near current and proposed oil and gas operations, we submit the following comments to the County’s initial redraft of its Oil and Gas Facility (“OGF”) permitting processes.

LOGIC very much appreciates Adams County revisiting its rules and the improvements between the existing and proposed new regulations. We also appreciate the positive steps the Colorado Oil and Gas Conservation Commission (“COGCC”) has taken to improve statewide health and safety protections. However, we are confident in telling you the progress is not enough to adequately protect health and welfare. Neighborhood drilling, much of it still the result of pre-Senate Bill 19-181 (“SB 181”) permit approvals, continues to have far-reaching impacts on nearby residents. State and local governments can do better for their residents and SB 181 gives them the tools to do so. Those tools must be fully utilized to be effective, though.

Neighborhoods along the Front Range, including some in Adams County, have been profoundly affected by recent oil and gas operations. Outside of Adams County, residents in Erie are just the latest to report widespread health effects from recent large-scale projects. Three mega-sites just a few hundred feet across the Erie border in Weld County are in various stages of fracking and completions and affecting nearby residents in many ways. Their complaints of excessive noise, headaches, nausea, and nosebleeds fit the typical pattern we have seen across Colorado. Adams County must be prepared to learn from these examples and to adopt new regulations that address these impacts and protect the health, safety, and welfare of its residents, the environment, and wildlife resources.

The residents’ complaints, while anecdotally persuasive on their own, are also backed up by science.¹ Numerous studies in Colorado and around the country, including a recent modeling study conducted for the Colorado Department of Public Health and Environment (“CDPHE”),

¹ See e.g. Concerned Health Professionals of New York & Physicians for Social Responsibility: *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction)* (6th ed., 2019), available at <http://concernedhealthny.org/compendium/>.

confirm what Coloradans close to drilling operations have been concerned about for many years.² Drilling and neighborhoods simply do not mix.

LOGIC has seen many commonalities between affected communities, many of which will be further outlined in this comment letter. At the top of the list are issues with noise, air quality, and lack of effective regulatory enforcement. Unfortunately, there is still a prevalent “nothing we can do” type of response throughout many local governments. The Board of County Commissioners must actively address those areas and others outlined in this letter to the extent that oil and gas operations are allowed within unincorporated Adams County.

Residential drilling is not inevitable. SB 181 elevated public health, safety, and welfare to the highest consideration for governments when considering drilling permits. Oil and gas left unextracted due to health and welfare concerns is no longer considered “waste” and can be justified under necessary and reasonable circumstances. In other words, Adams County can deny permits if an operator proposes drilling in an area that is antithetical to public health and welfare. The County can, and should, deny a permit application if public health and welfare would be negatively affected.

I. The Current Two-Tiered Approach for Permit Consideration Undermines Public Confidence

LOGIC submitted written comments during the County’s 2019 regulation revision process expressing concern about the two-tiered permit consideration process in which applications that meet all regulatory requirements may be approved or denied by the Director of Community and Economic Development without any input or decision by the Board of County Commissioners. The two-tiered process only requires permit approval by the Board of County Commissioners if the requested permit requests a waiver from the rules.

LOGIC’s major concerns about this system continue. Modern oil and gas facilities are large industrial operations with enormous impacts. The exclusion of the Board of County Commissioners from some permitting decisions means the Board plays no formal role in deciding whether the County allows those impacts and undermines public confidence in representative government. Commissioners are elected officials who must take into account the views of their constituents when making decisions more so than County staff, who are career officials without direct accountability to the public. It is easy for career staff who deal routinely with permit applications for new facilities and day-to-day matters on existing facilities to inadvertently become captured by the industry, with whom they must regularly communicate, and overlook the interests of affected communities and the general public.

Further, the two-tiered approach is rare in Colorado. Although some other jurisdictions have adopted a two-tiered approach, these jurisdictions generally distinguish between small, minor facilities that are subject to a less stringent process, and major facilities, which must undergo a

² “Final Report: Human Health Risk Assessment for Oil and Gas Operations in Colorado” Available at https://drive.google.com/file/d/1pO41DJMXw9sD1NjR_OKyBJP5NCb-AO0I/view

more significant review process. *See, e.g.,* La Plata County Code §§ 90-7 & 90-101; Gunnison County Code §§ 1-106(C) and (D). Adams County’s two-tiered approach does not even provide this distinction. A massive, 30-well project could be approved solely by the Director of Community and Economic Development as long as it complied with all applicable regulations, while a much smaller facility could require a hearing before the Board of County Commissioners if it involved a waiver request to just one of the rules.

LOGIC therefore reiterates its suggested revisions to Chapter 2 to require the Board to approve all OGF permits. LOGIC recognizes that the Board does not have the time or expertise to review every technical detail of every OGF permit application. Accordingly, the County should adopt a structure in which the Community and Economic Development Department continues to play an active role in reviewing the OGF permit application at all stages, and then makes a recommendation based on that review to the Board. The structure of staff making a recommendation to the Board is common in Adams County government processes, and should not be a major adjustment for either Adams County staff or the Board itself.

II. The County’s Authority to Deny Permits Should Be Stated More Clearly

While the current regulations codify the County’s ability to deny permits, and county staff has publicly acknowledged its ability to do so if appropriate, the language of certain sections of the regulations do not clearly enunciate that stated intent. For example, § 2-02-14-01 and § 4-11-02-03-03-01 state the purpose underlying each chapter in terms overly biased to the granting of permits. That language could be used against the County if litigation commences after a denied permit. Unequivocal language gives the permit applicant and the decisionmaker clear guidance. LOGIC makes the following suggestions in redline (or purple-line depending on your word processing software) to ensure the County’s ability to deny a permit application is at least on the same level as its ability to grant one:

§ 2-02-14-01 (Purpose)

The purpose of the oil and gas facility regulation is to allow for reasonable development of oil and gas in unincorporated Adams County ~~if while ensuring that those~~ facilities are ~~sited in appropriate areas and utilize best practices to protect protective of~~ the health, safety, and welfare of our residents and the environment and wildlife.

~~If granted by the County, t~~The purpose of an OGF Permit is to regulate the surface land use of oil and gas production in order to protect the public safety, health, welfare and the environment of Adams County and its residents by ensuring that facilities are constructed and operated in accordance with best practices, to provide for sound environmental practices to protect the County’s natural resources, to provide for the orderly siting and development of oil and gas operations, as well as to prevent damage to County roads and bridges. ~~The County will deny applications where the proposed oil and gas operations cannot be conducted in a manner that appropriately protects public health, safety, and welfare, and the environment and wildlife.~~

The Colorado Oil and Gas Conservation Commission (COGCC), the Colorado Department of Public Health and the Environment (CDPHE) and the federal government have authority to regulate certain aspects of oil and gas mineral extraction. Requirements contained in this section shall not exempt the owner or operator of an oil and gas facility from compliance with the requirements of the COGCC, CDPHE, or any other regulatory authority.

The provisions of these standards and regulations shall apply to the construction, installation, alteration, repair, erection, location, maintenance, operation, re-fracking or recompletions, and abandonment of all new or substantially modified oil and gas facilities within the unincorporated areas of the County. Substantially modified for the purposes of this section means anything requiring a Major Amendment.

§ 4-11-02-03-03-01 (Purpose)

This Section is enacted to protect and promote the health, safety, values, convenience, order, prosperity and general welfare of the current and future residents of the County. It is the County's intent by enacting this Section to protect public health, safety, and welfare, and the environment and wildlife resources during any approved development of oil and gas resources within the unincorporated area of the County; and regulate the surface impacts of any approved oil and gas operations in a reasonable manner to address matters related to the development of those oil and gas resources. ~~facilitate the development of oil and gas resources within the unincorporated area of the County while avoiding or mitigating potential land use conflicts between such development and existing, as well as planned, land uses. It is recognized that under state law the surface and mineral estates are separate and distinct interests in land and that one may be severed from the other. Owners of subsurface mineral interests have certain legal rights and privileges, including the right to use that part of the surface estate reasonably required to extract and develop their subsurface mineral interests from a consenting surface owner, subject to compliance with the provisions of this Section and any other applicable statutory and regulatory requirements. Similarly, owners of the surface estate have certain legal rights and privileges, including the right to have the mineral estate developed in a reasonable manner and to have adverse impacts upon their property, associated with the development of the mineral estate, avoided or mitigated through compliance with this Section.~~

III. Cumulative Impacts Considerations Should Include More Than Reporting Requirements

The cumulative impacts of a proposed new oil and gas location will depend on the size and scope of the new location as well as the footprint of existing oil and gas locations and other industrial facilities in the area. § 4-11-02-03-03-03(21) (General Provisions) requires the Operator to submit its own cumulative impacts assessment, the Operator to “minimize, avoid, mitigate, and

offset cumulative impacts from oil and gas operations to the extent technically feasible,” and to follow the COGCC cumulative impacts rules. These are appropriate requirements but they do not go far enough to address the deleterious effects of oil and gas facility cumulative impacts. The County must also explicitly consider the role of cumulative impacts in its decision of whether to approve or deny a permit application. For example:

§ 2-02-14-06 (Criteria for Approval)

The Board of County Commissioners ~~or Director of Community and Economic Development~~, in approving or denying an OGF Permit, shall consider:

...

3. The siting of the OGF, after evaluation of alternative sites and consideration of cumulative impacts of the proposed OGF, is ~~the most~~ compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare, the environment and wildlife of the County.

§ 2-02-14-05 (OGF Permit Review Steps)³

~~(3)~~ (4) Evaluation criteria. In determining which sites are likely to have the least off-site impact, ~~and~~ the Community and Economic Development Department ~~may~~ shall consider the following, at a minimum:

- (a) Distance from existing or platted residences, schools, state licensed daycares, high occupancy buildings, active open spaces, environmentally sensitive areas, public drinking water supply areas, or other areas likely to be adversely impacted;
- (b) Traffic impacts and impact to roads, bridges, and other infrastructure;
- (c) Access to water and other operational necessities;
- (d) Whether the site allows for utilization of impact mitigation, such as use of proximate pipelines;
- (e) Noise impacts;
- (f) The impact on the surrounding land;
- (g) The impact on wildlife; ~~and~~
- (h) Impact on nearby environmental resources such as water bodies; ~~and~~;
- (i) Cumulative impacts of each alternative site proposal.

It does not sufficiently protect public health and welfare for an Operator to merely inform the County of its anticipated cumulative impacts. The County must also be able to act upon that information and potentially make a decision to either condition or deny an application based upon those cumulative impacts. The impacts of the same proposed OGF will vary greatly

³ The blue text in this paragraph and hereinafter connote revisions already proposed by County staff. The redline text include LOGIC's suggested revisions.

depending on its location and the County should explicitly state its intent to review (and possibly deny) applications based upon their cumulative impacts.

IV. Alternative Site Analyses Should Not Lead to Approving the “Least Bad” Location

LOGIC greatly appreciates the effort by Adams County to ensure that the operator is submitting multiple distinct potential locations from which the oil and gas resources could potentially be developed. The Alternate Site Analysis requirement is a powerful tool for reducing potential impacts with a proposed site and provides important evaluative criteria for the *relative risks* associated with each location. Yet, we caution that an alternative site analysis leads to the perception that one of the proposed locations is the “safest” and should therefore be approved. In some cases, the safest alternative is the denial of the application. Local governments are fully empowered to deny any application that is not protective of public health and welfare, and local governments are not compelled to approve harmful locations simply because they are the “least bad” of the alternatives. We understand Adams County staff have publicly indicated that an alternate location analysis is not a guarantee of approval, but we urge the inclusion of language within the regulations to clarify that a failure of any alternative site to meet public health and welfare requirements will lead to a denial recommendation. Such clarity is vital to provide transparency to both the residents of Adams County and the regulated community.

Alternate location analysis is also an avenue by which the County can adopt actual substantive protections for Disproportionately Impacted Communities. Identifying these communities and ensuring better communication with them is an important first step, but without substantive protections the regulations fall short of their intended goal. Disproportionately impacted communities are *already disproportionately impacted*. The purpose of identifying these communities must be to prevent further impacts. Informing people that their environmental burden is going to be increased is not enough, even if it is done in someone’s native language.

To address both of these suggestions, we recommend the following redline revisions to § 2-02-14-05 (OGF Permit Review Steps):

(2) Description of potential sites.

...

(b) No potential sites shall be submitted as alternate locations if the proposed site is inside or within 2,500 feet of an identified disproportionately impacted community.

~~(4)~~ (5) Site Selection. The County shall review all proposed locations in order to determine which location(s) best protects public health, safety, welfare, and the environment, and wildlife resources and will choose the location that best satisfies this goal. The Director of Community and Economic Development will determine if any proposed sites meet this goal. If no location satisfies this goal, Operator shall submit three new proposed locations. The County ~~may~~ shall recommend denial of the OGF Permit if it does not believe that any of the

proposed sites meet the siting goal. [Site Selection as part of the Alternative Site Analysis, as outlined above, does not constitute the approval of an OGF application.](#)

V. Provisions Related to Public Health and Welfare Can Improve

LOGIC notes and appreciates several draft improvements to the regulations located in § 4-11-02-03-03-03 (General Provisions), including an increased setback, the imposition of a noise pseudo-setback, and better odor prevention requirements. We believe further refinements to better protect public health and welfare can be made, however. First, LOGIC has consistently advocated across Colorado for a 2,500-foot setback between oil and gas facilities and occupied structures or sensitive areas. We continue to believe the science supports a distance of at least 2,500 feet, including but not limited to these studies:

- **McKenzie et al. (2012)** (Colorado) – air monitoring indicated that living within ½ mile (2,640 feet) of active oil and gas wells was associated with increased risk of respiratory, neurological and reproductive health effects and slightly elevated cancer risk.⁴
- **McKenzie et al. (2014)** (Colorado) – study of 124,842 births found congenital heart and neural tube defects associated with increased density of oil and gas wells within one mile (5,280 feet).⁵
- **Stacy et al. (2015)** (Pennsylvania) – study of 15,451 births found lower birth weight associated with increased oil and gas well density within one mile.⁶
- **Webb, et al. (2016)**— literature review on respiratory risks of unconventional oil and gas development on infants and children found support for adverse respiratory effects at every stage of development. The authors recommended that “at a minimum, one-mile setbacks should be established between drilling facilities and occupied dwellings such as schools, hospitals, and other dwellings where infants and children might spend a substantial amount of time.”⁷

⁴ McKenzie, L. M., Witter, R. Z., Newman, L. S., & Adgate, J. L. (2012). Human health risk assessment of air emissions from development of unconventional natural gas resources. *The Science of the Total Environment*, 424, 79-87. <https://doi.org/10.1016/j.scitotenv.2012.02.018>.

⁵ McKenzie, L. M., Guo, R., Witter, R. Z., Savitz, D. A., Newman, L. S., & Adgate, J. L. (2014). Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado. *Environmental Health Perspectives*, 122(4). <https://doi.org/10.1289/ehp.1306722>.

⁶ Stacy, S. L., Brink, L. L., Larkin, J. C., Sadovsky, Y., Goldstein, B. D., Pitt, B. R., & Talbott, E. O. (2015). Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest Pennsylvania. *PLoS ONE*, 10(6), e0126425. <https://doi.org/10.1371/journal.pone.0126425>.

⁷ Webb, et al., Potential hazards of air pollutant emissions from unconventional oil and natural gas operations on the respiratory health of children and infants, *Review of Environmental Health* (2018).

- **Haley, et al. (2016)**—study concluded that setbacks of up to 1,500 feet in Pennsylvania, Texas and Colorado were not “sufficient to protect public health and safety,” considering blowouts and evacuations, thermal modeling, vapor dispersion and air pollution.⁸
- **Weinberger et al. (2017)** (Pennsylvania) – health assessment records reported sleep disruption, headaches, throat irritation, stress or anxiety, cough, shortness of breath, sinus problems, fatigue, nausea and wheezing within 1 km (3,261 feet) of active well drilling.⁹
- **Whitworth et al. (2017)** (Texas) – study of 158,000 births found significant association between distance and density of oil and gas wells, and preterm birth at ½ mile (2,640 feet) and fetal death at 2 miles (10,560 feet).¹⁰
- **McKenzie et al. (2017)** (Colorado) – study of 87 acute lymphocytic leukemia cases found increased risk among young people (ages 5-24) associated with proximity and density of oil and gas wells within approximately one mile (5,249 feet).¹¹
- **Currie et al. (2017)** (Pennsylvania) – study of 1.1 million births found evidence of low birthweight babies born to mothers within 1 km (3,281 feet) of unconventional oil and gas wells; little evidence of effects observed at 3 km (9,843 feet) and beyond.¹²
- **Hill (2018)** (Pennsylvania) –study of nearly 1.1 million births found increases in low birth weight among babies born to mothers living within 2.5 km (8,202 feet) of oil and gas wells.¹³
- **Whitworth et al. (2018)** (Texas) – Study of nearly 164,000 births found an association between distance and density of wells in the drilling phase within ½ mile (2,640 feet) and preterm births.¹⁴

⁸ Haley, et al. (2016). Adequacy of current state setbacks for directional high-volume hydraulic fracturing in the Marcellus, Barnett, and Niobrara Shale plays. *Environ Health Perspect* 124(9):1323-1333, doi: 10.1289/ehp.1510547.

⁹ Weinberger, B., Greiner, L. H., Walleigh, L., & Brown, D. (2017). Health symptoms in residents living near shale gas activity: A retrospective record review from the Environmental Health Project. *Preventive Medicine Reports*. <https://doi.org/10.1016/j.pmedr.2017.09.002>.

¹⁰ Whitworth, K. W., Marshall, A. K., & Symanski, E. (2017). Maternal residential proximity to unconventional gas development and perinatal outcomes among a diverse urban population in Texas. *PLoS One*; San Francisco, 12(7), e0180966. <http://dx.doi.org/10.1371/journal.pone.0180966>.

¹¹ McKenzie, L. M., Allshouse, W. B., Byers, T. E., Bedrick, E. J., Serdar, B., & Adgate, J. L. (2017). Childhood hematologic cancer and residential proximity to oil and gas development. *PLOS ONE*, 12(2), e0170423. <https://doi.org/10.1371/journal.pone.0170423>.

¹² Currie, J., Greenstone, M., & Meckel, K. (2017). Hydraulic fracturing and infant health: New evidence from Pennsylvania. *Science Advances*, 3(12), e1603021 <https://doi.org/10.1126/sciadv.1603021>.

¹³ Hill, E. L. (2018). Shale gas development and infant health: Evidence from Pennsylvania. *Journal of Health Economics*, 61, 134-150. <https://doi.org/10.1016/j.jhealeco.2018.07.004>.

¹⁴ Whitworth, K. W., Marshall, A. K., & Symanski, E. (2018). Drilling and Production Activity Related to Unconventional Gas Development and Severity of Preterm Birth. *Environmental Health Perspectives*. <https://doi.org/10.1289/EHP2622>.

- **Holder et al. (2019)** (Colorado) – CDPHE study employed emissions data from oil and gas operations in Colorado to estimate exposure to chemicals associated with oil and gas development, such as benzene. Analysis found that emissions from certain stages of development may cause short-term negative health impacts (e.g., headaches; dizziness; respiratory, skin, and eye irritation) from 300 to 2,000 feet away.¹⁵

Second, Adams County can benefit from analyses and processes involved in recently revised rules and regulations from the COGCC, CDPHE, and several local governments. Suggestions related to setback waivers, noise, air emissions, and financial assurances are all substantially similar to those adopted in at least one other jurisdiction. All of the below suggestions will help Adams County adopt more protective regulations than currently proposed.

§ 4-11-02-03-03 (General Provisions)

4. Setbacks: Oil and Gas Facilities shall be at least 2,500 ~~2,000~~ ~~1,000~~ feet from the property line of any existing or undeveloped residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, ~~and~~ environmentally sensitive areas, and designated parks and open spaces. Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

a. ~~Administrative~~ Waiver from Setback Requirements: ~~an administrative~~ waiver may be obtained from the setback requirements if the Operator receives a written waiver with informed consent from each ~~primary-adult~~ resident and property owner located within the setback. The written waiver(s) with informed consent shall be included with the setback waiver request submitted to the County.

a.b. ~~No Administrative~~ Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.

c. A setback waiver request shall be considered by the Board of County Commissioners and approved or denied based upon its consistency with public health, safety, welfare, the environment and wildlife resources.

7. Safety Standards:

a. Operator shall implement a safety management plan and maintain a safety management system applicable to all covered processes. Upstream facilities consisting of a standard, repeatable design may be covered with a single safety management plan. The safety management system shall provide for employees and systems to oversee implementation and periodic revision of the plan. The plan shall include the following elements and describe the manner in which each of the following elements will be applied to the covered processes

...

¹⁵ Published at https://drive.google.com/file/d/1pO41DJMXw9sD1NjR_OKyBJP5NCb-AO0I/view. The study “did not rule out the possibility of health impacts at greater distances.”

iii. Employee participation. Plan for ensuring employee and contractor or subcontractor participation in conduct and development of process hazards analysis and access to process hazards analysis;

iv. Training. Written procedures detailing initial and refresher employee and contractor or subcontractor training requirements and documentation of employee training;

c. Incident and accident reporting.

i. Incidents. As soon as practicable, but no more than Within a week three (3) days of any reportable safety event or emergency situation as defined by the COGCC, Operator shall submit a report to the County including the following, to the extent available...

vi. The County will notify the public of all incident reports disclosed by the Operator under this section by publishing the reports on its website.

14. Noise. The Operator shall control noise levels as follows.

c. The Operator ~~must~~ shall follow COGCC Regulations for noise level; however, the County may impose a noise limit of 40 dBA for any operations conducted in a residential area between 10:00 p.m. and 7:00 a.m.

f.g. All noise studies and assessments required by the County shall be completed by a qualified third party county approved sound professional.

15. Air emissions.

a. Air quality action days. Operator shall respond to air quality action day advisories posted by the CDPHE for the front range area by implementing suggested air emission reduction measures ~~as feasible~~ unless technically infeasible. Emissions reduction measures shall be implemented for the duration of an air quality action day advisory and may include measures such as...

(f)(iii) No flaring or venting other than if necessary for safety or during an emergency

(g)(i). Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during all phases of development, including the drilling, completion, and production, and operation, phases of development. The plan may include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5), BTEX, Hydrogen

Sulfide, Carbon Monoxide (CO), and Carbon Dioxide (CO2). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall ~~be able to~~ alert the operator and County of increases in monitored air pollutant concentrations.

22. Transportation and Traffic

a. General: Oil and gas operations shall minimize impacts to the physical infrastructure of the County transportation system and may be subject to vehicle daily or hourly caps as a condition of any OGF approval.

~~28~~ 33. Financial Assurance.

a. Operators shall be required to maintain environmental liability insurance to cover gradual pollution events.

b. Operator shall be required to file and maintain financial assurance equal to at least \$100,000 per well, with any greater amount as determined on a site-specific basis prior to commencing operations, and thereafter during the active life of the facility. In order to assist the County in setting a final financial assurance, the Operator shall disclose information related to the Operator's financial fitness to undertake the proposed oil and gas operations, including materials (audited, where appropriate) such as the following:

- a. Balance sheets for the previous 5 fiscal years;
- b. Operating cash flow statements for the previous 5 fiscal years;
- c. List of long- and short-term debt obligations;
- d. List of undercapitalized liabilities;
- e. Statements necessary to calculate net profit margin, debt ratio, and instant or current solvency ratio;
- f. Certified copies of all current financial assurances filed with the COGCC; and
- g. Tax returns for the prior 5 years.

The operator shall post and maintain a performance bond or other approved financial instrument with Adams County. Should any corrective actions be required by the County in order to protect the health, safety, welfare, and the environment which result from failure of the operator to follow any regulations, standards, or conditions of approval, the performance bond shall be forfeited in an amount sufficient to defray the expense of said actions, including staff time expended by Adams County involved in such corrective actions.

VI. Effective Enforcement is Necessary

Perhaps the greatest frustration from impacted residents involves inaction on complaints they file about nearby oil and gas operations with the COGCC, CDPHE, or local governments. A typical story involves the resident filing a complaint with the COGCC and their local government about loud noises from a wellsite that kept them awake throughout the night. The COGCC may send an inspector a day or two later, but the inspector hears nothing unusual at that time and dismisses the complaint. Someone from the local government may arrive sooner than the COGCC inspector, but the local official does nothing because he believes his “hands are tied.” The Operator claims it is following regulations, and has moved beyond fracking and completions well into production by the time the state or local government pushes through new rules to address the problems plaguing impacted communities.

Enforcement mechanisms are useless unless they have real teeth. LOGIC suggests the following revisions to the County’s inspection and enforcement rules to make them more effective:

§ 4-11-02-03-03-04 (Inspection and Enforcement)

1. Inspection: In recognition of the potential impacts associated with oil and gas facilities, all wells and accessory equipment and structures may be examined by the inspectors of the County at reasonable times to determine compliance with applicable provisions of this chapter, the International Fire Code, the International Building Code, and all other applicable standards in these Regulations. The County reserves the right in its discretion to make spot inspections or to inspect without notice in the event of an issue potentially involving an ~~immediate~~ risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another. For the purpose of implementing and enforcing the provisions of this chapter, the inspector and other authorized personnel have the right to enter upon private property. The County ~~may will~~ use the information collected on the inspections to enforce the requirements of this chapter. The County will report information regarding alleged violations of state and federal rules to the appropriate state and federal officials, and may also report any other inspection information to appropriate state and federal officials. may also report this information to appropriate state and federal officials, including but not limited to information regarding alleged violations of state and federal rules. Operator shall make available to County, upon request, all records required to be maintained by these regulations or to show compliance with these regulations, and the rules and regulations promulgated by the COGCC and the CDPHE, including permits, Air Pollutant Emission Notices (APENs) and other documents required to be maintained by the COGCC, CDPHE and these regulations. The County ~~will shall~~ charge a yearly inspection fee for all Oil and Gas Facilities in the County. Fees for Oil and Gas Facility inspections shall be assessed according to the County’s adopted fee schedule.

2. State Notification of Violations: Adams County will cooperate fully with the State of Colorado by notifying the Oil and Gas Conservation Commission and/or the Department of Public Health and Environment of any and all violations of the Colorado Laws and Regulations.

4. Penalties and Fines: The County has authority under C.R.S. § 29-20-104, as amended, to impose fines for leaks, spills, and emissions. Each violation and each day during which such a violation occurs shall be deemed a separate offense. The following table summarizes the fine schedule for violations of these Development Standards and Regulations:

...

65. County Violations: In addition to the fines outlined above, the County has authority to cite violations under its control pursuant to Section 1-05-06 Criminal Remedies and Enforcement.

6. Resident information: Audio, video, testimonial, or any other relevant evidence regarding a possible violation of the provisions of these Regulations gathered by a resident shall be accepted and considered by the County. A resident may request and receive a hearing with the Board of County Commissioners if public health, safety, welfare, environmental, or wildlife impacts persist after reporting those impacts to the County.

7. Legal Non-conforming: Adams County recognizes that there are oil and gas operations that were legally established prior to the effective date of these regulations that may or may not conform to these regulations. These operations may continue, provided the facility is not substantially modified.

VII. Reverse Setbacks Should Be Strengthened

While setbacks of new oil and gas facilities from existing development receives considerable public attention and consideration, “reverse” or “reciprocal” setbacks between existing oil and gas facilities and forthcoming development are just as important. A family living in a home five hundred feet away from an OGF is no less affected if that home was built before or after the OGF. Accordingly, the same principles of public health and welfare as discussed with setbacks, Section IV *supra*, should apply when considering reverse setbacks, especially during the construction and early production phases of the OGF’s operation.

§ 4-11-02-03-03-05 (Residential Construction Standards) currently allows the Director of Community and Economic Development to impose a 250-foot buffer between an existing oil and gas facility and buildings on platted or unplatted land. This is simply not sufficient, and certainly does not account for circumstances we see occurring more often along the Front Range: permits for large OGFs granted but the facility is not actually constructed until after new homes have been built abutting the OGF area. It also does not account for the impacts from maintenance, routine or otherwise, which may be severe and relatively frequent. Families in these homes, many of whom moved there with no knowledge of the impending oil and gas operation, suffer the same health and quality of life effects as if the OGF was permitted and constructed after their move.

In order to equally protect the health and welfare of every person who may live or work close to an OGF, LOGIC proposes a sliding scale system for reverse setbacks that accounts for the different phases of an OGF's operation. With permitted but not yet constructed facilities, those under construction, pre-production, and the first year of production, the reverse setback should equal the normal setback (i.e. 2,500 feet as recommended by LOGIC or 2,000 feet as currently recommended by County staff). These phases are when the health and welfare of nearby individuals are affected the most. After the first year of production, the reverse setback could be reduced if a relative reduction of OGF impacts can be shown to the satisfaction of the County. Finally, the reverse setback distance could be reduced again, but should be no less than three hundred feet, once each well on a site is plugged and abandoned. The three hundred foot minimum should remain in place indefinitely given the possibility of improper plugging or subsequent unanticipated disturbance of the site in the future.

In conclusion, LOGIC wishes to thank you very much for reviewing this letter. As always, we remain available to answer questions or further discuss specifics of its proposals.

Sincerely,

Sara Loflin
Director

Andrew Forkes-Gudmundson
Deputy Director

Michael Foote
Legal Counsel

June 9, 2021

FOR DELIVERY BY ELECTRONIC MAIL

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Mr. Greg Dean

Oil and Gas Liaison

Adams County

4430 S. Adams County Parkway

Brighton, CO 80601



Re: American Petroleum Institute Colorado's Comments Respecting Adams County Proposed Amendments to Oil and Gas Regulations

Dear Mr. Dean:

American Petroleum Institute Colorado (API Colorado) is pleased to provide these comments respecting the second draft of proposed amendments to Adams County's oil and gas regulations. API Colorado is a division of the American Petroleum Institute, which represents more than 600 members in all facets of the oil and gas industry, including but not limited to oil and gas exploration, supplying, production, refining, marketing, and transportation. We very much appreciate this opportunity to participate in the County's stakeholder process.

Our comments and suggested changes are outlined below and are arranged by chapter. In addition to these comments, attached please also find two documents in which API Colorado has provided marginal comments in redline that highlight our concerns and suggestions for Chapters 2 and 4 of the second draft of proposed regulations. We hope these documents will assist you in reviewing and considering our comments.

Chapter 2 – Application and Permitting Procedures

1. In the Purpose statement at 2-02-14-01, the May 2021 draft has been expanded to include coverage of "operation" and "abandonment" of oil and gas facilities. While API Colorado acknowledges the County's interest in issues associated with the life of the well, we also note that regulation of downhole activities such as well abandonment fall within the exclusive purview of the Colorado Oil and Gas Conservation Commission.
2. Section 2-02-14-05 outlines the Oil and Gas Facility Permit Review Steps but it omits any reference to the Oil and Gas Conservation Commission Rule 301.f that provides for consultation and coordination on permitting, including conduct of alternative location analyses. API Colorado encourages the Board to consider adding an explicit reference to Rule 301.f within the Board's rules. The consultation provision has the potential to reduce duplicative and sometimes inconsistent analyses as well as the potential for enhancing efficiencies at both the County and state level.
3. The same section refers to the "edge of maximum disturbance." In our initial comments we requested that the Board provide a definition, or at least greater clarity about this term's meaning. We reiterate that request here.
4. API Colorado understands the Board's desire to ensure that disproportionately impacted communities receive particularized notice of proposed oil and gas operations (proposed 2-02-14-05(2)) and potentially separate neighborhood meetings.. In addition, proposed 2-14-05(7) requires notice to all property owners and current residents within one (1) mile of the site where an oil and gas facility could be located.



We are concerned that requiring that notice of a neighborhood meeting be extended to all such communities within one (1) mile of the proposed site sweeps too broadly. The Oil and Gas Conservation Commission (Rule 303.e.1.B) requires notice to all surface owners, building unit owners, and residents within 2,000 feet of a working pad surface. A radius of 2,000 feet will likely capture all those with an interest in a site while a radius of one mile is equally likely to capture individuals with little or no interest in an application. Moreover, expanding notice and public hearing requirements to those within a mile will be logistically challenging and burdensome. API Colorado urges the Board to reconsider this requirement and to limit notice and public hearing requirements to those within 2,000 feet or, at most, one-half mile.

5. Proposed 2-14-05(10) would require that an entirely new permit be filed if the three-year term for completing a well at a site has lapsed. The current provision provides that the permit would have to be renewed. We recognize that circumstances and facts on the ground may change over the course of three years and that the County may need to revisit permit conditions upon passage of three years. Conversely, it also is possible that circumstances will be largely unchanged after the three-year term lapses and that completion of an entirely new permit application would be economically wasteful. API Colorado suggests that the Board consider language that requires renewal, and where appropriate a new permit, upon lapse of the primary term, at the discretion of the staff.

Chapter 4 – Design Requirements and Performance Standards

1. In the General Provisions section, (4-11-02-03-03-03 (4)) there is a reference to measuring setbacks from the “edge of maximum disturbance,” which includes the rough grading footprint and the final landscaping boundary. As noted above, API Colorado encourages the County to provide greater definition around the use of the term. It is especially confusing since the final landscaping boundary may not be fully known until the well or wells have been drilled and completed and production has commenced. For example, does the term correspond to either Well Site, working pad surface, or Oil and Gas Facility as defined by the Oil and Gas Conservation Commission? We believe that defining this term at the outset will avoid confusion in planning and permitting.
2. The same section seems to suggest that even if an operator receives a written waiver from each primary resident and property owner located within a setback, the staff still will evaluate whether an administrative waiver shall issue. We question whether it makes sense to establish additional hurdles to obtaining a waiver even in situations where every property owner and resident has signed an informed consent. Just as important, if the County insists on retaining discretion to deny an administrative waiver in such a circumstance the County should provide greater guidance on how such a request will be considered. The current draft refers only to “criteria including, but not limited to, the number of receptors, location, nature and size of the facility.” Fair process requires that the County provide clear direction to applicants about how and when an administrative waiver will, or will not, be granted.
3. Also, in the same section related to setbacks, this draft sets out a set of criteria for determining “substantially equivalent protections.” API Colorado is very concerned that the criteria proposed here differ markedly from the criteria established for essentially the same purpose by the Oil and Gas Conservation Commission. As a result, an applicant would have to develop two different demonstrations of “substantial equivalence” addressing what is essentially the same issue. Similarly, the use of two different set of criteria creates the real potential that the County and the Oil and Gas Conservation Commission could reach different conclusions. API Colorado urges the



County to either rely upon the criteria developed and adopted by the Oil and Gas Conservation Commission or to develop a clear and express process for coordination and consultation with the Commission in such circumstances.

4. Subsection 7(c)(vi) provides that an operator may be required to obtain additional permits from the County for site remediation in the event of a spill. API Colorado is concerned that imposing such a requirement on an operator that is responding to a spill could cause delay in the response, thereby exacerbating impacts to the environment and public health, and complicating a cleanup.

Moreover, requiring an operator to seek and obtain additional permits prior to conducting a remedial cleanup may conflict with the Oil and Gas Conservation Commission's spill response regulations. For example, Rule 912.a directs operators to control and contain certain spills and releases immediately upon discovery. Similarly, operators must timely file Forms 19 and 27 with the Commission laying out in some detail the measures they are taking, and plan to take, to respond to a spill or release. Common sense suggests that requiring operators to secure permits that are incidental to conducting a cleanup would be problematic.

5. Subsection 13.c, related to well plugging and abandonment, is of particular concern to us. This subsection would require the operator or contractor to provide notice to all property owners and current residents within one-half mile of a well or well site of plans to plug and abandon a well. That notice would have to occur at least seven days in advance of the operation.

This provision is of concern for a number of reasons. First, the Oil and Gas Conservation Commission has in place rules to avoid or minimize any adverse environmental impacts associated with plugging and abandoning a well. We question the need for a notice requirement such as this. Second, operators are literally plugging and abandoning thousands of wells annually, yielding a significant environmental benefit to local communities and the state. Imposing a notice requirement such as this will have the effect of delaying and complicating those operations and inflating plugging and abandonment costs for little, if anything, in the way of benefit. Third, workover rig schedules are often adjusted in the field to reflect changes in scheduling; imposing a notice requirement in Adams County could well divert workover rigs to sites outside Adams County when external events force a change in scheduling. Finally, this regulation may have the effect of redirecting capital for plugging and abandoning wells to other counties that do not impose notice requirements such as this. API Colorado strongly urges the County to eliminate this proposed provision.

6. Adams County (a) would require continuous noise monitoring for facilities within one-half mile (or greater) from the property line of any existing residences, high occupancy building units, and other structures but (b) requires compliance with lower maximum noise levels in COGCC rules for facilities within 2,000 feet of a land use of zoning designation. To the best of our knowledge the County has not supplied any expert evidence on the need for regulations more stringent than the state rules, especially where existing background noise conditions need to be accounted for.. Conversely, during the Oil and Gas Conservation Commission's mission change rulemaking, substantial evidence was presented on noise levels. We question whether the County has established an administrative record showing that these rules are necessary and reasonable.
7. It appears that Adams County's rules require that any leak identified through Leak Detection and Repair (LDAR) be reported to the County within 24 hours. In addition, Adams County also requires repairs within 72 hours. API Colorado believes these provisions require further consideration. The regulations do not distinguish between very



small leaks that can be observed using Method 21, for example, and much larger leaks. An LDAR inspection using either optical gas imaging or Method 21 conceivably could identify multiple very small leaks that pose no immediate risk to public health or the environment. We question the feasibility and need for immediate reporting of every leak regardless of its size or location. We also do not believe the County has established a need to conduct repairs in 72 hours rather than the period specified by EPA's NSPS OOOOa regulations and the Air Quality Control Commission's regulations. Again, we believe the County needs to demonstrate that these requirements are necessary and reasonable.

8. We also note that the proposal would require periodic community meetings for oil and gas facilities located within one mile of existing residences, platted development, high occupancy building units, schools, or childcare centers, with notice to all within one mile. We have two concerns with this proposed requirement. First, the County has not provided an explanation for requiring notice to all those within one mile of the working site as opposed to those within 2,000 feet. Moreover, we note that at many phases of a well's life, there will be nothing new to report to residents and others. Under those circumstances, a community meeting may be unnecessary and even counterproductive.
9. It appears the County's proposal on cumulative impacts is similar to the COGCC requirements for a cumulative impacts analysis. We are pleased the Adams County proposal would allow an operator to submit substantially equivalent "plans" for addressing and evaluating cumulative impacts. We support allowing the cumulative impacts analysis required by the Oil and Gas Conservation Commission to be used to satisfy the County's regulations. The cumulative impacts analysis prepared for the Commission likely will be at least as comprehensive and detailed as any the County appears to require.
10. The County's proposal on groundwater sampling differs in several material respects from the Oil and Gas Conservation Commission's requirements for groundwater sampling. As a result, an operator will have to conduct sampling under two different protocols, yet it is unclear what additional benefit the County's requirements would provide over and above those required by state rule. We urge the County to clarify why its regulations would differ from the state rules.

Appendix A: Oil and Gas Facility Permit (OGF) -- Guide to Development Application Submittal

1. Under the heading of General Format, the Guide states the County does not guarantee confidentiality of documents. API Colorado notes that COGCC Rule 223.b lists the kind of information that may qualify as confidential information. Rule 223.a sets out how the Oil and Gas Conservation Commission will treat confidential information: it may either be redacted or omitted altogether. We believe that confidential information, including confidential business information, must be treated as confidential by the County, just as it is by the Oil and Gas Conservation Commission.
2. The community outreach changes being considered by the County would require identification of disproportionately impacted communities within one mile (or greater) of a proposed site. As noted above, API Colorado has significant questions about requiring identification of communities so far removed from a site. Instead, we suggest that the County use the Oil and Gas Conservation Commission rules as a template.
3. Also, as noted above, API Colorado believes that because the County's proposed criteria for identifying



substantially equivalent protections differs significantly from the Oil and Gas Conservation Commission's process and criteria for identifying substantially equivalent protections, there is a danger that the County and the Commission will reach different conclusions about the same site. We urge the County to either use the Commission rules as a template or to establish explicit processes for coordinating with the Commission in instances where a site is proposed within a setback.

Once again, we appreciate the opportunity to comment on this latest version of proposed regulations. Please do not hesitate to contact me if you have any questions concerning this matter.

Respectfully,

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Attachments

CHAPTER 4—DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

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Chapter 4—DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

4-01 DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

These regulations are applicable to all zone districts, including new and established districts, except as otherwise noted. In addition to compliance with other regulations imposed by these standards and regulations, all uses, structures, buildings, and accessory uses shall comply with the design requirements and performance standards required by this Chapter. Where a design requirement or performance standard for a specific use conflicts with a general design requirement or performance standard, the design requirement or performance standard for the specific use shall control. Where any design requirement or performance standard conflicts with another design requirement or performance standard, the more restrictive design requirement or performance standard shall control. Wherever residential use of adjacent property is related to restrictions or certain non-residential uses, determination of residential use shall be based on the classification of land by the County Assessor. All Variance requests are subject to Section 2-02-19 of the Adams County Standards and Regulations, excluding Sexually Oriented Businesses, Marijuana Businesses and halfway Houses.¹ These regulations shall be subject to limitation regarding the number of marijuana businesses and/or the type of businesses as set forth by the BOD in resolution.

- closure plan, and to effect remedial measures if environmental damage is found to be taking place.
- d. *Traffic Control Plan*: Provisions of the approved traffic control plan shall be followed.
 - e. *Appearance*: All sites shall maintain a clean, neat, and orderly appearance. Litter, dust, and odors may not leave the boundaries of the site.
 - f. *Vehicle Parking*: Transfer vehicles may not be parked on public streets.
 - g. *Vector Controls*: All sites shall maintain vector controls as prescribed by the approved plan.
 - h. *CDPHE Regulations*: Colorado Department of Public Health and Environment Regulations 6CCR 1007-2, Section 14 are hereby incorporated in these Zoning Regulations.
6. *Infectious Waste Disposal Site and/or Processing Facility Standards* (required in addition to General Standards)
- a. *Radiation Monitoring Program*: The operator shall operate a radiation monitoring program in accordance with an approved plan.
 - b. *General Monitoring Program*: The general monitoring program, approved by the County for each infectious waste disposal and/or processing facility, shall be adhered to.
 - c. *Temperature Operating Charts*: Temperature operating charts from an infectious waste disposal and/or processing facility shall be retained for two (2) years for review by the Director of Community and Economic Development. The County may require additional monitoring if a facility has problems maintaining a temperature or other operational standard.
 - d. *Truck Washing*: All trucks shall be washed at least once a week with a detergent and disinfectant to minimize nuisance conditions, unless spills or leaks are detected which must be disinfected immediately. All wash water shall be properly controlled to prevent runoff.
 - e. *Waste Incineration*: Infectious waste incineration facilities shall be permitted to burn infectious waste only. Incineration of wastepaper, contraband, or other materials is not permitted unless specifically approved as part of the wastestream.
7. *Hazardous Waste Disposal Site and Facility Standards*: All hazardous waste disposal sites and facilities shall meet the standards established by State and Federal regulatory requirements.

4-11-02-03-03

OIL AND GAS FACILITY

4-11-02-03-03-01

Purpose

This Section is enacted to protect and promote the health, safety, values, convenience, order, prosperity and general welfare of the current and future residents of the County. It is the County's intent by enacting this Section to

facilitate the development of oil and gas resources within the unincorporated area of the County while avoiding or mitigating potential land use conflicts between such development and existing, as well as planned, land uses. It is recognized that under state law the surface and mineral estates are separate and distinct interests in land and that one may be severed from the other. Owners of subsurface mineral interests have certain legal rights and privileges, including the right to use that part of the surface estate reasonably required to extract and develop their subsurface mineral interests from a consenting surface owner, subject to compliance with the provisions of this Section and any other applicable statutory and regulatory requirements. Similarly, owners of the surface estate have certain legal rights and privileges, including the right to have the mineral estate developed in a reasonable manner and to have adverse impacts upon their property, associated with the development of the mineral estate, avoided or mitigated through compliance with this Section.

4-11-02-03-02

Definitions

Oil and Gas Facility means an oil and gas facility as defined by the rules ~~and regulations~~ and regulations of the Colorado Oil and Gas Conservation Commission ("COGCC"). For any other definition not listed in this section, the definitions listed in Chapter 11 of the Adams County Development Standards and Regulations and the COGCC's regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the COGCC's definitions, the COGCC's definitions shall prevail. If the term is not found in the COGCC's definitions or in Chapter 11, the term shall have its common meaning along with the spirit and intent of the Development Standards and Regulations and may be subject to interpretation by the Director of Community and Economic Development or his or her designee.

Commented [GD1]: Added May 2021, formatting change only

~~For any other definition not listed in this section, the definitions listed in Chapter 11 of the Adams County Development Standards and Regulations and the COGCC's regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the COGCC's definitions, the COGCC's definitions shall prevail. If the term is not found in the COGCC's definitions or in Chapter 11, the term shall have its common meaning along with the spirit and intent of the Development Standards and Regulations and may be subject to interpretation by the Director of Community and Economic Development or his or her designee.~~

4-11-02-03-03

General Provisions

1. Access: Oil and gas well installation shall be located to provide convenient access, shall accommodate the traffic and equipment related to the oil and gas operations and emergency vehicles, and shall conform to ~~comply with~~ COGCC rules and Adams County Development Standards and Regulations.

Oil and gas operations ~~shall~~ must avoid or minimize impacts to the physical infrastructure of the county transportation system.

~~1.2.~~ Signage: A sign with the 24-hour, 7-days per week contact information shall be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way. Signage shall conform to COGCC regulations for signage and posting.

~~2.3.~~ Building Permit Required: For all new or substantially modified wells, a building permit is required for the installation of permanent electrical, pumps, tank batteries, and all other above-ground structures as well as any other applicable permits including but not limited to, culvert permits, oversized-load permits, and flaring in use permit.

~~3.4.~~ Setbacks: Oil and Gas Facilities shall be at least 2,000 1,000 feet from the property line of any existing residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, and environmentally sensitive areas, and designated parks and open spaces. Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

a. Setbacks will be measured from the edge of maximum disturbance which includes the rough grading footprint of the Oil and Gas Facility, including the final landscaping boundary. The measurement of setbacks will not include the access road.

Commented [GD2]: Added in May 2021 draft

b. Administrative Waiver from Setback Requirements: an administrative waiver may be obtained from the setback requirements if the Operator receives a written waiver from each primary resident and property owner located within the setback. Staff will evaluate the granting of an Administrative Waiver from setback requirements based on criteria including, but not limited to: the number of receptors, location, nature, and size of the facility.

Commented [GD3]: Added in May 2021 draft

c. Administrative Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.

d. For Oil and Gas Facilities that do not meet the above setback requirements: A waiver may be granted by the Board of County Commissioners after a public hearing if the Oil and Gas Facility is deemed to provide substantially equivalent protections to public health, safety, welfare, the environment, and wildlife resources that are equal to or more effective to satisfy the criteria of approval. The criteria for determining substantially equivalent protections may include, but are not limited to:

Commented [GD4]: Added in May 2021 draft

i. The location of receptors and proximity of those receptors;

- ii. The location, nature, and size of the facility;
- iii. The duration and intensity of all phases of operation at the Oil and Gas Facility;
- iv. The extent to which the Oil and Gas Facility design, any planned best management practices, best available control measures and technologies, and conditions of approval avoid, minimize, and mitigate adverse impacts;
- v. The extent to which the Oil and Gas Facility is compatible with the surrounding area, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County;
- vi. The level of consent or waivers obtained from primary resident(s), landowners, or applicable Public Water System(s) located within the setback and;
- vii. The extent to which the Oil and Gas Facility will minimize, avoid, mitigate, and offset cumulative impacts.

4.5. Fees and Permits: All applicable County fees adopted by the County, including postage fees and inspection fees, must be paid at time of application and prior to issuance of building permit, including for all applicable permits required by the Adams County Development Standards and Regulations.

5.6. Oil and Gas Road Impact and Maintenance Fees:

- a. Operators ~~shall~~ pay oil and gas road impact and maintenance fees, as approved by the Board of County Commissioners, for all proposed oil and gas wells and pads. This fee shall be paid at the time of issuance of an Oil and Gas Facilities Permit or at the time of issuance of a building permit, and prior to the commencement of any ground disturbing activities. Any person or entity required to pay the oil and gas road impact fee may elect to submit an independent study and fee calculation to demonstrate that the nature, timing, or location of the proposed oil and gas development is likely to generate impacts costing less to mitigate than the amount of the fee that would be generated by the use of the fee schedule. Any independent fee study for oil and gas development shall generally follow the methodology established in the Adams County Oil & Gas Traffic Impact Study.

- i. The preparation of the independent fee calculation study shall be the sole responsibility of the electing party.
- ii. Any person or entity who requests to perform an independent fee calculation study shall pay an

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application fee for administrative review. An administrative decision related to the independent study may be appealed to the Board of County Commissioners. The appeal shall be filed within 14 days of staff decision and shall follow the appeal process established for OGF Permit Waivers.

6.7. Safety Standards:

- a. Operator shall implement a safety management plan and maintain a safety management system applicable to all covered processes. Upstream facilities consisting of standard, repeatable design may be covered with a single safety management plan. The safety management system shall provide resources and systems to oversee implementation and periodic revision of the plan. The plan shall include the following elements and describe the manner in which each of the following elements will be applied to the covered processes:
 - i. Process safety information. Compilation of written process safety information needed to conduct process hazard analysis. Process safety information shall include information pertaining to hazards of substances and chemicals used by the process, information pertaining to the technology of the process, information pertaining to the equipment used in the process, and information pertaining to the hazards of the substances or chemicals in the process. Documentation that equipment used in the process complies with recognized and generally accepted good engineering practices;
 - ii. Operating procedures. Written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information, and at least annual review of operating procedures to ensure they reflect current operating practices;
 - iii. Employee participation. Plan for ensuring employee participation in conduct and development of process hazards analysis and access to process hazards analysis;
 - iv. Training. Written procedures detailing initial and refresher employee training requirements and documentation of employee training;
 - v. Mechanical integrity. Written procedures designed to maintain the on-going integrity of process equipment, ensure employees involved in maintenance are properly trained to ensure the ongoing integrity of process equipment, ensure that process equipment is tested and inspected in accordance with

- manufacturer specifications, correct deficiencies in equipment in a safe and timely manner, and ensure that new equipment is installed or constructed properly;
- vi. Management of change. Written procedures to manage changes to covered processes, technologies, equipment and procedures;
 - vii. Pre-startup reviews. Written procedures regarding pre-startup safety reviews;
 - viii. Compliance audits. Written procedures requiring an audit every five years to verify compliance with the procedures and practices developed under the safety management plan, and procedures requiring correction of any deficiencies identified in audit; operator will make results of audit available to inspector upon request;
 - ix. Incident investigation. Written procedures requiring investigations of all near-misses and incidents, including root cause analysis of all incidents resulting in fatalities or serious environmental harm, establishing a system to promptly address and resolve the incident, and requiring that all employees and contractors whose job tasks are relevant to the investigation of the near miss or incident review the investigation report.
 - x. Hot work. The facility shall ensure that all hot work complies with local and state fire prevention and protection requirements.
 - xi. Contractors. Written procedures describing how operator screens, oversees, shares process safety and emergency response and preparedness information with contractors;
 - xii. Process hazard analysis. Process hazard analysis for each covered process;
 - xiii. Incident history. List of all reportable safety events as defined by the COGCC rules and regulations that have occurred at the operator's facilities within the last five years, along with any investigation reports, root cause analysis and operational or process changes that resulted from the investigation of the accident;
 - xiv. Safety culture assessment. Written procedures requiring operator periodically review safety culture, and at a minimum conduct such review after each major accident; and
 - xv. Inherently safer systems analysis. Require analysis at least every five years, whenever a change is proposed at the facility that could result in an incident, after an incident if recommended by the investigation report or root cause analysis, and during the design of new processes, equipment or facilities.

- xvi. Operator shall make available the safety management plan to Adams County at the County's request. Adams County may retain outside consultants to review safety management plan and may request modifications to safety management plan based on its review. Operator ~~shall must~~ reimburse County for any costs associated with retaining outside consultants.
- b. Automatic safety protective systems and surface safety valves. Operator is required to install automated safety system prior to commencement of production. Automated safety system shall include the installation, monitoring and remote control of a surface safety valve or a wellhead master control valve and shall be able to remotely shut in wells on demand. Surface safety valve or a wellhead master control valve shall be equipped to operate remotely via the automated safety protective system. Operator shall test ~~the~~ automated safety system ~~quarterly~~ ~~to~~ ~~quarterly~~ to ensure functionality and provide results of testing to County ~~quarterly~~ within 14 days of each testing.
- c. Incident and accident reporting.
- i. Incidents. ~~As soon as practicable, but no more than~~ Within a week three (3) days of any reportable safety event ~~or emergency situation~~ as defined by the COGCC, ~~Operator~~ shall submit a report to the County including the following, to the extent available:
- ~~(a)~~ Fuel source, location, proximity to residences and other occupied buildings, cause, duration, intensity, volume, specifics and degree of damage to properties, if any beyond the facility, injuries to persons, emergency response, impacts, if any, to public health, safety, welfare, the environment or wildlife resources, and remedial and preventative measures to be taken within a specified amount of time.
- ~~(b)~~ If public health, safety, welfare, the environment or wildlife resources are threatened, the Operator responsible for the operation causing the threat shall immediately notify the County's Local Government Designee ("LGD") electronically and orally.
- ii. County may require operator to conduct root cause analysis of any incidents or Grade 1 gas leaks, as defined by the COGCC.
- iii. Operator shall keep a daily incident log that shall be made available to Adams County upon request. Any spill or release that is reportable to the COGCC shall be simultaneously reported to the County's LGD and applicable fire district.

- iv. The Operator shall notify ~~Notification to~~ the County's LGD within 24 hours of discovery of all spills of one barrel or more that leaves the facility or released outside of berms or secondary containment, all spills of any material or volume on permeable ground at the facility that has a reportable spill quantity under any law, all spills or releases required to be reported by COGCC regulations, and copies of any self-reporting submissions that operator provides to the COGCC.
- v. Notification of the surface owner or the surface owner's tenant, and the water rights holder if applicable, of spills and releases in conformance with COGCC Rules.

v.i. The Operator may be required to obtain additional permits from the County, such as an inert fill or access permits, for site remediation as defined in Chapter 4 of the Adams County Development Standards and Regulations

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d. Worker Training and Records

- i. Workers at an OGF shall have nationally recognized certifications for the work they are performing. This includes, but is not limited to, Hazard Communications Training, Hazardous Waste Operations Certifications, heavy equipment operator training, and welding certifications per API 1104 and/or ASME Section 9.
- ii. All workers at an OGF shall have completed a nationally recognized occupational safety and health training program.
- iii. Upon request from the County, the Operator shall supply the County written procedures detailing employee training requirements and training records.

7.8 Spill Prevention and Containment. Oil and gas operations shall be in compliance with COGCC safety and spill and release requirements.

- a. Requirements to minimize and prevent liquid spills and releases include the following:
 - i. Berms or other secondary containment devices around crude oil, condensate, and produced water storage tanks enclosing an area sufficient to contain and provide secondary containment for 150-110% of the largest single tank.
 - ii. Berms or other secondary containment devices shall be sufficiently impervious to contain any spilled or released material.
 - iii. Inspection of all berms and containment devices at regular intervals, but not less than monthly. Berms shall be inspected within forty-eight (48) hours of a precipitation event of 1.0" or more, and Operator shall make necessary repairs as soon as

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possible, but not more than seventy-two (72) hours after the event.

- iv. Maintain all berms and containment devices to ensure they are in good condition.
- v. A prohibition on the storage or use of ignition sources inside the secondary containment area unless the containment area encloses a fired pressure vessel.
- vi. Construction of containment berms using steel rings, designed and installed to prevent leakage and resist degradation from erosion or routine operation.
- vii. Construction of secondary containment areas with a synthetic or engineered liner that contains all primary containment vessels and flowlines and is mechanically connected to the steel ring to prevent leakage.
- viii. For locations within 500 feet and upgradient of a surface water body or ground water source, tertiary containment, such as an earthen berm, around oil and gas facilities. Alternatively, the County may require Operator to install retention ponds for stormwater management.

Discharge valves shall be secured, inaccessible to the public and located within the secondary containment area. Open-ended discharge valves shall be placed within the interior of the tank secondary containment.

- b. Anchoring. Anchoring required within floodplain or geological hazard areas, as needed to resist flotation, collapse, lateral movement, sinking, or subsidence, and in compliance with Federal Emergency Management Agency (FEMA). All guy line anchors left buried for future use shall be identified by a marker of bright color not less than four feet in height and not greater than one (1) foot east of the guy line anchor.

8.9. Chemical Handling and Requirements

- a. The owner or operator of any installation that is required to prepare or have available a safety data sheet for a hazardous chemical under the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 et seq., and regulations promulgated under that Act, shall submit both a safety data sheet (SDS) for each such chemical and an annual emergency and hazardous chemical inventory form to the Local Emergency Planning Commission (LEPC) and the local fire district. A comprehensive and universal listing of all hazardous chemicals stored, handled, and/or used on site must be maintained in an inventory list and must be made available to the County upon request.

- b. Drilling and completion chemicals shall be removed at most sixty days after completion.
- c. Operator shall provide to the County a copy of the chemical disclosure registry form provided to the COGCC pursuant to the COGCC's "Hydraulic Fracturing Chemical Disclosure" rule prior to conducting hydraulic fracturing.
- d. The following toxic, including orally toxic chemicals shall not be added to the hydraulic fracturing fluid:
 - 1. Benzene
 - 2. Lead
 - 3. Mercury
 - 4. Arsenic
 - 5. Cadmium
 - 6. Chromium
 - 7. Ethylbenzene
 - 8. Xylene
 - 9. 1,3,5-trimethylbenzene
 - 10. 1,4-dioxane
 - 11. 1-butanol
 - 12. 1-butoxyethanol
 - 13. N,N-dimethylformamide
 - 14. 2-ethylhexanol
 - 15. 2-mercaptoethanol
 - 16. Benzene, 1, 1'-oxybis-,tetrapropylene derivatives, sulfonated, sodium salts
 - 17. Butyl glycidyl ether
 - 18. Polysorbate 80
 - 19. Quaternary ammonium compounds, dicoco alkyl dimethyl, chlorides
 - 20. Bis(hexamethylene triamine penta methylene phosphonic acid
 - 21. Diethylenetriamine penta
 - 22. FD&C blue no 1.
 - 23. Tetrakis (triethanolaminate) zirconium (IV) (TTZ)

9.10. Emergency Preparedness and Response

- a. In General. Oil and gas operations shall not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
- b. Emergency Preparedness Plan. Each Applicant with an operation in the County is required to implement an emergency preparedness plan for each specific oil and gas facility. The plan shall be referred to the Office of Emergency Management (OEM), and the applicable fire

district, filed with the County and updated on an annual basis or as conditions change (responsible field personnel change, ownership changes, etc.). The emergency preparedness plan shall consist of at least the following information:

- i. Name, address and phone number, including 24-hour emergency numbers for at least two persons located in or near Adams County who are responsible for emergency field operations.
- ii. An as-built facilities map in a format suitable for input into the County's GIS system depicting the locations and type of above and below ground facilities including sizes, and depths below grade of all oil and gas gathering and transmission lines and associated equipment, isolation valves, surface operations and their functions, as well as transportation routes to and from exploration and development sites, for emergency response and management purposes. The information concerning pipelines and isolation valves shall be held confidentially by the County's DEM, and shall only be disclosed in the event of an emergency. The County shall deny the right of inspection of the as-built facilities maps to the public pursuant to C.R.S. § 24-72-204.
- iii. Detailed information addressing each potential emergency that may be associated with the operation. This may include any or all of the following: explosions, fires, gas, oil or water pipeline leaks or ruptures, hydrogen sulfide or other toxic gas emissions, or hazardous material vehicle accidents or spills. For each potential emergency, threshold / trigger levels shall be pre-identified that govern when an emergency state is declared by the Applicant.
- iv. The plan shall include a provision that any spill outside of the containment area or which has the potential to leave the facility or to threaten a water body shall be reported to the emergency dispatch and the Director immediately.
- v. Detailed information identifying site access, evacuation routes as determined by first responders, impact zones for each emergency scenario identifying impacted facilities, and buildings and health care facilities anticipated to be used.
- vi. Project specific emergency preparedness plans are required for any project that involves drilling or penetrating through known zones of hydrogen sulfide gas.
- vii. The plan shall include a provision that obligates the Applicant to reimburse the appropriate emergency response service

providers for costs incurred in connection with any emergency.

- viii. Detailed information that the Applicant has adequate personnel, supplies, and funding to implement the emergency response plan immediately at all times during construction and operations. Supplies can include adsorption boom, granulated materials, and coordination of foam supplies with the local first responders.
- ix. The plan shall include provisions that obligate the Applicant to keep onsite and make immediately available to any emergency responders the identification and corresponding Safety Data Sheets (SDS) of all products used, stored or transported to the site. The sheets shall be provided immediately upon request to the Director, a public safety officer, or a health professional. In cases of spills or other emergency events, the plan shall include provisions establishing a notification process to emergency responders of potential products they may encounter, including the products used in the hydraulic fracturing fluids.
- x. The plan shall establish a process for informing surrounding neighbors and schools identified as being within the emergency impact zone of applicable emergency response plan and procedures.

~~10.11~~ **Recycle, Reuse, and Disposal of Fluids:**

- a. Operator shall recycle drilling, completion, flowback and produced fluids unless technically infeasible.
- b. Exploration & Production (E&P) Waste may be temporarily stored in tanks while awaiting transportation to licensed disposal or recycling sites.
- c. Produced Water must be transported by pipelines unless economically or technically infeasible.

~~11.12~~ **Stormwater Controls:**

- a. Oil and gas operations shall be in compliance with COGCC rules related to stormwater management regulations and Adams County Stormwater Quality Regulations as contained in the Adams County Development Standards and Regulations / Ordinances and other applicable federal, state, and county requirements.
- b. The Owner or Operator must provide a stormwater management plan that identifies possible pollutant sources that may contribute pollutants to stormwater, best management practices, sampling procedures (if required), and inspections that, when implemented, will reduce or eliminate any possible water quality impacts.

~~12. Water Bodies and Water Quality.~~

Commented [GD8]: Water Bodies and Water Quality relocated to a new section in DSR Chapter 4.

- a. ~~General. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Rules, specifically with respect to spills and releases in floodplains and/or water bodies, and applicable water quality standards set by the Colorado Department of Public Health and Environment.~~
- b. ~~Water quality plan. Operators shall implement a water quality plan and make available to Adams County upon request. Such plan shall include details such as operator's plans for water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies. The owner or operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Rules. The owner or operator shall provide all water source test results to the county and maintain records of such results. The owner or operator shall make available to the county upon approval by the COGCC, its plans concerning downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.~~
- c. ~~Wastewater Injection. Wells used for produced water disposal are prohibited in Adams County.~~
- d. ~~Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering regulations. A "100-year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.~~

Commented [GD9]: Water Quality Plan details relocated to the Development Application Guide, Appendix A.

13. Well Plugging and Abandonment:

- a. An ~~Operator~~ shall comply with all COGCC rules regarding well abandonment and reclamation, including, but not limited to, removal of all equipment from the location and restoring the surface of the land to its original state. Notice of well plugging and abandonment shall be submitted by the ~~Operator~~ to the Community and Economic Development Department ~~within~~ within seven (7) days ~~forty-eight (48) hours~~. Notice shall include, at a minimum, the surveyed coordinates of the decommissioned well or facility, planned or proposed access route(s), planned duration of activities, planned hours of operation, and a list of equipment to be utilized at the site.

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b. ~~The Operator shall submit the COGCC required Notice of Intent to Abandon report to the County concurrently with the COGCC.~~

~~a-c. Notice shall be sent by the Operator or contractor to all property owners and current residents within one-half (1/2) mile of the Oil and Gas Facility, well, or site being decommissioned or plugged and abandoned. Notice shall occur at least seven (7) days prior to commencement of decommissioning or plugging operations.~~

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~~b-d.~~ Decommissioned oil and gas well assessment. Prior to any hydraulic fracturing, and at periods following hydraulic fracturing, the Operator ~~shall~~ must perform an assessment and monitoring of plugged and decommissioned or removed from use, and dry and removed from use oil and gas (abandoned wells) within one-quarter mile of the projected track of the borehole of a proposed well. The assessment and monitoring includes:

- i. Identification of all abandoned wells located within one-quarter mile of the projected track of the borehole of a proposed well based upon examination of COGCC and other publicly available records.
- ii. A Risk assessment of leaking gas or water to the ground surface or into subsurface water resources, taking into account plugging and cementing procedures described in any completion or plugged and abandoned (P&A) report filed with the COGCC.
- iii. Notification to the County and COGCC of the results of the risk assessment of the plugging and cementing procedures.
- iv. Permission from each surface owner who has an abandoned well on the surface owner's property to access the property in order to test the abandoned well. If a surface owner has not provided permission to access after thirty days from receiving notice, the applicant shall not be required to test the abandoned well.
- v. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well prior to hydraulic fracturing.
- vi. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well within ninety (90) days after completion, and then every year after production has commenced if initial survey results suggest increased risk of leaking gas or water from the abandoned well.
- vii. Notification of the results of the soil gas survey to the County and the COGCC within three weeks of conducting the survey.

or advising the County that access to the abandoned wells could not be obtained from the surface owner.

- viii. In the event that contamination is detected during any soils testing, no further operations may continue until the cause of the contamination is detected and resolved and the County has given its approval for additional operations to continue.

~~e.e.~~ Marking of plugged and abandoned wells. The ~~O~~perator shall permanently mark by a brass plaque set in concrete, similar to a permanent bench mark to monument the plugged and abandoned well's existence and location. Such plaque shall contain all information required by the COGCC and the County.

14. ~~Noise~~. The Operator shall control noise levels as follows:

a. Prior to operations ~~O~~perator ~~will~~ shall obtain a baseline noise study that encompasses at least ~~five (5)~~ three days, one of those days being a weekend. The Operator may use the baseline noise study submitted with the Development Application to fulfill this requirement, if that noise study is completed within twelve (12) months of any ground disturbing activities.

b. Beginning with construction and up to production, the County will ~~may~~ require continuous noise monitoring for all oil and gas facilities located within one-half mile (1/2), or greater depending on the location, nature, and size of the facility, of the property line of any existing residences, schools, state licensed daycares or high occupancy building units, and may require that this ~~The County may require continuous noise monitoring~~ be conducted by an approved third-party consultant based on the location, nature, and size of the facility.

c. The Operator ~~must~~ shall ~~conform to follow~~ COGCC Regulations for noise level.

d. The Operator shall post 24-hour, 7 days per week contact information to deal with all noise complaints arising from Operator's oil and gas facility. Such posting shall be visible from the public rights-of-way.

e. For Oil and Gas facilities located within 2,000 feet of a land use or zoning designation boundary the Operator shall be required to comply with the lower maximum permissible noise level as defined in COGCC regulations for noise of that corresponding land use or zone district.

i. For locations within 2,000 feet of a land use or zoning designation boundary, noise must be attenuated to the maximum permissible noise levels for the corresponding land use or zone district, as specified in COGCC rules, at the land use designation boundary as determined by the Director of Community and Economic Development.

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d.f. The Operator shall update the noise modeling study or noise impact analysis if the planned or actual equipment at the Oil and Gas Facility is expected to produce noise levels that will exceed those previously presented to the County or if the noise modeling study or noise impact analysis was completed more than twelve (12) months prior to any ground disturbing activities.

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e.g. To ensure the Operator controls noise to the allowable levels set forth above, one or more of the following may be required based on the location, nature, and size of the facility:

- i. Acoustically insulated housing or cover enclosing the motor or engine;
- ii. Noise management plan identifying hours of maximum noise emissions, type, frequency, and level of noise to be emitted, and proposed mitigation measures;
- iii. Obtain all power from utility line power or renewable sources;
- iv. Utilize the most current equipment to minimize noise impact during drilling, completions, and all phases of operation including the use of "Quiet Fleet" noise mitigation measures for completions;
- v. Sound walls around well drilling and completion activities to mitigate noise impacts;
- vi. Restrictions on the unloading of pipe or other tubular goods between 6:00 p.m. and 8:00 a.m.;
- vii. Any abatement measures required by COGCC for high-density areas, if applicable;
- viii. The use of electric drill rigs.
- ix. Tier 4 or better diesel engines, diesel and natural gas co-fired Tier 2 or Tier 3 engines, natural gas fired spark ignition engines, or electric line power for hydraulic fracturing pumps.
- x. Use of quiet design mufflers (also referred to as hospital grade or dual dissipative) or equivalent.
- xi. The use of liquefied natural gas dual fuel hydraulic fracturing pumps.

Eh. All noise studies and assessments required by the County shall be completed by a qualified sound professional. Professional Consultant(s) Required: The baseline noise study and noise modeling shall be prepared by one (1) or more professionals deemed professionally qualified by the Community and Economic Development Department. Each professional shall be deemed qualified by the Department of Community and Economic Development based on education, professional certifications, experience in the field, and their understanding of the Adams County oil and gas regulations and COGCC rules pertaining to noise. The

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County shall maintain a list of qualified professional consultants. The applicant for an Oil and Gas Facility shall select one (1) or more individuals from the County's list of qualified consultants to prepare the required baseline noise studies and noise modeling reports.

15. Air Emissions: Air contaminant emission sources shall comply with the permit and control provisions of the state air quality control program (C.R.S. § 25-7-101 et seq.) and the rules and regulations promulgated by the State Air Quality Control Commission. The Operator shall employ the following control measures and operating procedures to avoid or minimize all emissions into the atmosphere.

a. Air quality action days. Operator shall respond to air quality action day advisories posted by the CDPHE for the front range area by implementing suggested air emission reduction measures as feasible. Emissions reduction measures shall be implemented for the duration of an air quality action day advisory and may include measures such as:

- i. Minimize vehicle and engine idling;
- ii. Reduce truck traffic and worker traffic;
- iii. Delay vehicle refueling;
- iv. Suspend or delay use of fossil fuel powered ancillary equipment; and
- v. Postpone construction or maintenance activities, if feasible.
- vi. Postpone well maintenance and liquids unloading activities that would result in emission to the atmosphere.

b. Leak Detection and Repair (LDAR). Operator shall develop and maintain an LDAR program using modern leak detection technologies for equipment used at the facility that complies with the following requirements:

- i. Inspections must occur at least semi-annually; more frequent inspections may be required based on the nature, location and size of the facility.
- ii. Any leaks discovered by operator, including any verified leaks that are reported to operator by a member of the public, shall be reported to the County no later than twenty-four hours after discovery. The operator shall maintain a weekly log of all reported leaks and shall make that log available upon request from the County.
- iii. Operator shall repair leaks as soon as possible, but at least within seventy-two hours, unless technically or operationally infeasible. If the leak presents an imminent hazard to persons or property, the operator may not operate the affected component, equipment or pipeline segment until the operator has corrected the problem and notified the County of the

successful repair. In the event of leaks that do not pose an imminent hazard to persons or property, if more than 48 hours repair time is needed after a leak is discovered, operator shall contact the County and provide an explanation of why more time is required.

- iv. Plan shall include detailed recordkeeping of the inspections for leaking components.
- v. At least once per year, the operator shall notify the County five business days prior to an LDAR inspection of its facilities to provide the County the opportunity to observe the inspection.

c. Well Completions and Emissions Control

- i. Operators shall utilize EPA Reduced Emission Completions for oil wells and gas wells.
- ii. Operators shall must utilize closed loop, pitless drilling, completions systems without permanent on-site storage tanks for containment and/or recycling of all drilling, completion, and flowback fluids. Any emissions must be routed to and controlled by a flare or combustor operated with at least a 98% destruction removal efficiency.

d. Combustion Devices

- i. For any flares or combustion devices used, manufacturer test or other data must be maintained and demonstrate that the device has a destruction removal efficiency of 98% for hydrocarbons.
- ii. To the extent used, all flares, thermal oxidizers, or combustion devices shall be designed and operated as follows:
 - (a) The flare and or combustor shall be fired with natural gas.
 - (b) The flare and or combustor shall be designed and operated in a manner that will ensure no visible emissions during normal operation. Visible emissions is defined as the observation of smoke for any period or periods of duration greater than or equal to one minute in any fifteen minute period during normal operation, pursuant to EPA Method 22. Visible emissions do not include radiant energy or water vapor.
 - (c) The flare and or combustor shall always be operated with a flame present when emissions may be vented to it.
 - (d) All combustion devices shall be equipped with an operating auto-igniter.

- (e) If using a pilot flame ignition system, the presence of a pilot flame shall be monitored using a thermocouple or other equivalent device to detect the presence of a flame. A pilot flame shall be maintained at all times in the flare's pilot light burner. A telemetry system shall be in place to monitor pilot flame and shall activate a visible and audible alarm in the case that the pilot goes out.
 - (f) If using an electric arc ignition system, the arcing of the electric arc ignition system shall pulse continually, and a device shall be installed and used to continuously monitor the electric arc ignition system.
 - e. Well Liquids Unloading
 - i. Best management practices during liquids unloading activities are required including the installation of artificial lift, automated plunger lifts and at least 90% emissions reductions when utilizing combustion to control any venting.
 - ii. If manual unloading is permitted, operator shall remain onsite.
 - f. General air quality protection measures:
 - i. Operators should work to limit truck traffic to and from the site.
 - ii. Hydrocarbon emissions control of at least 98% or better for crude oil, condensate, and produced water tanks with uncontrolled actual emissions of Volatile Organic Compounds (VOCs) greater than two tons per year (TPY) VOCs.
 - iii. No venting other than if necessary for safety or during an emergency or as otherwise allowable in COGCC rules.
 - iv. Operators should consolidate product treatment and storage facilities within a facility.
 - v. Operators should centralize compression equipment within a facility.
 - g. Site-specific air quality protection measures. To eliminate or minimize air emissions, the County may require any or all of the following depending on the size, location and nature of the facility:
 - i. Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during the drilling, completion and production phases of development. The plan may include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter

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(PM 2.5). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall be able to alert the operator of increases in monitored air pollutant concentrations.

- i. Implementation of tankless production techniques.
- ii. The use of zero emission dehydrators.
- iii. Use of a pressure-suitable separator and vapor recovery unit (VRU) where applicable.
- iv. Pipeline infrastructure for produced water, natural gas, crude oil and condensate constructed and placed into service prior to the start of any fluid flow from any wellbore.
- v. The use of bleed continuous and intermittent pneumatic devices. This requirement can be met by replacing natural gas with electricity or instrument ~~air~~, ~~or air~~ or routing the discharge emissions to a closed loop-system or process.
- vi. Automated tank gauging.
- vii. Flaring shall be eliminated other than during emergencies or upset conditions; all flaring shall be reported to the county

16. Odors:

- a. Operator ~~must shall~~ implement and maintain ~~and make available to the County upon request~~, an odor mitigation plan that demonstrates how ~~this~~ the Operator will minimize odors from its operations and comply with Colorado Department of Public Health and Environment, Air Quality Control Commission, Regulation No. 2 Odor Emissions, 5 CCR 1001-4, Regulation No. 3, 5 CCR 1001-5, and Regulation No. 7, 5 CCR 1001-9 sections VII and VIII. The plan shall also provide a plan for timely responding to odor complaints from the community, and for identifying and implementing additional odor control measures to control odors emanating from the ~~Oil~~ and ~~Gas~~ Facility.
- b. Operator ~~must shall~~ notify the County's LGD no later than 24 hours after receiving odor complaint.
- c. Operator ~~shall must~~ prevent odors from oil and gas facilities from affecting the health and welfare of the public by proactively addressing and, to the fullest extent, resolving complaints filed by members of the community, in coordination with County and Tri-County Health Department staff.
- d. In response to an odor-related complaint, the County may require the Operator to provide a complete description of all activities occurring at the Oil and Facility and measures or actions taken to reduce odors to the County's LGD within 24 hours upon request.
- e. The Director of Community and Economic Development may require an Operator to collect and analyze a speciated air sample to measure

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for volatile organic compounds or hazardous air pollutants in response to an odor-related complaint. Speciated air sample collection shall be done utilizing a third-party vendor approved by the County.

d.f. To ensure compliance with the odor mitigation plan, the County may require the Operator to implement any of the following measures depending on the size, location and nature of the facility:

- i. Adding an odorant which is not a masking agent or adding chillers to the mud
- ii. Using filtration systems or additives to minimize odors from drilling and fracturing fluids except that operator shall not mask odors by using masking fragrances.
- iii. Enclose shale shaker to contain fumes from exposed mud, where safe and feasible.
- iv. Wipe down drill pipe each time drilling operation “trips” out of hole
- v. Increasing additive concentration during peak hours provided additive does not create a separate odor. Additive must be used per manufacturer’s recommended level.

Requiring the use of, at a minimum, low odor Category III drilling fluid.

~~17. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant will be required to identify and offer to sample all available water sources located within one half mile of the proposed well or facility. All sampling must be conducted by third-party consultant approved by the County. Sampling requirements include:~~

- ~~i. Initial baseline samples and subsequent monitoring samples.~~
- ~~ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.~~
- ~~iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:~~
 - ~~i. One sample within six months after completion;~~
 - ~~ii. One sample between twelve and eighteen months after completion; and~~
 - ~~iii. One sample between sixty and seventy-two months after completion.~~
- ~~iv. For multi-well pads, collection shall occur annually during active drilling and completion.~~

Commented [GD17]: Water source sampling and testing relocated to a new section in DSR Chapter 4.

- ~~iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.~~
- ~~v. An operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 1, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.~~
- ~~vi. The operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the CED Director that the applicant could not obtain access to the water source from the surface owner.~~
- ~~vii. Testing for the analytes listed in Table 1, and subsequent testing as necessary or appropriate.~~
- ~~viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.~~
- ~~ix. Reporting the location of the water source using a GPS with sub-meter resolution.~~
- ~~x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.~~
- ~~xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.~~
- ~~xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:~~
 - ~~i. If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis~~

- and stable isotope analysis of the methane (carbon and hydrogen).
- ii. ~~If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.~~
 - iii. ~~Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l.~~
 - iv. ~~Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.~~
 - v. ~~Further water source sampling in response to complaints from water source owners.~~

~~Timely production and distribution of test results, well location and analytical data in electronic deliverable format to the CED Director, the COGCC and the water source owners.~~

~~18.17~~ Dust:

- a. Operator shall minimize dust pollution associated with onsite activities and traffic.
- b. No untreated produced water or other process fluids shall be used for dust suppression.
- c. The operator ~~will~~ shall avoid creating dust or dust suppression

Table 4-11-A: Water Quality Analytes

GENERAL WATER QUALITY	Alkalinity Conductivity & TDS pH Dissolved Organic Carbon (or Total Organic Carbon) Bacteria Hydrogen Sulfide
MAJOR IONS	Bromide Chloride Fluoride Magnesium Potassium Sodium Sulfate Nitrate + Nitrite as N (total)
METALS	Arsenic Barium Boron Chromium Copper Iron Lead Manganese Selenium Strontium
DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS	Methane Ethane Propane BTEX as Benzene, Toluene, Ethylbenzene, Xylenes Total Petroleum Hydrocarbons (TPH)
OTHER	Water Level Stable isotopes of water (Oxygen, Hydrogen, Carbon) Phosphorus

activities

within 300 feet of the ordinary high-water mark of any water body, unless the dust suppressant is water.

Commented [GD18]: Table 4-11A: Water Quality Analytes relocated to new section in DSR Chapter 4.

- i. Safety Data Sheets (SDS) for any chemical-based dust suppressant shall be submitted to the County prior to use.
- d. To ensure the Operator controls dust, one or more of the following may be required based on the location, nature, and size of the facility:
 - i. Ceasing all earthwork activities when wind speeds equal or exceed 30 MPH at any time measured by onsite anemometer,
 - ii. The use of reduced speed restrictions,
 - iii. Approved dust suppression activities,
 - iv. Ceasing ongoing truck traffic causing fugitive dust, until Operator has minimized dust to acceptable levels.

19.18. Visual Aesthetics.

- a. ~~Operator shall submit a visual mitigation plan in compliance with COGCC Rules, including but not limited to, a list of the proposed colors for the Facilities, regardless of construction date, which are observable from any public highway, All permanent equipment on an Oil and Gas Facility, regardless of construction date, which are observable from any public highway, road, or publicly maintained trail will be painted, providing for paint that is~~ uniform, non-contrasting, nonreflective color tones (similar to the Munsell Soil Color Coding System), and with colors matched to but slightly darker than the surrounding landscape, ~~a listing of the operations' equipment, proposed fencing and screening. Plan shall indicate the location of all outdoor lighting on the site and any structures and include cut sheets of all proposed fixtures.~~ Fencing shall be required around all well site equipment, including, but not limited to, storage tanks, well heads, and meters if the well site is visible from a subdivision west of Imboden Road. Such fencing shall screen equipment, provide safety precautions, and be compatible with the surrounding environment. Should fencing apply to a well site, the design and construction of such fencing shall be approved by the Community and Economic Development Department prior to the construction of any site. If a chain link fence is required to achieve safety requirements set by the COGCC, then landscaping and other screening mechanisms shall be required that comply with the County's Development Standards and Regulations and the Operator's safety requirements. Operator shall be responsible for obtaining consent by surface owner allowing any required fencing.
 - i. Required sound walls shall comply with a color scheme approved by the County, blending with natural background.
- a.b. Operator shall submit landscaping and berming plan that includes maintenance and irrigation requirements for planted vegetation.

Commented [GD19]: Visual Mitigation plan details relocated to the Development Application Guide, Appendix A.

Commented [GD20]: Landscaping and berming Plan details relocated to the Development Application Guide, Appendix A.

~~throughout the duration of operations, including production.~~ Operator shall be required to provide maintenance funding through bonding to ensure funds are available for upkeep of any planted vegetation throughout the duration of operations, including production. Weed control is required at the facility and along access roads until final reclamation and abandonment. ~~Required sound walls shall be included in the visual mitigation plan and shall comply with the color scheme approved by the County, blending with natural background.~~ All landscaping shall be in compliance with County requirements and in compliance with the safety requirements of the Operator. Existing vegetation shall be minimally impacted. Motorized equipment shall be limited to the well sites and access roads to the well sites. Operator is responsible for obtaining consent by surface owner allowing landscaping as well as automatic irrigation for landscaping in urban mitigation areas and/or parks/recreation areas. All plant materials shall be kept in a healthy growing condition at all times.

- ~~b. Operator shall submit lighting mitigation plan for all phases of development and operation, which adheres to best management practices to minimize light escaping the facility including making all lighting downward facing and fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture. Operator shall conduct a photometric study prior to start of construction to indicate impact on surrounding properties and measure the lumens emitted from the facility outside of the walls.~~
- ~~c. Site access and security. Site shall be properly secured during all phases of operations, including, but not limited to, security fencing or barriers to prevent unauthorized access to site. Site shall be properly secured prior to the start of drilling. Proposed fencing, barriers, and screening shall be included in the visual mitigation plan.~~

19. Lighting. The Operator shall minimize light escaping the facility as follows:

- a. All lighting shall be directed downward and inward and use fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture.
- b. Operator shall conform to follow COGCC Regulations for lighting standards.
- c. Operator shall provide sufficient on-site lighting to ensure the safety of personnel on or near the site.
- d. If the facility has a noise barrier (sound walls, etc.), the Operator shall install facility lighting beneath the noise barrier, except for drilling rig lights.

Commented [GD21]: Lighting moved to a new section within DSR Chapter 4

e. To ensure the Operator controls light escaping from the facility, one or more of the following may be required based on the location, nature, and size of the facility:

- i. The use of timers or motion sensor lighting, ii.
The use of full cut-off lighting,
- iii. The use of reduced light intensity colors and low-glare or no-glare lighting.

20. Community Outreach

a. The Operator shall hold quarterly neighborhood meetings from initial permit approval by the County, through the completion of the first wellbore, or longer as determined by the Director of Community and Economic Development for all oil and gas facilities located within one mile (1/2) of any existing residences, platted residential development, high occupancy building units, school facilities, or state licensed child care centers. The Operator shall hold additional quarterly neighborhood meetings for each subsequent return to the Oil and Gas Facility for any drilling or completion operations if there have been no neighborhood meetings held for a period of six consecutive (6) months or more. Notice for quarterly neighborhood meetings shall be sent by the Operator to all property owners, current residents, or school facility or childcare center administrators within one-half mile (1/2) at a minimum, or greater, as determined by the Director of Community and Economic Development, of the facility. Notice for the quarterly neighborhood meetings shall occur at least 14 days prior to the meeting.

b. At the quarterly neighborhood meetings, the Operator shall provide an update on the status of any pending permits with the County, state or federal agencies associated with facility, an overview of all planned or ongoing operations at the Oil and Gas Facility and allow those in attendance to ask questions and provide input related to the facility.

c. The location, timing, and format of the quarterly neighborhood meetings will be approved by the County.

d. The Operator shall provide a recording or summary of the neighborhood meeting, which includes, at a minimum, a list of attendees and their contact information, if provided, format of the meeting, an overview of comments or questions received, and the Operator's responses to the County within seven (7) days of the meeting.

e. The County may require one or more of the following based on the location, nature, and size of the facility:

Commented [GD22]: Disproportionately Impacted Community identification is located in Development Application Guide, Appendix A

Commented [GD23]: Added in May 2021 draft

Commented [GD24]: Added in May 2021 draft

- i. The Operator to provide written and digital materials in languages other than English,
- ii. The Operator to provide interpretation services at neighborhood meetings and,
- iii. The Operator to hold additional neighborhood meetings to accommodate resident or property owner input.

21. Cumulative Impacts. Operators shall evaluate and address the potential cumulative impacts from the Oil and Gas Facility, and all reasonably foreseeable development associated with other oil and gas activity and heavy industrial operations within one mile (1), at a minimum, of the Oil and Gas Facility. Operators shall minimize, avoid, mitigate, and offset cumulative impacts from oil and gas operations to the extent technically feasible. This may be achieved through a suite of best management practices, engineering or operations controls, and/or compensatory measures.

a. The evaluation and review of cumulative impacts may require the submission of quantitative and/or qualitative analysis and data for the following impact areas, at a minimum:

- i. Air Quality,
- ii. Public health and welfare, including nuisance-type impacts,
- iii. Traffic,
- iv. Water resources,
- v. Wildlife, Ecosystems, and Soil

b. The Operator shall follow all COGCC regulations and standards that address cumulative impacts related to noise, odor, dust, and light.

c. An Operator may submit substantially equivalent plans, data, or analyses as required in COGCC rules for addressing and evaluating cumulative impacts.

Commented [GD25]: Added in May 2021 draft

22. Transportation and Traffic

a. General. Oil and gas operations shall minimize impacts to the physical infrastructure of the County transportation system.

b. Mud Tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two four hours.

Commented [GD26]: Added in May 2021 draft

c. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire

district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6 road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and reseeded with an appropriate native seed mixture within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.

ii. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department.

i. Requirements for the access permit may include the following:

1. A location that provides a safe entrance and exit that accommodates the type and volume of traffic using the access and reduces impact to residents on local roadways;
2. Haul route and traffic data;
3. Pre and post inspection of roadways used by the Operator;
4. Collateral or bond to ensure that road damage caused by the Operator is repaired;
5. Dust control (material used for dust control must be pre-approved by the County);
6. Road maintenance agreement during drilling phase; and
7. Payment of all applicable fees.

ii. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m.

- iii. Operator shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school buses when schools are in session.
- iv. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.
- e. All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:
 - i. Access permit fees
 - ii. Oversize and/or weight permit fees
 - iii. Right of way construction permit fees; and iv.
 - Traffic impact and road maintenance fees.

23. Water and Wildlife Protection.

a. Water Bodies and Water Quality.

- i. General. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Regulations, and applicable water quality standards set by the Colorado Department of Public Health and Environment and Colorado Water Quality Control Commission.
- ii. The owner or Operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Regulations.
- iii. The owner or Operator shall provide all water source test results to the County and maintain records of such results.
- iv. The owner or Operator shall make available to the County upon approval by the COGCC, its plans concerning downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.
- v. Wastewater Injection Wells used for produced water disposal are prohibited in Adams County.
- vi. Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering

Commented [GD27]: Water Quality Plan details relocated to the Development Application Guide, Appendix A.

regulations. A “100-year floodplain” shall be, for purposes of this Section, a “Special Flood Hazard Area” as identified and mapped by the Federal Emergency Management Agency’s National Flood Insurance Program and adopted by the County.

b. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant shall be required to identify and offer to sample all available water sources located within one-half mile of the proposed facility. All sampling must be conducted by third-party consultant approved of by the County. Sampling requirements include:

i. Initial baseline samples and subsequent monitoring samples.

ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.

iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:

(1) One sample within six months after completion;

(2) One sample between twelve and eighteen months after completion; and

(3) One sample between sixty and seventy-two months after completion.

(4) For multi-well pads, collection shall occur annually during active drilling and completion.

iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.

v. An Operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 4-11-A, and there has been no significant oil and gas activity within a one-mile radius in the time period

- between the original sampling and the commencement of drilling the well.
- vi. The Operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the Director of Community and Economic Development that the applicant could not obtain access to the water source from the surface owner.
- vii. Testing for the analytes listed in Table 4-11-A, and subsequent testing as necessary or appropriate.
- viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.
- ix. Reporting the location of the water source using a GPS with sub-meter resolution.
- x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.
- xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.
- xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:
- (1) If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).
 - (2) If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.
 - (3) Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l.
 - (4) Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.
 - (5) Further water source sampling in response to complaints from water source owners.

- (6) Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the Director of Community and Economic Development, the COGCC, and the water source owners.
- c. Wildlife. Operators shall avoid, minimize, and mitigate adverse impacts to wildlife resources.
- i. Operators shall comply with all COGCC Regulations for wildlife impacts.
 - ii. Operators shall actively engage Colorado Parks and Wildlife, where applicable, for the sake of avoiding, minimizing and mitigating wildlife impacts.
 - iii. Operators shall share all findings, recommendations, and reports resulting from any consultation with Colorado Parks and Wildlife with the County within seven (7) days.

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24. Flammable material. The area twenty-five feet around anything flammable shall be kept free of dry grass or weeds, conform to COGCC safety standards and applicable fire code. The operator's conceptual review application and application shall be reviewed by the serving fire district.

Table 4-11-A: Water Quality Analytes

<u>GENERAL WATER QUALITY</u>	<u>Alkalinity</u> <u>Conductivity & TDS</u> <u>Ph</u> <u>Dissolved Organic Carbon</u> <u>(or Total Organic Carbon) Bacteria</u> <u>Hydrogen Sulfide</u>
<u>MAJOR IONS</u>	<u>Bromide</u> <u>Chloride</u> <u>Fluoride</u> <u>Magnesium</u> <u>Potassium</u> <u>Sodium</u> <u>Sulfate</u> <u>Nitrate + Nitrite as N (total)</u>
<u>METALS</u>	<u>Arsenic</u> <u>Barium</u> <u>Boron</u> <u>Chromium</u> <u>Copper</u> <u>Iron</u> <u>Lead</u> <u>Manganese</u> <u>Selenium</u> <u>Strontium</u>
<u>DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS</u>	<u>Methane</u> <u>Ethane</u> <u>Propane</u> <u>BTEX as</u> <u>Benzene, Toluene, Ethylbenzene, Xylenes</u> <u>Total Petroleum Hydrocarbons (TPH)</u>
<u>OTHER</u>	<u>Water Level</u> <u>Stable isotopes of water (Oxygen, Hydrogen, Carbon)</u> <u>Phosphorus</u>

- e. ~~Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two hours.~~

Commented [GD28]: Transportation and traffic related topics combined into another section in DSR Chapter 4

~~f. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6 road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and revegetated within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.~~

~~g. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department. Requirements for the access permit may include the following: a) access location providing for a safe entrance/exit and utilization of main roadways to minimize impact /conflict with residents on local roadways; b) haul route and traffic data; c) pre/post inspection of roadways used by the Operator; d) collateral or bond to insure that road damage caused by the Operator is repaired; e) dust control (material used for dust control must be pre approved by the County); f) road maintenance agreement during drilling phase; and g) payment of all applicable fees. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m., and shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school~~

~~buses when schools are in session. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department, for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.~~

~~20-25.~~ Removal of debris. All excess debris shall be removed during construction activities. Site shall remain free of debris and excess materials at all times during operations. Burning of debris and other materials is strictly prohibited at all times.

~~21-26.~~ Removal of equipment. No permanent storage of equipment. When no longer used, equipment shall be removed within thirty days unless a Temporary Use Permit for said storage is obtained from the County.

~~22-27.~~ Maintenance of machinery. Routine field maintenance of equipment involving hazardous materials within 300 feet of any water body is prohibited. All fueling shall occur on impervious material and shall not be done during storm events. Operator shall operate and maintain all equipment in accordance with manufacturer specifications. Regular maintenance checks are required for all equipment.

~~23-28.~~ Burning. No open burning of trash, debris or other flammable materials.

~~24-29.~~ Chains. Traction chains shall be removed from heavy equipment on public streets.

~~25-30.~~ Off-location flow lines and crude oil transfer lines

- a. Off-location flow lines and crude oil transfer lines regulated by the COGCC shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, applicant shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must conduct leak detection inspections or pressure testing in order to identify flowline leaks or integrity issues in accordance with COGCC Regulations.
- e. Operator must make available to County upon request all records required to be kept by COGCC
- f. Buried pipelines shall have a minimum of four feet cover.

~~26-31.~~ Gathering Lines

- a. Gathering lines shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, Operator shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must make available to County upon request all records submitted to the Pipeline and Hazardous Materials Safety Administration (PHMSA) or the Public Utilities Commission (PUC) including those related to inspections, pressure testing, pipeline accidents and other safety incidents.
- e. ~~Well Connects: Well connects do not require a separate permit as long as the well connect was permitted under the original permit for the Oil and Gas Facility. Well connects are defined as a pipeline, 10" or less inside diameter and 2 miles or less in length, laid running from the custody transfer point or production facility for a new well(s) to an existing gathering line connection point.~~

~~27.32.~~ Temporary surface water lines

- a. Operator shall use temporary surface water lines, unless infeasible.
- ~~a-b.~~ ~~Operator shall not use County drainage culverts or ditches for laying and operation of temporary water lines.~~
- ~~b-c.~~ Operator may use County Road Right-of-Way, and County drainage culverts for the laying and operation of temporary water lines on the surface and in accordance with Adams County Standards and Regulations only after the approval of all applicable County permits, unless infeasible.
- ~~c.~~ d. Operator will bury temporary water lines at existing driveway and gravel road crossings, or utilize existing culverts, if available, with County approval.

~~28.33.~~ Financial Assurance.

- a. Operators shall be required to maintain environmental liability insurance to cover gradual pollution events.
- b. Operator shall be required to file and maintain financial assurance as determined on a site-specific basis prior to commencing operations, and thereafter during the active life of the facility, the operator shall post and maintain a performance bond or other approved financial instrument with Adams County. Should any corrective actions be

Commented [GD29]: Added May 2021 draft

required by the County in order to protect the health, safety, welfare, and the environment which result from failure of the operator to follow any regulations, standards, or conditions of approval, the performance bond shall be forfeited in an amount sufficient to defray the expense of said actions, including staff time expended by Adams County involved in such corrective actions.

~~29-34.~~ Mapping Information. Operator shall agree to provide coordinates and/or exact location of well sites to the County's GIS Department within forty-eight (48) hours of final completion of a well site in a format acceptable to the County. Any subsequent changes o a well site location shall also be provided to the County within forty-eight (48) hours of such changes.

4-11-02-03-03-04

INSPECTION AND ENFORCEMENT

1. Inspection: In recognition of the potential impacts associated with oil and gas facilities, all wells and accessory equipment and structures may be examined by the inspectors of the County at reasonable times to determine compliance with applicable provisions of this chapter, the International Fire Code, the International Building Code, and all other applicable standards in these Regulations. The County reserves the right in its discretion to make spot inspections or to inspect without notice in the event of an issue potentially involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another. For the purpose of implementing and enforcing the provisions of this chapter, the inspector and other authorized personnel have the right to enter upon private property. The County may use the information collected on the inspections to enforce the requirements of this chapter. The County may also report this information to appropriate state and federal officials, including but not limited to information regarding alleged violations of state and federal rules. Operator shall make available to County, upon request, all records required to be maintained by these regulations or to show compliance with these regulations, and the rules and regulations promulgated by the COGCC and the CDPHE, including permits, Air Pollutant Emission Notices (APENs) and other documents required to be maintained by the COGCC, CDPHE and these regulations. The County ~~will shall~~ charge a yearly inspection fee for all Oil and Gas Facilities in the County. Fees for Oil and Gas Facility inspections shall be assessed according to the County's adopted fee schedule.
2. State Notification of Violations: Adams County will cooperate fully with the State of Colorado by notifying the Oil and Gas Conservation Commission of any and all violations of the Colorado Laws and Regulations.
3. Delinquent Taxes: One condition of any oil and gas well building permit is that all taxes as provided by statute, shall be paid.

4. Penalties and Fines: The County has authority under C.R.S. § 29-20-104, as amended, to impose fines for leaks, spills, and emissions.¹ The following table summarizes the fine schedule for violations of these Development Standards and Regulations:

		Rule Classification		
		Class 1: Paperwork other ministerial regulations, a violation of which presents no direct risk of harm to public health, safety, welfare, or the environment.	Class 2: Regulations related at least indirectly to promoting the public health, safety, welfare, and the environment and wildlife resources, a violation of which presents a possibility of distinct, identifiable actual or threatened adverse impacts to those interests.	Class 3: Regulations directly related to protecting public health, safety, welfare, the environment, and wildlife resources, a violation of which presents a significant probability of actual or threatened adverse impacts to those interests.
Degree of threatened or actual impact to public health, safety, welfare, the environment, or wildlife	<u>Major:</u> Actual significant adverse impacts	\$5,000	\$10,000	\$15,000
	<u>Moderate:</u> Threat of significant adverse impacts, or moderate actual adverse impacts	\$1,500	\$5,000	\$10,000
	<u>Minor:</u> No actual adverse impact and little or no threat of adverse impacts	\$200	\$2,500	\$5,000

TABLE 4-11-B: Fine Structure

6. County Violations: In addition to the fines outlined above, the County has authority to cite violations under its control pursuant to Section 1-05-06 Criminal Remedies and Enforcement.
7. Legal Non-conforming: Adams County recognizes that there are oil and gas operations that were legally established prior to the effective date of these regulations that may or may not conform to these regulations. These operations may continue, provided the facility is not substantially modified.

¹ Violations of Section 4-10-02-03-03(15) are capped at \$300/day per violation in accordance with the State Air Pollution Control Act, C.R.S. § 25-7-128.

8. Hearing, Enforcement and Appeal Procedures for Air Quality Violations

a. Hearings:

- i. Operators of OGFs may request a hearing in front of the BOCC to contest any alleged violations of the provisions contained in the Air Quality section of these Development Standards and Regulations or to contest permitting decisions involving the provisions contained in the Air Quality section of these Development Standards and Regulations. The BOCC shall grant request for a hearing within 15 days of receipt of such request.
- ii. Hearing date ~~must~~will be set within 90 da
 - iii. Notice ~~must~~will be printed in newspaper of general circulation in the area where the OGF is located.
 - iv. Director of ~~CED-Community and Economic Development~~ shall appear as a party in all hearings adjudicating decisions of the ~~CEDCommunity and EconomicDevelopmentDepartment~~.
 - v. The Director of ~~CED-Community and Economic Development~~ shall have the same right to judicial review as other parties.
 - vi. All testimony ~~shall~~must be under oath or affirmation.
 - vii. A full and complete record of proceedings and testimony presented shall be taken and filed.
 - viii. Information related to secret processes or methods of manufacture or production must be kept confidential. The person seeking to keep information confidential has the burden of proof. Except as provided in the Clean Air Act, information claimed to be related to secret processes or methods of manufacture or production which is emissions data may not be withheld as confidential; except such information may be submitted under a claim of confidentiality and the County shall not disclose such information unless required under the Clean Air Act
 - ix. Any person who is affected and not adequately represented shall have an opportunity to be a party upon prior application to and approval by the BOCC in its discretion; such party shall have the right to be heard and cross-examine witnesses
 - x. BOCC shall make a decision within 30 days of completion of the hearing
 - xi. Burden of proof is on Director of ~~CED-Community and Economic Development~~ with respect to any hearings involving alleged violations.
 - xii. Where the Operator requests a hearing before the BOCC on a Permit involving provisions contained in the Air Quality section of these Development Standards and Regulations, the permit applicant bears burden of proof with respect to justification therefor and information, data, and analysis supportive thereof or required with respect to the application

b. **Judicial Review:**

- i. Final orders or determinations of the Community and Economic Development Director or the BOCC are subject to judicial review

- ii. Any party may move the court to remand the case to the ~~CED~~-Director of Community and Economic Development or the BOCC in the interests of justice for purpose of adducing additional evidence and findings; such party shall show reasonable grounds for failure to adduce such evidence previously
- iii. Any proceeding for judicial review shall be filed in the district court in which the OGF is located
- c. **Injunctions:**
 - i. If any person fails to comply with a final order of the ~~CED~~-Director of Community and Economic Development or the BOCC that is not subject to a pending administrative or judicial review, or in the event of a violation of an emission control regulation, or term or condition of a permit, the ~~CED~~-Director of Community and Economic Development or the BOCC may request the District Attorney for the district court in which the air pollution source is located to bring suit for an injunction
 - ii. In proceedings brought to enforce an order of the of the ~~CED~~-Director of Community and Economic Development or BOCC, a temporary restraining order or preliminary injunction, if sought, shall not issue if there is probable cause to believe granting such order or injunction will cause serious harm to the affected person or any other person and; (1) that the alleged violation or activity will not continue or be repeated; or (2) the granting of such temporary restraining order or preliminary injunction would be without sufficient corresponding public benefit.
- d. **Coordination with the Air Quality Control Commission**
 - i. Pursuant to section 25-7-128(4), C.R.S., upon the issuance of any enforcement order or granting of any permit, the County shall transmit to the AQCC a copy of the order or permit. Pursuant to section 25-7-128(6), C.R.S., the County shall confer and coordinate its activities regarding efforts to control or abate air pollution consistent with that provision.

4-11-02-03-03-05

RESIDENTIAL CONSTRUCTION STANDARDS

1. **Residential Construction Standards:** The Director of Community and Economic Development may impose any one (1) or more of the following standards on a specific site basis as a condition of subdivision approval and/or building permits on platted or unplatted land:
 - a. The oil and gas well location shall include a two-hundred-fifty (250) foot buffer in the form of an easement on the Final Plat. No structures may be constructed within the buffer area.
 - b. Access to the oil and gas well location shall be provided by a public street or recorded easement for private access.
 - c. The Final Plat shall include notice to prospective buyers of the location of the oil and gas well and associated easements.

- d. All oil and gas well flow lines and/or easements shall be graphically depicted on the Final Plat.
 - e. All surface and subsurface agreements shall be noted on the Final Plat by the recorded book and page number.
 - f. Pursuant to Section 4-06-01-02-01-12, where a new home and/or other permanent structure with plumbing is constructed within three hundred (300) feet of an existing oil and gas well, the property owner shall submit a signed waiver acknowledging the existence of the facility.
2. **Plugged and Abandoned, and Former Oil and Gas Production Sites:** This Section is enacted to protect and promote the health, safety, morals, convenience, order, prosperity, or general welfare of the present and future residents of the County. These regulations are based upon the land use authority of the County.
- a. Prior to submittal of a final plat or site-specific development plan, each plugged and abandoned well shall be located and surveyed. The plugged and abandoned well shall be permanently marked by a brass plaque set in concrete similar to a permanent benchmark to monument its existence and location. Such plaque shall contain all information required on a dry hole marker by the Colorado Oil and Gas Conservation Commission and the County.
 - b. As a condition of review of any final plat or ~~site-specific~~ site-specific development plan which contains a plugged and abandoned well or former oil and gas production site or is within 200 feet of such well or site, the owner shall submit a location diagram of the location of the well.
 - c. On every final plat or site-specific development plan which contains a plugged and abandoned well, there shall be dedicated a well maintenance and workover setback depicted on the plat, the dimensions of which shall be not less than fifty feet in width and 100 feet length. No structures shall be located within this setback. The plugged and abandoned well shall be located in the center of the setback. There shall be public access for ingress and egress to the setback of a width of not less than twenty feet.
 - d. Every final plat and site specific development plan which contains a plugged and abandoned well or a site specific development that includes a property that is less than 200 feet from a plugged and abandon well, shall include the following notation: "The owner shall disclose to prospective purchasers of lots within a radius of 200 feet of the plugged and abandoned well of (1) the location of the plugged and abandoned well, (2) the location of the maintenance and workover setback, and (3) the purpose for the well maintenance and workover setback."

- e. As a condition of building permit review, no dwelling shall be constructed within fifty (50) feet of a plugged and abandoned well.
- f. Prior to issuance of a grading permit within a development containing a known reserve pit site, the reserve pit site shall be tested for expansive soils. Reserve pits containing expansive soils in locations proposed for buildings shall be subject to the provisions of the International Building Code.
- g. No utility lines shall be installed within ten feet of any plugged and abandoned well.

4-11-02-03-06

COGCC AND COUNTY APPROVALS REQUIRED

Development of the OGF shall not commence unless and until applicant receives an approved OGF Permit, including any approved waiver(s), and receives all required approvals and permits from COGCC.

4-11-02-04 HEAVY INDUSTRY

4-11-02-04-01

GENERAL

- 1. *Outdoor Storage:* Materials may be stored outdoors, provided the storage area is consistent with the zone district allowances. All outdoor storage shall be screened in accordance with the Fencing, Walls and Screening section (See Section 4-11-01-03) of these standards and regulations.
- 2. *Garbage Storage:* Garbage area screening shall consist of a six (6) foot high minimum screen fence made of wood or masonry material. Fencing materials should be cleaned and maintained must be clean and maintained at all times to present an orderly appearance. No garbage storage area shall be located within twenty (20) feet of a public sidewalk.
- 3. *Smoke and Odor Control:* Smoke and odor shall be controlled by filter, scrubbers, fans, or other means.
- 4. *Hours of Operation:* The hours of operation shall be from 7:00 a.m. to 7:00 p.m. for this use category when within two-hundred feet of a residentially used dwelling.

4-11-02-04-02

AUCTION YARDS, WITH LIVESTOCK

- 1. *Minimum Parcel Area:* one (1) acre
- 2. *Location:* All auction yards shall be located at least fifty (50) feet away from any on-property residence, fifty (50) feet from any right-of-way and five hundred (500) feet from any off-property residence.
- 3. *Operation in Accordance with County Tax Regulations:* The yard shall operate in accordance with the County Sales and Tax Department Regulations.

4-13 PARKING, LOADING, AND CURB CUT REQUIREMENTS

4-13-01 APPLICABILITY

Off-road parking and loading requirements in all new developments shall comply with the general access, circulation, and parking standards set forth in this Section.

4-13-02 GENERAL STANDARDS

4-13-02-01 SAFETY BARRICADES

A curb, rail, fence, guard, or other continuous safety barricade of a height or design sufficient to retain vehicles within the parking area shall be provided except for single-family residences and duplexes.

4-13-02-02 COMMERCIAL AND INDUSTRIAL PARKING LOT SCREENING/FENCING REQUIRED

For each boundary line of a commercial or industrial parking area abutting directly on a residential lot a wall, fence, or screen planting of a year-round nature shall be installed at least forty-eight inches high to serve as a barrier for passage of persons and waste material, to conceal glare from headlights, and to reduce noise, fumes, and pavement heat.

4-13-02-03 PLANTINGS PROTECTED

Wheel or bumper guards shall be located so no part of any vehicle extends beyond the boundary lines of the parking area or comes in contact with walls, fences, plantings, or any other structures.

4-13-02-04 PARKING AREA LANDSCAPING REQUIREMENTS

Parking areas are required to meet standards for landscaping within the parking area and around the perimeter of the parking area. Landscaping requirements are found in Section [4-17](#) ~~Error! Reference source not found.~~ of these standards and regulations.

4-13-02-05 SURFACE OF PARKING AREA

Except for agricultural areas, off-road parking areas shall be surfaced and maintained with a portland or asphalt concrete surface, or other suitable surface as determined by the Director of Community and Economic Development. Drainage shall be subject to the approval of the Director of Community and Economic Development.

The surface of the parking area shall be maintained with the following minimum requirements:

1. Potholes shall not exceed six (6) inches deep or six (6) inches wide.
2. Cracks shall not exceed three (3) inches in width.

4-16 OFF-PREMISE ADVERTISING DEVICES (BILLBOARD)

4-16-01 PURPOSE

The Purpose of this section is to advance the County's legitimate and substantial interest in limiting the number and area of off-premise advertising devices permitted to maintain the visual appearance of scenic corridors, avoid clutter, and protect the health, safety, and welfare of the citizens of Adams County by mitigating traffic distractions.

4-16-02 APPLICABILITY

Off-premise advertising devices are permitted with an approved Conditional Use Permit in the C-5 and industrial zone districts. All off-premise advertising devices shall meet the standards contained in this Section 4-1615.

A Conditional Use Permit or a Major Amendment to an existing Conditional Use Permit or Planned Unit Development shall be required to display, erect, relocate, or alter any off-premise advertising device excluding indirect lighting traditionally used and attached to a sign, but not internally located.

Provided any Off-Premise Advertising Device complies with all standards in this Section and allows off-premise commercial messages, the Off-Premise Advertising Device shall also be permitted to allow no commercial messages to the same extent.

In conjunction with these development standards and Regulations, the Colorado Outdoor Advertising Act, C.R.S. 43-1-401 et seq, and the Colorado Rules and Regulations promulgated thereunder by the Colorado Department of Transportation shall be adhered to. Nothing in these Standards and Regulations shall be construed to allow advertising devices which are prohibited, or otherwise non-conforming with the Colorado Outdoor Advertising Act.

4-16-03 MAXIMUM NUMBER OF SIGNS

Only one (1) two-faced off-premise advertising device shall be permitted per lot.

4-16-04 MAXIMUM SIZE

No off-premise advertising device shall exceed three hundred (300) square feet per face.

4-16-05 MAXIMUM HEIGHT AND MINIMUM CLEARANCE

No off-premise advertising device shall exceed forty (40) feet in height. Height shall be determined as the distance from the grade of the right-of-way on which the sign fronts to the top of the sign including all projections. If located within one thousand

3. *Required Trees and Shrubs:* A minimum of one (1) large tree and two (2) shrubs, or two (2) ornamental trees and two (2) shrubs, shall be required for each increment of fifteen hundred (1,500) square feet in western Adams County and three thousand (3,000) square feet in eastern Adams County.
4. *Parking Lot Landscaping:* All parking lots which consist of thirty (30) spaces or more must be designed to include landscaped islands between rows. This landscaping shall be credited toward the total landscaped area required.
5. *Required Tree Mix:* The selection of trees shall be a mix of large deciduous (10% - 50%) and ornamental (10% - 50%). Evergreens shall be considered ornamental.
6. Minimum size requirements for trees and shrubs shall be:

<i>Plant Type</i>	<i>Maturity Height</i>	<i>Minimum Plant Size at Planting</i>
Ornamentals	Less than 20'	2" - 1-1/2"
Large Deciduous	Over 20'	2" to 2-1/2"
Evergreens (Sm.)	Less than 20'	5' tall
Evergreens (Lg.)	Over 20'	6' tall
Low Shrubs	4' to 3'	5 gallon
Upright Shrubs	3' to 10'	5 gallon

7. *Irrigation System Required:* A fully automatic irrigation system is required.

4-17-09-01-05

DWELLING, MANUFACTURED HOME PARK

A twenty (20) foot strip around the boundary must be landscaped to provide a visual screen. All open spaces and other unimproved areas must be suitably landscaped. All landscaping must be maintained and furnished with an automatic sprinkler system.

4-17-09-01-06

DWELLING, MOBILE HOME PARK

A landscaping plan shall be submitted for review and approval. The setbacks of the development and any other area not covered by mobile homes, driveways, ingress and egress, or other structures, shall be landscaped.

4-17-09-02 COMMERCIAL USES

4-17-09-02-01

AUTOMOBILE SERVICE STATIONS

1. *Screening:* Service stations shall be separated from abutting residential properties by a six (6) foot high masonry wall and a Bufferyard as required in Section 4-~~17~~16-06.

December 8, 2020

4-17-13 DEVELOPMENT ABUTTING ADAMS COUNTY TRAIL SYSTEM

Any new development abutting any portion of the designated Adams County Trail System, a public park, or limited access highway, shall be buffered from the trail, or park, using a Special Bufferyard (Type C), unless increased or decreased by the Director of Community and Economic Development.

4-17-14 REQUIRED LOT LANDSCAPING

In addition to the required bufferyards and bufferyard landscaping, the following site landscaping shall also be required:

4-17-15 ADMINISTRATIVE RELIEF

Administrative relief is provided to allow flexibility in the application of the landscaping regulations in this Section 4-1716 when a standard is inapplicable or inappropriate to a specific use or design proposal. However, the granting of administrative relief should not always mean a requirement is reduced without mitigation – be it landscaping combined with urban design elements (i.e. architectural elements within a parking lot that screen parking to provide shade pavement, sidewalk/tree lawn area, gathering space or plaza, or natural areas), concentrated/denser plant material within a reduced bufferyard width, or demonstrations of concepts that are equal to or superior in fulfilling the purpose of the landscaping requirements).

A written request for administrative relief shall be submitted to the Director of Community and Economic Development either before or in conjunction with the building permit review process. The written request shall:

Include a justification in terms of the findings necessary to grant administrative relief; and the written request shall close with a section for the Director of Community and Economic Development's use, which will include a block for the decision of approval/denial, the Director of Community and Economic Development's signature, and decision date.

The written request with decision shall be attached to the plan or retained in the applicable file, as appropriate. An example of this written request shall be available from the Director of Community and Economic Development.

The Director of Community and Economic Development must make all of the following findings in order to grant administrative relief:

The strict application of the regulations in question is unreasonable given the development proposal or the measures proposed by the applicant or the property has extraordinary or exceptional physical conditions or unique circumstances which

CHAPTER 2—APPLICATION AND PERMITTING PROCEDURES

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2-02-14 OIL AND GAS FACILITY (OGF) PERMIT**2-02-14-01 PURPOSE**

The purpose of the Oil and Gas Facility regulation is to allow for reasonable development of oil and gas in unincorporated Adams County while ensuring that facilities are sited in appropriate areas and utilize best practices to protect the health, safety, and welfare of our residents and the environment and wildlife.

The purpose of an OGF Permit is to regulate the surface land use of oil and gas production in order to protect the public safety, health, welfare and the environment of Adams County and its residents by ensuring that facilities are constructed and operated in accordance with best practices, to provide for sound environmental practices to protect the County's natural resources, to provide for the orderly siting and development of oil and gas operations, as well as to prevent damage to County roads and bridges.

The Colorado Oil and Gas Conservation Commission (COGCC), the Colorado Department of Public Health and the Environment (CDPHE) and the federal government have authority to regulate certain aspects of oil and gas mineral extraction. Requirements contained in this section shall not exempt the owner or operator of an oil and gas facility from compliance with the requirements of the COGCC, CDPHE, or any other regulatory authority.

The provisions of these standards and regulations shall apply to the construction, installation, alteration, repair, erection, location, maintenance, operation, and abandonment of all new or substantially modified oil and gas facilities within the unincorporated areas of the County. Substantially modified for the purposes of this section means anything requiring a Major Amendment.

Commented [GD1]: Added May 2021 draft

2-02-14-02 APPLICABILITY

All uses that require an OGF must be processed in accordance with this Section. The Director of Community and Economic Development (CED) is the permit issuing authority for OGF Permits that do not require any waiver from approval criteria or performance standards. OGF Permits requiring waivers from approval criteria or performance standards must be approved by the Board of County Commissioners through the designated Waiver process.

2-02-14-03 WHO CAN INITIATE AN OGF PERMIT

An OGF Permit may be requested, without limitation, by any owner of, or person demonstrating a legal interest in property on which the OGF use is proposed to

be located. The applicant has the burden of proof to demonstrate the use fully complies with these standards and regulations and meets the criteria for approval.

2-02-14-04 OGF PERMIT REVIEW PROCEDURES

An OGF Permit may be approved by the Director of Community and Economic Development if the application does not require waiver or modification from any approval criteria or performance standards. An OGF Permit requiring a waiver or modification from any of the approval criteria or performance standards, ~~or as otherwise stated in these regulations, must~~ be approved by the Board of County Commissioners and requires a public hearing. The Director of Community and Economic Development or the Board of County Commissioners shall approve, approve with condition, or deny the OGF Permit based on consideration of the staff report, the evidence from the public hearing (if applicable), and compliance with the criteria for approval.

Commented [GD2]: Added May 2021 draft

2-02-14-05 OGF PERMIT REVIEW STEPS

The processing of a proposed OGF permit shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures (although not necessarily conducted in the following order) as follows:

1. **Conceptual Review.** Operator shall identify three (3) proposed locations for the ~~Oil and Gas~~ Facility for the Alternative Site Analysis process outlined below. For each location, ~~Operator~~ shall identify, and visually depict the same on a map, the following items that are located within a half-mile (1/2) radius of the parcel boundary of the proposed facility: existing or platted residences, occupied buildings, parks, open space, schools, future school facilities, state licensed daycares, known areas of environmental contamination such as superfund sites, hospitals, water bodies, floodplains, floodways, water supply facilities including wells, existing active and decommissioned wells, and roadways. Proposed access routes to the site should also be provided. This information must be submitted to Community and Economic Development for review. Following that, a conceptual review meeting shall be held with the ~~Operator~~. Operators are encouraged to schedule a conceptual review prior to entering into any surface use agreements.

- a. **Alternative Site Analysis:** Prior to submittal of Form 2 ~~or 2A,~~ or Oil and Gas Development Plan to the COGCC and during the

conceptual review, the applicant must consult with the County on an Alternative Site Analysis as outlined below:

- (1) In General. The County seeks to site OGFs in areas that have the least off-site impact possible in order to protect the health, safety, and welfare of its residents and to protect the environment and wildlife. In order to determine whether proposed siting is appropriate, ~~CED staff~~the Community and Economic Development Department must evaluate alternative sites.
- (2) Description of potential sites. Applicant must submit descriptions of at least three (3) potential sites for the OGF that were considered by applicant. All potential site descriptions shall include Geographic Information System (GIS) data. The GIS data shall include, at a minimum, the outline, size of maximum disturbance and the access road for each proposed site. The description shall include an explanation of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.
 - (a) ~~Potential sites must be a minimum of~~Potential sites shall be: (1) a minimum of 500 feet away from each other if located on the same parcel; and (2) uniquely distinct different from one another as determined by the Director of Community and Economic Development. Description must include~~description of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.~~
- ~~(4)(3)~~ Evaluation materials. ~~CED staff~~the Community and Economic Development Department will evaluate the potential sites to determine which site is likely to have the least off-site impacts. The ~~CED~~Director of Community and Economic Development will determine whether applicant is required to provide traffic impact studies, engineering studies, Environmental Impact Analysis as defined in these standards and regulations, or other evaluation tools in order to adequately evaluate site options. If not required by the ~~CED~~Director of Community and Economic Development as part of the alternative site analysis, these

site-specific evaluation tools can be submitted by the applicant after site selection has occurred.

~~(3)~~(4) Evaluation criteria. In determining which sites are likely to have the least off-site impact, ~~CED~~the Community and Economic Development Department may consider the following, at a minimum:

- (a) Distance from existing or platted residences, schools, state licensed daycares, high occupancy buildings, active open spaces, environmentally sensitive areas, public drinking water supply areas, or other areas likely to be adversely impacted;
- (b) Traffic impacts and impact to roads, bridges, and other infrastructure;
- (c) Access to water and other operational necessities;
- (d) Whether the site allows for utilization of impact mitigation, such as use of proximate pipelines;
- (e) Noise impacts;
- (f) The impact on the surrounding land;
- (g) The impact on wildlife; and
Impact on nearby environmental resources such as water bodies.

~~(4)~~(5) Site Selection. The County shall review all proposed locations in order to determine which location(s) best protects public health, safety, welfare, ~~and~~ the environment, and wildlife resources and will choose the location that best satisfies this goal. The Director of Community and Economic Development will determine if any proposed sites meet this goal. If no location satisfies this goal, Operator shall submit three new proposed locations. The County may recommend denial of the OGF Permit if it does not believe that any of the proposed sites meet the siting goal. Site Selection as part of the Alternative Site Analysis, as outlined above, does not constitute the approval of an OGF application.

2. Neighborhood Meeting: Applicable. At the neighborhood meeting, the applicant shall provide an overview of its proposed oil and gas operation and allow those in attendance to provide input as to the proposed operation, including, but not limited to, issues that arise from application of these regulations to the proposed operation, and suggested mitigation to adequately ensure compliance with these regulations. Where Disproportionately Impacted Communities, as

defined in COGCC rules, are located within one (1) half mile of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns based on primary and secondary languages, culturally sensitive methods of communication and, other socio-economic factors that impact public availability and participation in neighborhood meetings. If any additional neighborhood meetings are required, those meetings shall comply with the requirements of Section 4-11-02-03-03-03. Any additional neighborhood meetings shall comply with the Community Outreach requirements of Adams County Development Standards and Regulations (Chapter 4).

Commented [GD3]: Added May 2021 draft

2.3. Development Application Submittal: The Community and Economic Development Department has developed a checklist and development application guide for required submittals for OGF Permits that are subject to change (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed.

3. Development Application Submittal: the Community and Economic Development Department has developed a check list and development application guide for of required submittals for OGF Permits that are subject may change to change from time to time (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed. At a minimum, the following items are required as part of an OGF application submittal:

Commented [GD4]: Added May 2021 draft, formatting only

4. Application Form: a completed OGF Permit application form.

Commented [GD5]: Application Form and fees relocated to OGF Development application checklist.

5. Application Fee: OGF application fee

6. Operations Plan:

(1) Plan Format: Two hard copies of all plans shall be provided, and one copy of the plans shall be provided in digital format, on either a thumb drive or CD. No plans shall contain copyright restrictions or public use restrictions.

Commented [GD6]: Operations Plan details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

(2) Cover Sheet: The cover sheet shall have a title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township and range. The cover sheet shall also include a legal description of the area, date of the drawing, existing zoning of the site, a sheet key, a vicinity map with north arrow (scale of 1" = 2,000' preferred) with an

emphasis on the major roadway network within two (2) miles of the proposal, and all applicable County notes, an approval signature block and a block to insert the COGCC Permit number when approved.

- (3) Impact Area Map: The second sheet shall contain an Impact Area Map that shows the proposed location of the Oil and Gas Facility, locations of all producing oil and gas wells and other oil and gas operations within the one-mile (1) impact area; locations of all abandoned and shut-in wells within one quarter (1/4) mile radius of the projected track of the borehole; locations of all permitted registered water wells within one-half (1/2) mile of the proposed Oil and Gas Operations; existing improvements within 1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one-mile impact area.
- (4) Drilling Operations Plan: The third sheet shall provide a site plan of drilling operations with drilling equipment with existing and proposed finished grade topography at two-foot (2') contours or less tied to a datum acceptable to the County. The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.
- (5) Production Plan: The fourth sheet shall provide a site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished grade topography at two-foot (2') contours or less tied to a datum acceptable to the County. The production plan shall also identify tentative drilling and completion schedules. A seed mix shall be provided for reseeding the well pad. Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility; if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

(6) **Signage Plan/Sign Detail:** A dimensioned Signage Plan or Sign Detail shall be included on one of the sheets describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs. Directional signs for emergency responders and inspectors shall be included, along with a 24-hour, 7-days per week contact information to deal with all noise complaints. The sign with the 24-hour contact information must be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way.

(7) **Final Plan:** Once the review process is complete and staff has determined that all outstanding issues have been resolved, staff will request a final copy of the Oil and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the County staff.

b. **Emergency Preparedness and Response:** in accordance with the Emergency Preparedness and Response requirements in Section 4-10-02-03-03-03(9).

(1) **Emergency Service Providers:** The applicant must provide a commitment to serve ("will serve") letter from the authority having jurisdiction for providing emergency services (fire protection and emergency medical services) for that facility, or, where no authority has jurisdiction, from an emergency services provider with the ability to provide such emergency services.

c. **Engineering Documents:** The following technical Engineering documents are required by the CED staff unless otherwise waived:

(1) **Construction Plans:** If applicable, Construction Plans for the proposed Oil and Gas Operation's public improvements including road plan and profile sheets, storm drainage improvements plans and other public improvements, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

(2) **Pavement Design Report:** If applicable, a Pavement Design Report prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 7).

Commented [GD7]: Emergency Preparedness and Response details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [GD8]: Engineering Documents details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

~~(3) Grading Erosion and Sediment Control: If applicable, a Grading, Erosion, Sediment Control Report and Plan as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~

~~(4)(1)~~ Transportation, roads, access standards, and fees:

- (a) The applicant's transportation plan must be designed and implemented to ensure public safety and maintain quality of life for other users of the county transportation system, adjacent residents, and affected property owners.
- (b) Where available, existing private roads shall be used to minimize land disturbance unless traffic safety, visual or noise concerns, or other adverse surface impacts clearly dictate otherwise.
- (c) Access roads on the site and access points to public roads as identified in the application materials shall be reviewed by the Community and Economic Development Department CED ~~Department~~ and shall be built and maintained in accordance with the engineering specifications and access road standards defined in the Adams County Development Standards and Regulations (Chapter 8).

~~(d) All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:~~

- ~~i. Access permit fees~~
- ~~ii. Oversize/overweight permit fees~~
- ~~iii. Right of way construction permit fees;~~
- ~~and~~
- ~~iv. Traffic impact and road maintenance fees.~~

~~(e)(d)~~ Oil and gas operations must minimize impacts to the physical infrastructure of the county transportation system. Any costs to improve county transportation system infrastructure necessitated by the proposed oil and gas operation shall be the responsibility of the Applicant. All transportation system infrastructure improvements and associated costs shall be determined by the Community

Commented [GD9]: Transportation fees relocated to DSR Chapter 4

and Economic Development Department ~~CE~~
~~department~~. The County shall perform the
work or arrange for it to be performed. If the
Applicant disagrees with the infrastructure
improvements or associated costs as assessed
by ~~CE~~the Community and Economic
Development Department, it may request that
the department approve a different route for its
proposed oil and gas operation that avoids the
need for such improvements. Alternatively, the
Applicant may engage a licensed civil
engineering firm to perform a traffic impact
study in accordance with Chapter 8 of the
Development Standards and Regulations to
independently evaluate county transportation
system infrastructure improvements
necessitated by the proposed oil and gas
operation.

(5) ~~Drainage study/technical drainage letter/plan: If
applicable, a Drainage Study/Technical Drainage
Letter/Plan prepared in accordance with the latest
version of the Adams County Development Standards
and Regulations (Chapter 9).~~

(6) ~~Floodplain Use Permit: The applicant must obtain a
Floodplain Use Permit, in accordance with the latest
version of the Adams County Development Standards
and Regulations, if the proposed Oil and Gas
construction disturbance or operation encroaches into
the 100-year floodplain, or the access is crossing a
major drainage way, as defined by the latest version of
the Adams County Development Standards and
Regulations (Chapter 9).~~

(7) ~~Natural Resource Conservation Overlay (NRCO): if the
Oil and Gas Facility is located in the NRCO, a Resource
Review may be required.~~

~~d. **Water Supply:** the applicant must provide proof of adequate
water supply. Operator shall identify a water resource—
lawfully available for industrial use, including oil and gas—
development, to be utilized by Operator and its suppliers.~~

~~e. **Surface Owner Documentation:** Documentation as to whether
the surface owner and others with interest in the property
have authorized the proposed OGF.~~

Commented [GD10]: Water Supply requirements relocated to
Development Application Guide, Appendix A and where applicable
into DSR Chapter 4. These changes were made for consistency with
other land-use application processes.

Commented [GD11]: Surface Owner Documentation relocated
to Development Application Guide, Appendix A and where
applicable into DSR Chapter 4. These changes were made for
consistency with other land-use application processes.

~~f. **Additional Information:** Community and Economic Development will develop an application check list that may require additional information to process an OGF Permit application. In addition to the items required on the check list, the Director of Community and Economic Development may require additional information deemed necessary to evaluate particular applications.~~

Commented [GD12]: Additional Information relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

~~7.5. **Determination of Sufficiency:** Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.~~

~~8.6. **Staff Report:** Applicable.~~

~~a. **Concurrent Referral and Review.** County staff may refer the complete application review by the various County Departments and the County Attorney's Office, as deemed appropriate. An application may require review by outside experts or agencies such as the U.S. Army Corps of Engineers, if the project impacts a floodplain, life-safety providers, adjacent jurisdictions, local public health departments, and others as may be deemed appropriate. Operator shall reimburse the County for reasonable costs incurred in connection with the use of third-party expert reviewers.~~

~~9. **Notice:** Applicable, except notice shall be sent by the applicant to all property owners and current residents within **one (1) half mile of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County,** at a minimum, or greater, as determined by the Director of Community and Economic Development. The Notice shall meet the format prescribed by the County. The notice shall contain a statement informing the recipients of the notice that they may request written notification by the Applicant of the commencement of construction and commencement of drill operations. The applicant shall provide written notification by U.S. Mail, which shall include an offer to consult, to any municipality, special district, or **C**ounty whose boundaries are within one-half (1/2) mile of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County. Posted notice shall be required for all OGF Permits. The signs shall be posted by the County on the subject property in a manner and at a location to afford the best notice to the public. Posting for an OGF Permit shall take place no later than ten days after the Operator selects a site for the facility.~~

Commented [GD13]: Added in May 2021 draft

~~10.8. **Public Hearing.** Applicable if the OGF Permit requires **non-administrative** waiver from any approval criteria or performance~~

standards. In cases requiring a waiver, a public hearing shall be held in front of the Board of County Commissioners.

~~11-9.~~ Standards: Applicable.

~~12-10.~~ Conditions of Approval: Applicable. The Director of Community and Economic Development in approving a permit for an OGF may attach any conditions necessary to implement the Adams County Comprehensive Plan, and to ensure the compatibility with adjacent uses, and are protective to public health, safety, welfare, the environment, and wildlife resources. Conditions may include a requirement of an Access Permit or Oversize Load Permit prior to development of the Oil and Gas Facility, a Floodplain Use Permit prior to any work within the floodplain, or a building permit prior to construction of certain structures within the Oil and Gas Facility.

a. Term: The approving authority shall specify the term of the OGF Permit as three (3) years. If, at the expiration of the three (3) year period, a well is not completed or has not commenced production operations as defined by the COGCC Rules and Regulations, the approval of that well shall lapse. For any wells for which approval has lapsed, the applicant shall be required to apply for a new OGF Permit in accordance with these regulations. the following: provided that at least one well is drilled and completed during the initial three (3) year period following all required State and local approvals of the OGF, such action permanently vests the permitted location for the number of wells contained within the initial permit approval. If wells permitted as part of the initial OGF permit are to be drilled at the multi-well pad location following expiration of the initial three (3) year period, those permit(s) for those wells shall be renewed following the OGF permit process as outlined in these regulations.

Commented [GD14]: Added in May 2021 draft

~~13-11.~~ Amendments. Applicable. All amendments must be processed in accordance with Section 2-01-10, Amendments. Major Amendments for OGFs include, at a minimum, any amendments to a Form 2A with the COGCC. For purposes of an OGF Permit, anything not identified as a major amendment shall be processed as a Minor Amendment.

2-02-14-06 CRITERIA FOR APPROVAL

The Board of County Commissioners or Director of Community and Economic Development, in approving an OGF Permit, shall consider:

1. The OGF is consistent with the purposes of these standards and regulations.
2. The OGF will comply with the requirements of these standards and regulations including, but not limited to, all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
3. The siting of the OGF, after evaluation of alternative sites, is the most compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare, the environment and wildlife of the County.
4. The siting of the OGF does not create any site-specific conditions that present significant or material impacts to nearby land uses.
5. The OGF has addressed off-site impacts and complies with all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
6. The site is suitable for the use, including adequate usable space, adequate access, and adherence of environmental or wildlife stipulations.
7. The site plan for the proposed use will provide adequate parking, traffic circulation, fencing, screening, and landscaping.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are available and adequate to serve the needs of the OGF as designed and proposed.
9. Cultural and Historical Resources: the OGF does not cause significant degradation of cultural, historic, or archaeological sites eligible for County landmarking, or the National Historic Register.
10. Water Bodies and Water Quality: the OGF does not cause adverse impacts to surface or ground waters within Adams County. The Operator shall comply with all applicable water quality standards.
11. Emergency Preparedness and Response: the OGF does not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
12. Air Quality: The OGF meets all required air quality standards.

2-02-14-07 OIL AND GAS FACILITY PERMIT WAIVER**2-02-14-07-01 PURPOSE**

The purpose of this section is to establish criteria and detail the steps whereby the Board of County Commissioners, at public meeting, may grant waivers or modifications from approval criteria or performance standards normally required for OGF Permits, allow the OGF use in an area not zoned for OGFs, or allow applicant to develop an OGF site not selected by Community and Economic Development.

2-02-14-07-02 APPLICABILITY

If the OGF permit application is denied based on noncompliance with the approval criteria or performance standards, if the applicant seeks to develop in an area not zoned for OGF development, or if an applicant seeks to develop on a site not approved by ~~CED staff~~ the Community and Economic Development Department, an applicant may apply for an Oil and Gas Facility Permit Waiver.

2-02-14-07-03 WHO CAN INITIATE A WAIVER

A waiver may be proposed by any applicant that may apply for an OGF. The applicant has the burden of proof to demonstrate that the waiver or proposed site selection meets the criteria for approval.

2-02-14-07-04 WAIVER REVIEW PROCEDURES

Any waiver shall be processed through a public hearing before the Board of County Commissioners (See Steps 1 through 10 below). Waiver applications will be heard by the Board of County Commissioners at a public hearing. At such public hearing, the Board of County Commissioners may waive or modify specific regulations or standards requested by the applicant and approve the application, may approve with conditions, or may deny the application.

Applicants may only seek a waiver after submitting a complete application for an OGF Permit and participating in a conceptual review meeting with Community and Economic Development staff. If applicant is unable to meet all approval criteria and comply with all performance standards required for an OGF Permit, applicant may choose to seek a waiver from the Board of County Commissioners. The processing of a waiver shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures as follows:

1. Conceptual Review: Must be completed prior to application for waiver as part of OGF Permit process.
2. Neighborhood Meeting: Director of Community and Economic Development will determine whether neighborhood meetings are required after evaluating steps taken as part of OGF process.
3. Development Application Submittal: In addition to all requirements for an OGF Permit, applicant must provide a request for waiver that articulates the specific waivers sought and explains why waivers are necessary.
4. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.
5. Staff Report: Applicable.
6. Notice: Applicable.
7. Public Hearing: Applicable. A public hearing shall be held before the Board of County Commissioners. Any requested waiver shall be reviewed and acted upon by the Board of County Commissioners prior to issuance of an OGF Permit.
8. Standards: Applicable.
9. Conditions of Approval: Applicable. The Board of County Commissioners, in approving a waiver for an OGF Permit, may attach any conditions necessary to implement the Adams County Comprehensive Plan and to ensure the compatibility with adjacent uses.
10. Amendments: Applicable.

2-02-14-07-05

CRITERIA FOR APPROVAL

The Board of County Commissioners, in approving a waiver, shall find:

1. Extraordinary hardships or practical difficulties result from strict compliance with these standards and regulations
2. The purpose of these standards and regulations are served to a greater extent by the alternative proposal.
3. The waiver does not have the effect of nullifying the purpose of these standards and regulations.

2-02-14-07-06

ADDITIONAL CRITERIA FOR A ZONE DISTRICT WAIVER

The Board of County Commissioners, in approving zone district waiver, in addition to the criteria outlined above, shall find:

1. The proposed Oil and Gas Facility is consistent with the Adams County Comprehensive Plan.
2. The proposed Oil and Gas Facility is compatible with the surrounding area, harmonious with the character of the neighborhood, and not

detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare or the environment of the inhabitants of the area and the County.

2-02-15 AMENDMENT TO TEXT OF THE STANDARDS AND REGULATIONS AND/OR ZONING MAP (REZONING) AND/OR COMPREHENSIVE PLAN

2-02-15-01 PURPOSE

The purpose of this section is to detail the steps to follow for changing the text of these standards and regulations, or the boundaries of the zone districts shown on the Zoning Map (Rezoning), or the Comprehensive Plan.

2-02-15-02 APPLICABILITY

All amendments to the text of these standards and regulations and any changes to the Zoning Map or Comprehensive Plan, be processed in accordance with this section. Only the Board of County Commissioners may, after recommendation of the Planning Commission, adopt a resolution amending the text of these standards and regulations or the Zoning Map, or the Comprehensive Plan.

2-02-15-03 WHO CAN INITIATE A TEXT, ZONING MAP, OR COMPREHENSIVE PLAN AMENDMENT

2-02-15-03-01 AMENDMENT TO ZONING MAP (REZONING)

An amendment to the Zoning Map may be proposed, without limitation, by the Planning Commission, the Board of County Commissioners, or the owner(s) of the property to be rezoned.

In addition, a municipality, airport authority, or other owner or operator of an aviation facility available for public use may propose an amendment to the Zoning Map to establish or amend an Aviation Zone or Influence Area Overlay District for the area including area surrounding an aviation facility.

2-02-15-03-02 AMENDMENT TO COMPREHENSIVE PLAN

An amendment to the Comprehensive Plan may be proposed, without limitation, by the Planning Commission, the Board of County Commissioners, the Director of Community and Economic Development or the owner(s) of the property to be amended on the plan.

April 28, 2021

Greg Dean
Adams County
4430 S. Adams County Parkway
Brighton, Colorado 80601

VIA EMAIL**SUBJECT: API Initial Written Comments on Adams County's Proposed Oil and Gas Regulations**

Good afternoon,

API Colorado is a division of the American Petroleum Institute, which represents all facets of the natural gas and oil industry. Our 600 members produce, process, and distribute most of the nation's energy. In our first 100 years, API has developed more than 700 standards to enhance operational and environmental safety, efficiency and sustainability. API Colorado is committed to ensuring a strong, viable industry capable of meeting the energy needs of the state in a safe and environmentally responsible manner. API Colorado appreciates the opportunity to comment on your proposed oil and gas rules.

First, we would like to start by again emphasizing that we appreciate your desire to protect the health, safety, and welfare of your constituents. We also want to thank you for your outreach during the stakeholder process. However, we believe your latest code proposal contains some concerning provisions.

With respect to your latest proposal, we have attached an associated redline to this letter that notates our highest priorities. For example, we are troubled by the county's proposal to require an operator to use the lowest available noise standard within two thousand feet of a location, regardless of zoning and other applicable regulations. We would inquire if other specified uses will be required to follow such a noise standard, and if the county believes this is necessary in light of the other substantial protections put in place surrounding the development and operation of wells. We would additionally inquire into the county's setback proposal and the requirement that distances be measured from the maximum disturbance area of a proposed location. How will the maximum disturbance area be defined in such a way as to ensure that this definition does not encompass, for example, access roads. Finally, there are some additional definitions such as environmentally sensitive areas and substantially equivalent protections that we would appreciate if the county clarified.

Again, we appreciate the county's willingness to work with us on our concerns. We look forward to partnering with the county to ensure the final adopted code provides protections to the public at large while still allowing future development to thrive. If you have any questions, please do not hesitate to contact me at (720) 878-7688, or mcgownec@api.org.

Sincerely,

Chris McGowne
Associate Director
API Colorado

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CHAPTER 2—APPLICATION AND PERMITTING PROCEDURES

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2-02-14 OIL AND GAS FACILITY (OGF) PERMIT**2-02-14-01 PURPOSE**

The purpose of the oil and gas facility regulation is to allow for reasonable development of oil and gas in unincorporated Adams County while ensuring that facilities are sited in appropriate areas and utilize best practices to protect the health, safety, and welfare of our residents and the environment and wildlife.

The purpose of an OGF Permit is to regulate the surface land use of oil and gas production in order to protect the public safety, health, welfare and the environment of Adams County and its residents by ensuring that facilities are constructed and operated in accordance with best practices, to provide for sound environmental practices to protect the County's natural resources, to provide for the orderly siting and development of oil and gas operations, as well as to prevent damage to County roads and bridges.

The Colorado Oil and Gas Conservation Commission (COGCC), the Colorado Department of Public Health and the Environment (CDPHE) and the federal government have authority to regulate certain aspects of oil and gas mineral extraction. Requirements contained in this section shall not exempt the owner or operator of an oil and gas facility from compliance with the requirements of the COGCC, CDPHE, or any other regulatory authority.

The provisions of these standards and regulations shall apply to the construction, installation, alteration, repair, erection, location, maintenance, and abandonment of all new or substantially modified oil and gas facilities within the unincorporated areas of the County. Substantially modified for the purposes of this section means anything requiring a Major Amendment.

2-02-14-02 APPLICABILITY

All uses that require an OGF must be processed in accordance with this Section. The Director of Community and Economic Development (CED) is the permit issuing authority for OGF Permits that do not require any waiver from approval criteria or performance standards. OGF Permits requiring waivers from approval criteria or performance standards must be approved by the Board of County Commissioners through the designated Waiver process.

2-02-14-03 WHO CAN INITIATE AN OGF PERMIT

An OGF Permit may be requested, without limitation, by any owner of, or person demonstrating a legal interest in property on which the OGF use is proposed to

be located. The applicant has the burden of proof to demonstrate the use fully complies with these standards and regulations and meets the criteria for approval.

2-02-14-04 OGF PERMIT REVIEW PROCEDURES

An OGF Permit may be approved by the Director of Community and Economic Development if the application does not require waiver or modification from any approval criteria or performance standards. An OGF Permit requiring a waiver or modification from any of the approval criteria or performance standards must be approved by the Board of County Commissioners and requires a public hearing. The Director of Community and Economic Development or the Board of County Commissioners shall approve, approve with conditions, or deny the OGF Permit based on consideration of the staff report, the evidence from the public hearing (if applicable), and compliance with the criteria for approval.

2-02-14-05 OGF PERMIT REVIEW STEPS

The processing of a proposed OGF permit shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures (although not necessarily conducted in the following order) as follows:

1. Conceptual Review. Operator shall identify three (3) proposed locations for the Oil and Gas Facility for the Alternative Site Analysis process outlined below. For each location, Operator shall identify, and visually depict the same on a map, the following items that are located within a half-mile (1/2) radius of the parcel boundary of the proposed facility: existing or platted residences, occupied buildings, parks, open space, schools, future school facilities, state licensed daycares, known areas of environmental contamination such as superfund sites, hospitals, water bodies, floodplains, floodways, water supply facilities including wells, existing active and decommissioned wells, and roadways. Proposed access routes to the site should also be provided. This information must be submitted to Community and Economic Development for review. Following that, a conceptual review meeting shall be held with the Operator. Operators are encouraged to schedule a

conceptual review prior to entering into any surface use agreements.

- a. **Alternative Site Analysis:** Prior to submittal of Form 2 ~~or 2A~~, or Oil and Gas Development Plan to the COGCC and during the

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conceptual review, the applicant must consult with the County on an Alternative Site Analysis as outlined below:

- (1) In General. The County seeks to site OGFs in areas that have the least off-site impact possible in order to protect the health, safety, and welfare of its residents and to protect the environment and wildlife. In order to determine whether proposed siting is appropriate, ~~CEO staff~~ the Community and Economic Development Department must evaluate alternative sites.
- (2) Description of potential sites. Applicant must submit descriptions of at least three (3) potential sites for the OGF that were considered by applicant. ~~All potential site descriptions shall include Geographic Information System (GIS) data. The GIS data shall include, at a minimum, the outline edge of maximum disturbance and the access road for each proposed site. The description shall include an explanation of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.~~

- (a) Potential sites ~~must be a minimum of~~ shall be: (1) a minimum of 500 feet away from each other but can be located on the same parcel; and (2) uniquely different from one another as determined by the Director of Community and Economic Development. Description must include description of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.

Commented [CJM1]: Is this defined? Also, applies even if the maximum disturbance area is reduced? In other words if operators have a small maximum impact, will the distance still be measured from that point?

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~~(2)~~(3) Evaluation materials. ~~CED staff~~the Community and Economic Development Department will evaluate the potential sites to determine which site is likely to have the least off-site impacts. The ~~CED~~Director of Community and Economic Development will determine whether applicant is required to provide traffic impact studies, engineering studies, Environmental Impact Analysis as defined in these standards and regulations, or other evaluation tools in order to adequately evaluate site options. If not required by the ~~CED~~Director of Community and Economic Development as part of the alternative site analysis, these site-specific evaluation tools can be submitted by the applicant after site selection has occurred.

~~(3)~~(4) Evaluation criteria. In determining which sites are likely to have the least off-site impact, ~~CED~~the Community and Economic Development Department may consider the following, at a minimum:

- (a) Distance from existing or platted residences, schools, state licensed daycares, high occupancy buildings, active open spaces, environmentally sensitive areas, public drinking water supply areas, or other areas likely to be adversely impacted;
- (b) Traffic impacts and impact to roads, bridges, and other infrastructure;
- (c) Access to water and other operational necessities;
- (d) Whether the site allows for utilization of impact mitigation, such as use of proximate pipelines;
- (e) Noise impacts;
- (f) The impact on the surrounding land;
- (g) The impact on wildlife; and
- (h) Impact on nearby environmental resources such as water bodies.

~~(4)~~(5) Site Selection. The ~~Ce~~County shall review all proposed locations in order to determine which location(s) best protects public health, safety, welfare, ~~and~~ the environment, and wildlife resources and will choose the location that best satisfies this goal. The Director of Community and Economic Development will determine if any proposed sites meet this goal. If no location satisfies this goal, Operator shall submit three new proposed

locations. The County may recommend denial of the OGF Permit if it does not believe that any of the proposed sites meet the siting goal. Site Selection as part of the Alternative Site Analysis, as outlined above, does not constitute the approval of an OGF application.

2. **Neighborhood Meeting:** Applicable. At the neighborhood meeting, the applicant shall provide an overview of its proposed oil and gas operation and allow those in attendance to provide input as to the proposed operation, including, but not limited to, issues that arise from application of these regulations to the proposed operation, and suggested mitigation to adequately ensure compliance with these regulations. Where Disproportionately Impacted Communities are

located within one-half mile of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns. Any additional neighborhood meetings shall comply with the Community Outreach requirements of Adams County Development Standards and Regulations (Chapter 4).

3. **Development Application Submittal:** the Community and Economic Development Department has developed a checklist and development application guide for required submittals for OGF Permits that are subject to change from time to time (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed. At a minimum, the following items are required as part of an OGF application submittal:

4. **Application Form:** a completed OGF Permit application form.

5. **Application Fee:** OGF application fee

6.3. Operations Plan:

(1) Plan
Format:
Two hard
copies of
all plans
shall be

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s shall be provided in digital format, on either a thumb drive or CD. No plans shall contain copyright restriction s or public use restriction s.

(2) Cover Sheet: The cover sheet shall have a title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township and range. The cover sheet shall also include a legal description of the area, date of the drawing, existing zoning of the site, a sheet key,

a vicinity map with north arrow (scale of 1" = 2,000'

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insert the
COGCC
Permit
number
when
approved.

(3) Impact
Area Map:
The
second
sheet shall
contain an
Impact
Area Map
that shows
the
proposed
location of
the Oil and
Gas
Facility,
locations
of all
producing
oil and gas
wells and
other oil
and gas
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Commented [GD1]: Application Form and fees relocated to OGF Development application checklist.

~~one-half~~
~~(1/2) mile~~
~~of the~~
~~proposed~~
~~Oil and~~
~~Gas~~

Commented [GD2]: Operations Plan details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Operation; existing improvements within 1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one-mile impact area.

- (4) Drilling Operations Plan: The third sheet shall provide a site plan of drilling operations with drilling equipment with existing and proposed finished grade topography at two-foot (2') contours or less tied to a datum acceptable to the County. The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

- (5) Production Plan: The fourth sheet shall provide a site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished grade topography at two-foot (2') contours or less tied to a datum acceptable to the County. The production plan shall also identify tentative drilling and completion schedules. A seed mix shall be provided for reseeding the well pad. Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility; if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

- (6) Signage Plan/Sign Detail: A dimensioned Signage Plan or Sign Detail shall be included on one of the sheets describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs. Directional signs for emergency responders and inspectors shall be included, along with a 24-hour, 7 days per week contact information to deal with all noise complaints. The sign with the 24-hour contact

information must be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way.

- (7) Final Plan: Once the review process is complete and staff has determined that all outstanding issues have been resolved, staff will request a final copy of the Oil

and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the County staff.

b. Emergency Preparedness and Response: in accordance

with the Emergency Preparedness and Response requirements in Section 4-10-02-03-03-03(9).

- (1) Emergency Service Providers: The applicant must provide a commitment to serve ("will serve") letter from the authority having jurisdiction for providing emergency services (fire protection and emergency medical services) for that facility, or, where no authority has jurisdiction, from an emergency services provider with the ability to provide such emergency services.

c. Engineering Documents: The following technical Engineering documents are required by the CED staff unless otherwise waived:

- (1) Construction Plans: If applicable, Construction Plans for the proposed Oil and Gas Operation's public improvements including road plan and profile sheets, storm drainage improvements plans and other public improvements, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

- (2) Pavement Design Report: If applicable, a Pavement Design Report prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 7).

- (3) Grading Erosion and Sediment Control: If applicable, a Grading, Erosion, Sediment Control Report and Plan as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9).

- (4)(1) Transportation, roads, access standards, and fees:

- (a) The applicant's transportation plan must be designed and

implemented to ensure public safety and maintain quality of life for other users of the county transportation system, adjacent residents, and affected property owners.

- (b) Where available, existing private roads shall be used to minimize land disturbance unless traffic safety, visual or noise concerns, or other

Commented [GD3]: Emergency Preparedness and Response details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [GD4]: Engineering Documents details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

adverse surface impacts clearly dictate otherwise.

- (c) Access roads on the site and access points to public roads as identified in the application materials shall be reviewed by the Community and Economic Development Department ~~and CED department~~ and shall be built and maintained in accordance with the engineering specifications and access road standards defined in the Adams County Development Standards and Regulations (Chapter 8).

- ~~(d) All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:~~

- ~~i. Access permit fees~~
- ~~ii. Oversize/overweight permit fees~~
- ~~iii. Right-of-way construction permit fees; and~~
- ~~iv. Traffic impact and road maintenance fees.~~

- ~~(e)~~(d) Oil and gas operations must minimize impacts to the physical infrastructure of the county transportation system. Any costs to improve county transportation system infrastructure necessitated by the proposed oil and gas operation shall be the responsibility of the Applicant. All transportation system infrastructure improvements and associated costs shall be determined by the Community and Economic Development Department ~~CED department~~. The County shall perform the work or arrange for it to be performed. If the Applicant disagrees with the infrastructure improvements or associated costs as assessed by ~~CED~~ the Community and Economic Development Department, it may request that the department approve a different route for its proposed oil and gas operation that avoids the need for such improvements. Alternatively, the Applicant may engage a licensed civil engineering firm to perform a traffic impact study in accordance with Chapter 8 of the Development Standards and Regulations to

Commented [GD5]: Transportation fees relocated to DSR Chapter 4

independently evaluate county transportation system infrastructure improvements necessitated by the proposed oil and gas operation.

(5) ~~Drainage study/technical drainage letter/plan: If applicable, a Drainage Study/Technical Drainage Letter/Plan prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~

(6) ~~Floodplain Use Permit: The applicant must obtain a Floodplain Use Permit, in accordance with the latest version of the Adams County Development Standards and Regulations, if the proposed Oil and Gas construction disturbance or operation encroaches into the 100-year floodplain, or the access is crossing a major drainage way, as defined by the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~

(7) ~~Natural Resource Conservation Overlay (NRCO): if the Oil and Gas Facility is located in the NRCO, a Resource Review may be required.~~

d. ~~Water Supply: the applicant must provide proof of~~

~~adequate water supply. Operator shall identify a water resource lawfully available for industrial use, including oil and gas development, to be utilized by Operator and its suppliers.~~

e. ~~Surface Owner Documentation: Documentation as to whether the surface owner and others with interest in the property have authorized the proposed OGF.~~

f. ~~Additional Information: Community and Economic Development will develop an application check list that may require additional information to process an OGF Permit~~

~~application. In addition to the items required on the check list, the Director of Community and Economic~~

~~Development may require additional information deemed necessary to evaluate particular applications.~~

~~7.4. Determination of~~

~~Sufficiency:~~ Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.

~~8.5. Staff Report:~~ Applicable.

a. ~~Concurrent Referral and Review.~~ County staff may refer the complete application review by the various County Departments and the County Attorney's Office, as deemed

Commented [GD6]: Water Supply requirements relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [GD7]: Surface Owner Documentation relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [GD8]: Additional Information relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

appropriate. An application may require review by outside experts or agencies such as the U.S. Army Corps of Engineers, if the project impacts a floodplain, life-safety providers, adjacent jurisdictions, local public health departments,

and others as may be deemed appropriate. Operator shall reimburse the County for reasonable costs incurred in connection with the use of third-party expert reviewers.

9-6. Notice: Applicable, except notice shall be sent by the applicant to all property owners and current residents within a half mile at a minimum, or greater, as determined by the Director of Community and Economic Development. The Notice shall meet the format prescribed by the County. The notice shall contain a statement informing the recipients of the notice that they may request written notification by the Applicant of the commencement of construction and commencement of drilling operations. The applicant shall provide written notification by U.S. Mail, which shall include an offer to consult, to any municipality, special district, or County whose boundaries are within one-half (1/2) mile of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County. Posted notice shall be required for all OGF Permits. The signs shall be posted by the County on the subject property in a manner and at a location to afford the best notice to the public. Posting for an OGF Permit shall take place no later than ten days after the Operator selects a site for the facility.

10-7. Public Hearing: Applicable if the OGF Permit requires nonadministrative waiver from any approval criteria or performance standards. In cases requiring a waiver, a public hearing shall be held in front of the Board of County Commissioners.

11-8. Standards: Applicable.

such action permanently vests the permitted location for the number of wells contained within the initial permit approval. If wells permitted as part of the initial OGF permit are to be drilled at the multi-well pad location following expiration of the initial three (3) year period, those permit(s) for those wells shall be renewed following the OGF permit process as outlined in these regulations.

13-10. Amendments: Applicable. All amendments must be processed in accordance with Section 2-01-10, Amendments. Major Amendments for OGFs include any amendments to a Form 2A with the COGCC. For purposes of an OGF Permit, anything not identified as a major amendment shall be processed as a Minor Amendment.

2-02-14-06 CRITERIA FOR APPROVAL

12-9. Conditions of Approval: Applicable. The Director of Community and Economic Development in approving a permit for an OGF may attach any conditions necessary to implement the Adams County Comprehensive Plan ~~and to ensure the compatibility with adjacent uses, and are~~ protective to public health, safety, welfare, the environment, and wildlife resources. Conditions may include a requirement of an Access Permit or Oversize Load Permit prior to development of the Oil and Gas Facility, a Floodplain Use Permit prior to any work within the floodplain, or a building permit prior to construction of certain structures within the Oil and Gas Facility.

a. Term: The approving authority shall specify the term of the OGF Permit as the following: provided that at least one well is drilled and completed during the initial three (3) year period following all required State and local approvals of the OGF,

Commented [CJM2]: We have concern about how this provision could work in practice. We are concerned that the comprehensive plan requirement could ultimately lead to the elimination of available sites based on projected future development and possible future zoning changes. We understand there is a zoning waiver option that could be utilized, but those are difficult processes and leave little certainty of outcome.

The Board of County Commissioners or Director of Community and Economic Development, in approving an OGF Permit, shall consider:

1. The OGF is consistent with the purposes of these standards and regulations.
2. The OGF will comply with the requirements of these standards and regulations including, but not limited to, all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
3. The siting of the OGF, after evaluation of alternative sites, is the most compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare, the environment and wildlife of the County.
4. The siting of the OGF does not create any site-specific conditions that present significant or material impacts to nearby land uses.
5. The OGF has addressed off-site impacts and complies with all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
6. The site is suitable for the use, including adequate usable space, adequate access, and adherence of environmental or wildlife stipulations.
7. The site plan for the proposed use will provide adequate parking, traffic circulation, fencing, screening, and landscaping.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are available and adequate to serve the needs of the OGF as designed and proposed.
9. Cultural and Historical Resources: the OGF does not cause significant degradation of cultural, historic, or archaeological sites eligible for County landmarking, or the National Historic Register.
10. Water Bodies and Water Quality: the OGF does not cause adverse impacts to surface or ground waters within Adams County. The Operator shall comply with all applicable water quality standards.
11. Emergency Preparedness and Response: the OGF does not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
12. Air Quality: The OGF meets all required air quality standards.

2-02-14-07 OIL AND GAS FACILITY PERMIT WAIVER**2-02-14-07-01 PURPOSE**

The purpose of this section is to establish criteria and detail the steps whereby the Board of County Commissioners, at public meeting, may grant waivers or modifications from approval criteria or performance standards normally required for OGF Permits, allow the OGF use in an area not zoned for OGFs, or allow applicant to develop an OGF site not selected by Community and Economic Development.

2-02-14-07-02 APPLICABILITY

If the OGF permit application is denied based on noncompliance with the approval criteria or performance standards, if the applicant seeks to develop in an area not zoned for OGF development, or if an applicant seeks to develop on a site not approved by ~~CED staff~~[the Community and Economic Development Department](#), an applicant may apply for an Oil and Gas Facility Permit Waiver.

2-02-14-07-03 WHO CAN INITIATE A WAIVER

A waiver may be proposed by any applicant that may apply for an OGF. The applicant has the burden of proof to demonstrate that the waiver or proposed site selection meets the criteria for approval.

2-02-14-07-04 WAIVER REVIEW PROCEDURES

Any waiver shall be processed through a public hearing before the Board of County Commissioners (See Steps 1 through 10 below). Waiver applications will be heard by the Board of County Commissioners at a public hearing. At such public hearing, the Board of County Commissioners may waive or modify specific regulations or standards requested by the applicant and approve the application, may approve with conditions, or may deny the application.

Applicants may only seek a waiver after submitting a complete application for an OGF Permit and participating in a conceptual review meeting with Community and Economic Development staff. If applicant is unable to meet all approval criteria and comply with all performance standards required for an OGF Permit, applicant may choose to seek a waiver from the Board of County Commissioners. The processing of a waiver shall be according to, in

compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures as follows:

1. Conceptual Review: Must be completed prior to application for waiver as part of OGF Permit process.
2. Neighborhood Meeting: Director of Community and Economic Development will determine whether neighborhood meetings are required after evaluating steps taken as part of OGF process.
3. Development Application Submittal: In addition to all requirements for an OGF Permit, applicant must provide a request for waiver that articulates the specific waivers sought and explains why waivers are necessary.
4. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.
5. Staff Report: Applicable.
6. Notice: Applicable.
7. Public Hearing: Applicable. A public hearing shall be held before the Board of County Commissioners. Any requested waiver shall be reviewed and acted upon by the Board of County Commissioners prior to issuance of an OGF Permit.
8. Standards: Applicable.
9. Conditions of Approval: Applicable. The Board of County Commissioners, in approving a waiver for an OGF Permit, may attach any conditions necessary to implement the Adams County Comprehensive Plan and to ensure the compatibility with adjacent uses.
10. Amendments: Applicable.

2-02-14-07-05 CRITERIA FOR APPROVAL

The Board of County Commissioners, in approving a waiver, shall find:

1. Extraordinary hardships or practical difficulties result from strict compliance with these standards and regulations
2. The purpose of these standards and regulations are served to a greater extent by the alternative proposal.
3. The waiver does not have the effect of nullifying the purpose of these standards and regulations.

|

2-02-14-07-06 *ADDITIONAL CRITERIA FOR A ZONE DISTRICT WAIVER*

The Board of County Commissioners, in approving zone district waiver, in addition to the criteria outlined above, shall find:

1. The proposed Oil and Gas Facility is consistent with the Adams County Comprehensive Plan.
2. The proposed Oil and Gas Facility is compatible with the surrounding area, harmonious with the character of the neighborhood, and not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare or the environment of the inhabitants of the area and the County.

2-02-15 AMENDMENT TO TEXT OF THE STANDARDS AND REGULATIONS AND/OR ZONING MAP (REZONING) AND/OR COMPREHENSIVE PLAN**2-02-15-01 PURPOSE**

The purpose of this section is to detail the steps to follow for changing the text of these standards and regulations, or the boundaries of the zone districts shown on the Zoning Map (Rezoning), or the Comprehensive Plan.

2-02-15-02 APPLICABILITY

All amendments to the text of these standards and regulations and any changes to the Zoning Map or Comprehensive Plan must be processed in accordance with this section. Only the Board of County Commissioners may, after recommendation of the Planning Commission, adopt a resolution amending the text of these standards and regulations, or the Zoning Map, or the Comprehensive Plan.

CHAPTER 4—DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

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3. *Pre-Existing Pools*: All pre-existing pools shall be completely enclosed by a fence no later than six (6) months following adoption of these standards and regulations.
4. *Wading Pools*: Wading pools with a maximum possible water depth of twenty (20) inches or less are not required to be fenced.

4-03-04 ACCESSORY USES, COMMERCIAL

4-03-04-01 GENERAL ACCESSORY USES PERMITTED

The following general accessory uses are permitted in Commercial Districts:

1. Communication Tower, Non-Commercial (see Section 4-03-02-02-02 Accessory Uses, Agricultural for detailed performance standards)
2. Guard Dogs (see Section 4-03-04-02-01 Accessory Uses, Commercial for detailed performance standards)
3. Marijuana Hospitality Business (see section 4-18-07 for detailed performance standards)
4. Outdoor Storage, Loading and Garbage Areas (see Section 4-03-04-02-0203 Accessory Uses, Commercial for detailed performance standards)
5. Parking (see Section 4-1304-22 Parking and Loading for detailed performance standards)
6. Signs (see Section 4-01 Signs and Outdoor Commercial Advertising Devices for detailed performance standards)
7. Solar Energy Systems for use on Property (see Section 4-03-03-02-11 Accessory Uses, Residential for detailed performance standards)
8. Temporary Use. All temporary uses shall meet the temporary use performance standards contained in Section 4-05 and shall be required to obtain a Special Use Permit unless the temporary use is a permitted principal use within the zone district in which it will be located.
9. Vending and Produce Stands (see Section 04-03-02-02-05 Accessory Uses, Agricultural for detailed performance standards)
10. Wind Powered Generators (see Section 4-03-02-02-06 Accessory Uses, Residential for detailed performance standards)
11. Other accessory uses approved by the Director of Community and Economic Development. The Director of Community and Economic Development may require the accessory use meet performance standards for similar uses permitted by these standards and regulations.

- d. *Traffic Control Plan*: Provisions of the approved traffic control plan shall be followed.
 - e. *Appearance*: All sites shall maintain a clean, neat, and orderly appearance. Litter, dust, and odors may not leave the boundaries of the site.
 - f. *Vehicle Parking*: Transfer vehicles may not be parked on public streets.
 - g. *Vector Controls*: All sites shall maintain vector controls as prescribed by the approved plan.
 - h. *CDPHE Regulations*: Colorado Department of Public Health and Environment Regulations 6CCR 1007-2, Section 14 are hereby incorporated in these Zoning Regulations.
6. Infectious Waste Disposal Site and/or Processing Facility Standards (required in addition to General Standards)
- a. *Radiation Monitoring Program*: The operator shall operate a radiation monitoring program in accordance with an approved plan.
 - b. *General Monitoring Program*: The general monitoring program, approved by the County for each infectious waste disposal and/or processing facility, shall be adhered to.
 - c. *Temperature Operating Charts*: Temperature operating charts from an infectious waste disposal and/or processing facility shall be retained for two (2) years for review by the Director of Community and Economic Development. The County may require additional monitoring if a facility has problems maintaining a temperature or other operational standard.
 - d. *Truck Washing*: All trucks shall be washed at least once a week with a detergent and disinfectant to minimize nuisance conditions, unless spills or leaks are detected which must be disinfected immediately. All wash water shall be properly controlled to prevent runoff.
 - e. *Waste Incineration*: Infectious waste incineration facilities shall be permitted to burn infectious waste only. Incineration of wastepaper, contraband, or other materials is not permitted unless specifically

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approved as part of the wastestream.

7. Hazardous Waste Disposal Site and Facility Standards: All hazardous waste disposal sites and facilities shall meet the standards established by State and Federal regulatory requirements.

4-11-02-03-03

OIL AND GAS FACILITY

4-11-02-03-03-01

Purpose

This Section is enacted to protect and promote the health, safety, values, convenience, order, prosperity and general welfare of the current and future residents of the County. It is the County's intent by enacting this Section to

facilitate the development of oil and gas resources within the unincorporated area of the County while avoiding or mitigating potential land use conflicts between such development and existing, as well as planned, land uses. It is recognized that under state law the surface and mineral estates are separate and distinct interests in land and that one may be severed from the other. Owners of subsurface mineral interests have certain legal rights and privileges, including the right to use that part of the surface estate reasonably required to extract and develop their subsurface mineral interests from a consenting surface owner, subject to compliance with the provisions of this Section and any other applicable statutory and regulatory requirements. Similarly, owners of the surface estate have certain legal rights and privileges, including the right to have the mineral estate developed in a reasonable manner and to have adverse impacts upon their property, associated with the development of the mineral estate, avoided or mitigated through compliance with this Section.

4-11-02-03-03-02

Definitions

Oil and Gas Facility means an oil and gas facility as defined by the rules and regulations of the Colorado Oil and Gas Conservation Commission ("COGCC").

For any other definition not listed in this section, the definitions listed in Chapter 11 of the Adams County Development Standards and Regulations and the COGCC's regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the COGCC's definitions, the COGCC's definitions shall prevail. If the term is not found in the COGCC's definitions or in Chapter 11, the term shall have its common meaning along with the spirit and intent of the Development Standards and Regulations and may be subject to interpretation by the Director of Community and Economic Development or his or her designee.

4-11-02-03-03-03

General Provisions

1. Access: Oil and gas well installation shall be located to provide convenient access, shall accommodate the traffic and equipment related to the oil and gas operations and emergency vehicles, and shall comply with COGCC rules and Adams County Development Standards and Regulations. Oil and gas operations ~~shall must~~ avoid or minimize impacts to the physical infrastructure of the county transportation system.
- ~~1.2.~~ Signage: A sign with the 24-hour, 7-days per week contact information shall be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way. Signage shall follow COGCC Regulations for signage and posting.
- ~~2.3.~~ Building Permit Required: For all new or substantially modified wells, a building permit is required for the installation of permanent electrical,

pumps, tank batteries, and all other above-ground structures as well as any other applicable permits including, but not limited to, culvert permits, oversized-load permits, and floodplain use permit.

~~3.4.~~ Setbacks: Oil and Gas Facilities shall be at least ~~2,000~~ ~~4,000~~ feet from the property line of any existing residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, ~~and environmentally sensitive areas, and designated parks and open spaces.~~ Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

Commented [CJM1]: Will you clarify what substantially equivalent protections will be needed to gain a waiver from the setback requirements?

Commented [CJM2]: We understand you mean surface water, floodplain and some biological resources. We were wondering if you will be ensuring this definition is narrowed to those specific items?

a. Administrative Waiver from Setback Requirements: an administrative waiver may be obtained from the setback requirements if the Operator receives a written waiver from each primary resident and property owner located within the setback.

~~a.b.~~ No Administrative Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.

~~4.5.~~ Fees and Permits: All applicable County fees adopted by the County, including postage fees and inspection fees, must be paid at time of application and prior to issuance of a building permit, including for all applicable permits required by the Adams County Development Standards and Regulations.

~~5.6.~~ Oil and Gas Road Impact and Maintenance Fees:

a. Operators ~~shall~~~~must~~ pay oil and gas road impact and maintenance fees, as approved by the Board of County Commissioners, for all proposed oil and gas wells and pads. This fee shall be paid at the time of issuance of an Oil and Gas Facilities Permit. Any person or entity required to pay the oil and gas road impact fee may elect to submit an independent study and fee calculation to demonstrate that the nature, timing, or location of the proposed oil and gas development is likely to generate impacts costing less to mitigate than the amount of the fee that would be generated by the use of the fee schedule. Any independent fee study for oil and gas development shall generally follow the methodology established in the Adams County Oil & Gas Traffic Impact Study.

i. The preparation of the independent fee calculation study shall be the sole responsibility of the electing party.

- ii. Any person or entity who requests to perform an independent fee calculation study shall pay an application fee for administrative review. An administrative decision related to the independent study may be appealed to the Board of County Commissioners. The appeal shall be filed within 14 days of staff decision and shall follow the appeal process established for OGF Permit Waivers.

6.7. Safety Standards:

- a. Operator shall implement a safety management plan and maintain a safety management system applicable to all covered processes. Upstream facilities consisting of a standard, repeatable design may be covered with a single safety management plan. The safety management system shall provide for employees and systems to oversee implementation and periodic revision of the plan. The plan shall include the following elements and describe the manner in which each of the following elements will be applied to the covered processes:
 - i. Process safety information. Compilation of written process safety information needed to conduct process hazard analysis. Process safety information shall include information pertaining to hazards of substances and chemicals used by the process, information pertaining to the technology of the process, information pertaining to the equipment used in the process, and information pertaining to the hazards of the substances or chemicals in the process. Documentation that equipment used in the process complies with recognized and generally accepted good engineering practices;
 - ii. Operating procedures. Written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information, and at least annual review of operating procedures to ensure they reflect current operating practices;
 - iii. Employee participation. Plan for ensuring employee participation in conduct and development of process hazards analysis and access to process hazards analysis;
 - iv. Training. Written procedures detailing initial and refresher employee training requirements and documentation of employee training;
 - v. Mechanical integrity. Written procedures designed to maintain the on-going integrity of process equipment, ensure employees

- involved in maintenance are properly trained to ensure the ongoing integrity of process equipment, ensure that process equipment is tested and inspected in accordance with manufacturer specifications, correct deficiencies in equipment in a safe and timely manner, and ensure that new equipment is installed or constructed properly;
- vi. Management of change. Written procedures to manage changes to covered processes, technologies, equipment and procedures;
 - vii. Pre-startup reviews. Written procedures regarding pre-startup safety reviews;
 - viii. Compliance audits. Written procedures requiring an audit every five years to verify compliance with the procedures and practices developed under the safety management plan, and procedures requiring correction of any deficiencies identified in audit; operator will make results of audit available to inspector upon request;
 - ix. Incident investigation. Written procedures requiring investigations of all near-misses and incidents, including root cause analysis of all incidents resulting in fatalities or serious environmental harm, establishing a system to promptly address and resolve the incident, and requiring that all employees and contractors whose job tasks are relevant to the investigation of the near miss or incident review the investigation report.
 - x. Hot work. The facility shall ensure that all hot work complies with local and state fire prevention and protection requirements.
 - xi. Contractors. Written procedures describing how operator screens, oversees, shares process safety and emergency response and preparedness information with contractors;
 - xii. Process hazard analysis. Process hazard analysis for each covered process;
 - xiii. Incident history. List of all reportable safety events as defined by the COGCC rules and regulations that have occurred at the operator's facilities within the last five years, along with any investigation reports, root cause analysis and operational or process changes that resulted from the investigation of the accident;
 - xiv. Safety culture assessment. Written procedures requiring operator periodically review safety culture, and at a minimum conduct such review after each major accident; and

- xv. Inherently safer systems analysis. Require analysis at least every five years, whenever a change is proposed at the facility that could result in an incident, after an incident if recommended by the investigation report or root cause analysis, and during the design of new processes, equipment or facilities.
- xvi. Operator shall make available the safety management plan to Adams County at the County's request. Adams County may retain

outside consultants to review safety management plan and may request modifications to safety management plan based on its review. Operator ~~shall~~ must reimburse County for any costs associated with retaining outside consultants.

- b. Automatic safety protective systems and surface safety valves. Operator is required to install automated safety system prior to commencement of production. Automated safety system shall include the installation, monitoring and remote control of a surface safety valve or a wellhead master control valve and shall be able to remotely shut in wells on demand. Surface safety valve or a wellhead master control valve shall be equipped to operate remotely via the automated safety protective system. Operator shall test ~~the~~ automated safety system ~~quarterly~~ quarterly to ensure functionality and provide results of testing to County ~~quarterly within 14 days of such testing~~.
- c. Incident and accident reporting.
 - i. Incidents. ~~As soon as practicable, but no more than~~ Within a week three (3) days of any reportable safety event ~~or emergency situation~~ as defined by the COGCC, Operator shall submit a report to the County including the following, to the extent available:
 - (a) Fuel source, location, proximity to residences and other occupied buildings, cause, duration, intensity, volume, specifics and degree of damage to properties, if any beyond the facility, injuries to persons, emergency response, ~~impacts, if any, to public health, safety, welfare, the environment or wildlife resources,~~ and remedial and preventative measures to be taken within a specified amount of time.
 - ~~(a)(b)~~ If public health, safety, welfare, the environment or wildlife resources are threatened, the Operator responsible for the operation causing the threat shall immediately notify the County's Local Government Designee ("LGD") electronically and orally.
 - ii. County may require operator to conduct root cause analysis of any incidents or Grade 1 gas leaks, as defined by the COGCC.
 - iii. Operator shall keep a daily incident log that shall be made available to Adams County upon request. Any spill or release that is reportable to the COGCC shall be simultaneously reported to the County's LGD and applicable fire district.
 - iv. ~~The Operator shall notify~~ Notification to the County's LGD ~~within 24 hours of discovery of~~ all spills of one barrel or more

that leaves the facility or released outside of berms or secondary containment, all spills of any material or volume on permeable ground at the facility that has a reportable spill quantity under any law, all spills or releases as required by COGCC Regulations, and copies of any self-reporting submissions that operator provides to the COGCC.

- v. Notification of the surface owner or the surface owner's tenant, and the water rights holder if applicable, of spills and releases in conformance with COGCC Rules.

d. Worker Training and Records

- i. Workers at an OGF shall have nationally recognized certifications for the work they are performing. This includes, but is not limited to, Hazard Communications Training, Hazardous Waste Operations Certifications, heavy equipment operator training, and welding certifications per API 1104 and/or ASME Section 9.
- ii. All workers at an OGF shall have completed a nationally recognized occupational safety and health training program.
- iii. Upon request from the County, the Operator shall supply the County written procedures detailing employee training requirements and training records.

7-8 Spill Prevention and Containment. Oil and gas operations shall be in compliance with COGCC safety and spill and release requirements.

- a. Requirements to minimize liquid spills and releases include the following:

- i. Berms or other secondary containment devices around crude oil, condensate, and produced water storage tanks enclosing an area sufficient to contain and provide secondary containment for 110% of the largest single tank.
- ii. Berms or other secondary containment devices shall be sufficiently impervious to contain any spilled or released material.
- iii. Inspection of all berms and containment devices at regular intervals, but not less than monthly. Berms shall be inspected within forty-eight (48) hours of a precipitation event of 1.0" or more, and Operator shall make necessary repairs as soon as possible, but not more than seventy-two (72) hours after the event.
- iv. Maintain all berms and containment devices to ensure they are in good condition.
- v. A prohibition on the storage or use of ignition sources inside the secondary containment area unless the containment area encloses a fired pressure vessel.

- vi. Construction of containment berms using steel rings, designed and installed to prevent leakage and resist degradation from erosion or routine operation.
- vii. Construction of secondary containment areas with a synthetic or engineered liner that contains all primary containment vessels and flowlines and is mechanically connected to the steel ring to prevent leakage.
- viii. For locations within 500 feet and upgradient of a surface water body or ground water source, tertiary containment, such as an earthen berm, around oil and gas facilities. Alternatively, the County may require Operator to install retention ponds for stormwater management.
- ix. Discharge valves shall be secured, inaccessible to the public and located within the secondary containment area. Openended discharge valves shall be placed within the interior of the tank secondary containment.
- b. Anchoring. Anchoring is required within floodplain or geological hazard areas, as needed to resist flotation, collapse, lateral movement, sinking, or subsidence, and in compliance with Federal Emergency Management Agency (FEMA). All guy line anchors left buried for future use shall be identified by a marker of bright color not less than four feet in height and not greater than one (1) foot east of the guy line anchor.

8.9. Chemical Handling and Requirements

- a. The owner or operator of any installation that is required to prepare or have available a safety data sheet for a hazardous chemical under the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 et seq., and regulations promulgated under that Act, shall submit both a safety data sheet (SDS) for each such chemical and an annual emergency and hazardous chemical inventory form to the Local Emergency Planning Commission (LEPC) and the local fire district. A comprehensive and universal listing of all hazardous chemicals stored, handled, and/or used on site must be maintained in an inventory list and must be made available to the County upon request.
- b. Drilling and completion chemicals shall be removed at most sixty days after completion.
- c. Operator shall provide to the County a copy of the chemical disclosure registry form provided to the COGCC pursuant to the COGCC's "Hydraulic Fracturing Chemical Disclosure" rule prior to conducting hydraulic fracturing.

- d. The following toxic, including orally toxic chemicals shall not be added to the hydraulic fracturing fluid:
1. Benzene
 2. Lead
 3. Mercury
 4. Arsenic
 5. Cadmium
 6. Chromium
 7. Ethylbenzene
 8. Xylene
 9. 1,3,5-trimethylbenzene
 10. 1,4-dioxane
 11. 1-butanol
 12. 2-butoxyethanol
 13. N,N-dimethylformamide
 14. 2-ethylhexanol
 15. 2-mercaptoethanol
 16. Benzene, 1, 1'-oxybis-,tetrapropylene derivatives, sulfonated, sodium salts
 17. Butyl glycidyl ether
 18. Polysorbate 80
 19. Quaternary ammonium compounds, dicocopalmyldimethyl, chlorides
 20. Bis hexamethylene triamine penta methylene phosphonic acid
 21. Diethylenetriamine penta
 22. FD&C blue no 1.
 23. Tetrakis (triethanolaminate) zirconium (IV) (TTZ)

9-10. Emergency Preparedness and Response

- a. In General. Oil and gas operations shall not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
- b. Emergency Preparedness Plan. Each Applicant with an operation in the County is required to implement an emergency preparedness plan for each specific oil and gas facility. The plan shall be referred to the Office of Emergency Management (OEM), and the applicable fire district, filed with the County and updated on an annual basis or as conditions change (responsible field personnel change, ownership changes, etc.). The emergency preparedness plan shall consist of at least the following information:
 - i. Name, address and phone number, including 24-hour emergency numbers for at least two persons located in or

- near Adams County who are responsible for emergency field operations.
- ii. An as-built facilities map in a format suitable for input into the County's GIS system depicting the locations and type of above and below ground facilities including sizes, and depths below grade of all oil and gas gathering and transmission lines and associated equipment, isolation valves, surface operations and their functions, as well as transportation routes to and from exploration and development sites, for emergency response and management purposes. The information concerning pipelines and isolation valves shall be held confidentially by the County's OEM, and shall only be disclosed in the event of an emergency. The County shall deny the right of inspection of the as-built facilities maps to the public pursuant to C.R.S. § 24-72-204.
 - iii. Detailed information addressing each potential emergency that may be associated with the operation. This may include any or all of the following: explosions, fires, gas, oil or water pipeline leaks or ruptures, hydrogen sulfide or other toxic gas emissions, or hazardous material vehicle accidents or spills. For each potential emergency, threshold / trigger levels shall be pre-identified that govern when an emergency state is declared by the Applicant.
 - iv. The plan shall include a provision that any spill outside of the containment area or which has the potential to leave the facility or to threaten a water body shall be reported to the emergency dispatch and the Director immediately.
 - v. Detailed information identifying site access, evacuation routes as determined by first responders, impact zones for each emergency scenario identifying impacted facilities, and buildings and health care facilities anticipated to be used.
 - vi. Project specific emergency preparedness plans are required for any project that involves drilling or penetrating through known zones of hydrogen sulfide gas.
 - vii. The plan shall include a provision that obligates the Applicant to reimburse the appropriate emergency response service providers for costs incurred in connection with any emergency.
 - viii. Detailed information that the Applicant has adequate personnel, supplies, and funding to implement the emergency

response plan immediately at all times during construction and operations. Supplies can include adsorption boom, granulated materials, and coordination of foam supplies with the local first responders.

- ix. The plan shall include provisions that obligate the Applicant to keep onsite and make immediately available to any emergency responders the identification and corresponding Safety Data Sheets (SDS) of all products used, stored or transported to the site. The SDS sheets shall be provided immediately upon request to the Director, a public safety officer, or a health professional. In cases of spills or other emergency events, the plan shall include provisions establishing a notification process to emergency responders of potential products they may encounter, including the products used in the hydraulic fracturing fluids.
- x. The plan shall establish a process for informing surrounding neighbors and schools identified as being within the emergency impact zone of applicable emergency response plan and procedures.

~~10-11.~~ Recycle, Reuse and Disposal of Fluids:

- a. Operator shall recycle drilling, completion, flowback and produced fluids unless technically infeasible.
- b. Exploration & Production (E&P) Waste may be temporarily stored in tanks while awaiting transportation to licensed disposal or recycling sites.
- c. Produced Water must be transported by pipelines unless economically or technically infeasible.

~~11-12.~~ Stormwater Controls:

- a. Oil and gas operations shall be in compliance with COGCC rules related to stormwater management regulations and Adams County Stormwater Quality Regulations as contained in the Adams County Development Standards and Regulations / Ordinances and other applicable federal, state, and county requirements.
- b. The Owner or Operator must provide a stormwater management plan that identifies possible pollutant sources that may contribute pollutants to stormwater, best management practices, sampling procedures (if required), and inspections that, when implemented, will reduce or eliminate any possible water quality impacts.

~~12. Water Bodies and Water Quality:~~

- ~~a. General. Oil and gas operations shall not cause adverse impacts to surface or groundwater. All operations shall comply with all Adams County rules, COGCC Rules, specifically with respect to spills and releases in floodplains and/or water bodies, and~~

Commented [GD1]: Water Bodies and Water Quality relocated to a new section in DSR Chapter 4.

~~applicable water quality standards set by the Colorado Department of Public Health and Environment.~~

- ~~b. Water quality plan. Operators shall implement a water quality plan and make available to Adams County upon request. Such plan shall include details such as operator's plans for water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies. The owner or operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Rules. The owner or operator shall provide all water source test results to the county and maintain records of such results. The owner or operator shall make available to the County upon approval by the COGCC, its plans concerning downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.~~
- ~~c. Wastewater Injection Wells used for produced water disposal are prohibited in Adams County.~~
- ~~d. Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering regulations. A "100-year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.~~

13. Well Plugging and Abandonment:

- a. An Operator shall comply with all COGCC rules regarding well abandonment and reclamation, including, but not limited to, removal of all equipment from the location and restoring the surface of the land to its original state. Notice of well plugging and abandonment shall be submitted by the Operator to the Community and Economic Development Department within forty-eight (48) hours. Notice shall include surveyed coordinates of the decommissioned well or facility.

- ~~a-b.~~ The Operator shall submit the COGCC required Notice of Intent to Abandon report to the County concurrently with the COGCC.
- ~~b-c.~~ Decommissioned oil and gas well assessment. Prior to any hydraulic fracturing, and at periods following hydraulic fracturing, the Operator shall~~must~~ perform assessment and monitoring of plugged and decommissioned or removed from use, and dry and removed from use oil and gas wells (abandoned wells) within one-quarter mile

Commented [GD2]: Water Quality Plan details relocated to the Development Application Guide, Appendix A.

of the projected track of the borehole of a proposed well. The assessment and monitoring includes:

- i. Identification of all abandoned wells located within onequarter mile of the projected track of the borehole of a proposed well based upon examination of COGCC and other publicly available records,
 - ii. A Risk assessment of leaking gas or water to the ground surface or into subsurface water resources, taking into account plugging and cementing procedures described in any recompletion or plugged and abandoned (P&A) report filed with the COGCC.
 - iii. Notification to the County and COGCC of the results of the risk assessment of the plugging and cementing procedures.
 - iv. Permission from each surface owner who has an abandoned well on the surface owner's property to access the property in order to test the abandoned well. If a surface owner has not provided permission to access after thirty days from receiving notice, the applicant shall not be required to test the abandoned well.
 - v. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well prior to hydraulic fracturing
 - vi. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well within ninety (90) days after completion, and then every year after production has commenced if initial survey results suggest increased risk of leaking gas or water from the abandoned well.
 - vii. Notification of the results of the soil gas survey to the County and the COGCC within three weeks of conducting the survey or advising the County that access to the abandoned wells could not be obtained from the surface owner.
 - viii. In the event that contamination is detected during any soils testing, no further operations may continue until the cause of the contamination is detected and resolved and the County has given its approval for additional operations to continue.
- ~~e.d.~~ Marking of plugged and abandoned wells. The ~~O~~perator shall permanently mark by a brass plaque set in concrete, similar to a permanent bench mark to monument the plugged and abandoned well's existence and location. Such plaque shall contain all information required by the COGCC and the County.
14. ~~Noise~~. The Operator shall control noise levels as follows:

Commented [CJM3]: We have some significant concerns with the new noise standard. First, we are unsure why the county is proposing that operators be required to use the lowest available noise standard within 2000'. We absolutely understand the county's concerns surround noise, however based on Adam County's location and siting regulations, in addition to their zoning restrictions, operators are already limiting in their ability to locate proposed development sites. This would propose that even when operators place locations within appropriately zoned areas, and follow location and siting guidelines, they may still be required to implement noise measures that are either unnecessary based on the location or will be different from the other types of land use activities located within that zone district.

- a. Prior to operations ~~Operator will~~ shall obtain a baseline noise study that encompasses at least ~~five (5)~~ three days, one of those days being a weekend. ~~The Operator may use the baseline noise study submitted with the Development Standards and Regulations.~~ Adams County Development Standards and Regulations require that the noise study is completed within twelve (12) months of any ground disturbing activities.
- b. Beginning with construction and up to production, the County ~~will~~

- viii. The use of electric drill rigs.
- ix. Tier 4 or better diesel engines, diesel and natural gas co-fired Tier 2 or Tier 3 engines, natural gas fired spark ignition engines, or electric line power for hydraulic fracturing pumps.
- x. Use of quiet design mufflers (also referred to as hospital grade or dual dissipative) or equivalent.
- xi. The use of liquefied natural gas dual fuel hydraulic fracturing pumps.

~~For example, all noise studies and assessments required by the County shall be completed by a qualified sound professional.~~

15. Air Emissions: Air contaminant emission sources shall comply with the permit and control provisions of the state air quality control program (C.R.S. § 25-7-101 et seq.) and the rules and regulations promulgated by the State Air Quality Control Commission. The Operator shall employ the following control measures and operating procedures to avoid or minimize all emissions into the atmosphere.

a. Air quality action days. Operator shall respond to air quality action day advisories posted by the CDPHE for the front range area by implementing suggested air emission reduction measures as feasible. Emissions reduction measures shall be implemented for the duration of an air quality action day advisory and may include measures such as:

- i. Minimize vehicle and engine idling;
- ii. Reduce truck traffic and worker traffic;
- iii. Delay vehicle refueling;
- iv. Suspend or delay use of fossil fuel powered ancillary equipment; and
- v. Postpone construction or maintenance activities, if feasible.
- vi. Postpone well maintenance and liquids unloading activities that would result in emission to the atmosphere.

b. Leak Detection and Repair (LDAR). Operator shall develop and maintain an LDAR program using modern leak detection technologies for equipment used at the facility that complies with the following requirements:

- i. Inspections must occur at least semi-annually; more frequent inspections may be required based on the nature, location and size of the facility.
- ii. Any leaks discovered by operator, including any verified leaks that are reported to operator by a member of the public, shall be reported to the County no later than twenty-four hours after discovery. The operator shall maintain a weekly log of all reported leaks and shall make that log available upon request from the County.

- iii. Operator shall repair leaks as soon as possible, but at least within seventy-two hours, unless technically or operationally infeasible. If the leak presents an imminent hazard to persons or property, the operator may not operate the affected component, equipment or pipeline segment until the operator has corrected the problem and notified the County of the successful repair. In the event of leaks that do not pose an imminent hazard to persons or property, if more than 48 hours repair time is needed after a leak is discovered, operator shall contact the County and provide an explanation of why more time is required.
 - iv. Plan shall include detailed recordkeeping of the inspections for leaking components.
 - v. At least once per year, the operator shall notify the County five business days prior to an LDAR inspection of its facilities to provide the County the opportunity to observe the inspection.
- c. Well Completions and Emissions Control
- i. Operators shall utilize EPA Reduced Emission Completions for oil wells and gas wells.
 - ii. Operators ~~shall~~^{must} utilize closed loop, pitless drilling, completions systems without permanent on-site storage tanks for containment and/or recycling of all drilling, completion, and flowback fluids. Any emissions must be routed to and controlled by a flare or combustor operated with at least a 98% destruction removal efficiency.
- d. Combustion Devices
- i. For any flares or combustion devices used, manufacturer test or other data must be maintained and demonstrate that the device has a destruction removal efficiency of 98% for hydrocarbons.
 - ii. To the extent used, all flares, thermal oxidizers, or combustion devices shall be designed and operated as follows:
 - (a) The flare and or combustor shall be fired with natural gas.

I

(b) The flare and or combustor shall be designed and op

emissions during normal operation. Visible emissions is defined as the observation of smoke for any period or periods of duration greater than or equal to one minute in any fifteen minute period during normal operation, pursuant to EPA Method 22. Visible emissions do not include radiant energy or water vapor.

- (c) The flare and or combustor shall always be operated with a flame present when emissions may be vented to it.
- (d) All combustion devices shall be equipped with an operating auto-igniter.
- (e) If using a pilot flame ignition system, the presence of a pilot flame shall be monitored using a thermocouple or other equivalent device to detect the presence of a flame. A pilot flame shall be maintained at all times in the flare's pilot light burner. A telemetry system shall be in place to monitor pilot flame and shall activate a visible and audible alarm in the case that the pilot goes out.
- (f) If using an electric arc ignition system, the arcing of the electric arc ignition system shall pulse continually, and a device shall be installed and used to continuously monitor the electric arc ignition system.
- e. Well Liquids Unloading
 - i. Best management practices during liquids unloading activities are required including the installation of artificial lift, automated plunger lifts and at least 90% emissions reductions when utilizing combustion to control any venting.
 - ii. If manual unloading is permitted, Operator shall remain onsite.
- f. General air quality protection measures.
 - i. Operators should work to limit truck traffic to and from the site.
 - ii. Hydrocarbon emissions control of at least 98% or better for crude oil, condensate, and produced water tanks with uncontrolled actual emissions of Volatile Organic Compounds (VOCs) greater than two tons per year (TPY) VOCs.
 - iii. No venting other than if necessary for safety or during an emergency.
 - iv. Operators should consolidate product treatment and storage facilities within a facility.
 - v. Operators should centralize compression equipment within a facility.
- g. Site-specific air quality protection measures. To eliminate or minimize air emissions, the County may require any or all of the following depending on the size, location and nature of the facility:
 - i. Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during the drilling, completion and production phases of development. The plan may include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall be able to alert the operator of increases in monitored air pollutant concentrations.
 - ii. Implementation of tankless production techniques.
 - iii. The use of zero emission dehydrators.
 - iv. Use of a pressure-suitable separator and vapor recovery unit (VRU) where applicable.
 - v. Pipeline infrastructure for produced water, natural gas, crude oil and condensate constructed and placed into service prior to the start of any fluid flow from any wellbore.
 - vi. The use of no-bleed continuous and intermittent pneumatic devices. This requirement can be met by replacing natural gas

with electricity or instrument air, or routing the discharge emissions to a closed loop-system or process.

- vii. Automated tank gauging. |
- viii. ~~Flaring shall be eliminated other than during emergencies or~~
upset conditions; all flaring shall be reported to the county

16. Odors:

- a. Operator ~~must-shall~~ implement and maintain ~~and make available to the County upon request,~~ an odor mitigation plan that demonstrates how ~~the~~ ~~Operator~~ will minimize odors from its operations and comply with Colorado Department of Public Health and Environment, Air Quality Control Commission, Regulation No. 2 Odor Emissions, 5 CCR 1001-4, Regulation No. 3, 5 CCR 1001-5, and Regulation No. 7, 5 CCR 1001-9 sections VII and VIII. The plan shall also provide a plan for timely responding to odor complaints from the community, and for identifying and implementing additional odor control measures to control odors emanating from the ~~Oil~~ and ~~Gas~~ Facility.
- b. Operator ~~must-shall~~ notify the County's LGD no later than 24 hours after receiving odor complaint.
- c. Operator ~~shall must~~ prevent odors from oil and gas facilities from affecting the health and welfare of the public by proactively addressing and, to the fullest extent, resolving complaints filed by

Commented [CJM4]: We believe complaints, such as those proposed in subsection (d), should be verified.

members of the community, in coordination with County and Tri-County Health Department staff.

~~d. In response to an odor-related complaint, the Operator shall provide a complete description of all activities occurring at the oil and facility and measures or actions taken to reduce odors to the County's LGD within 24 hours.~~

~~e. The Director of Community and Economic Development may require an Operator to collect and analyze a speciated air sample to measure for volatile organic compounds or hazardous air pollutants in response to an odor-related complaint. Speciated air sample collection shall be done utilizing a third-party vendor approved by the County.~~

~~d.f.~~ To ensure compliance with the odor mitigation plan, the County may require the Operator to implement any of the following measures depending on the size, location and nature of the facility:

- i. Adding an odorant which is not a masking agent or adding chillers to the mud systems.
- ii. Using filtration systems or additives to minimize odors from drilling and fracturing fluids except that operator shall not mask odors by using masking fragrances.
- iii. Enclose shale shaker to contain fumes from exposed mud, where safe and feasible
- iv. Wipe down drill pipe each time drilling operation "trips" out of hole
- v. Increasing additive concentration during peak hours provided additive does not create a separate odor. Additive must be used per manufacturer's recommended level.

~~vi. Requiring the use of, at a minimum, low odor Category III drilling fluid.~~

~~17. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant will be required to identify and offer to sample all available water sources located within one-half mile of the proposed well or facility. All sampling must be conducted by third-party consultant approved of by the County. Sampling requirements include:~~

- i. Initial baseline samples and subsequent monitoring samples.
- ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.

Commented [GD3]: Water source sampling and testing relocated to a new section in DSR Chapter 4.

~~iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:~~

- ~~i. One sample within six months after completion;~~
- ~~ii. One sample between twelve and eighteen months after completion; and~~
- ~~iii. One sample between sixty and seventy-two months after completion.~~
- ~~iv. For multi-well pads, collection shall occur annually during active drilling and completion.~~
- ~~iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give~~
priority to the selection of water sources closest to the facility.
- ~~v. An operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 1, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.~~
- ~~vi. The operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the CED Director that the applicant could not obtain access to the water source from the surface owner.~~
- ~~vii. Testing for the analytes listed in Table 1, and subsequent testing as necessary or appropriate.~~
- ~~viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.~~
- ~~ix. Reporting the location of the water source using a GPS with sub-meter resolution.~~
- ~~x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.~~

~~xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.~~

~~xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:~~

- ~~i. If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).~~
- ~~ii. If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.~~
- ~~iii. Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l.~~
- ~~iv. Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.~~
- ~~v. Further water source sampling in response to complaints from water source owners.~~

~~Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the CED Director, the COGCC and the water source owners.~~

- ~~18.17.~~ Dust:
- Adams County Development Standards and Regulations 4-169
- a. Operator shall minimize dust pollution associated with onsite activities and traffic.
 - b. No untreated produced water or other process fluids shall be used for dust suppression.
 - c. ~~The Operator will shall~~ avoid creating dust or dust suppression

Table 4-11-A: Water-Quality Analytes	
GENERAL WATER QUALITY	Alkalinity Conductivity & TDS pH Dissolved Organic Carbon (or Total Organic Carbon) Bacteria Hydrogen Sulfide
MAJOR IONS	Bromide Chloride Fluoride Magnesium Potassium Sodium Sulfate Nitrate + Nitrite as N (total)
	Arsenic Barium

- i. Safety Data Sheets (SDS) for any chemical-based dust suppressant shall be submitted to the County prior to use.
- d. To ensure the Operator controls dust, one or more of the following may be required based on the location, nature, and size of the facility:
- Ceasing all earthwork activities when wind speeds equal or exceed 30 MPH at any time measured by onsite anemometer.
 - The use of reduced speed restrictions.
 - Approved dust suppression activities.
 - Ceasing ongoing truck traffic causing fugitive dust, until Operator has minimized dust to acceptable levels.

49-18. Visual Aesthetics.

- a. Operator shall submit a visual mitigation plan in compliance with COGCC Rules, including but not limited to, a list of the proposed colors for the Facilities, regardless of construction date, which are observable from any public highway. All permanent equipment on an oil and gas facility, regardless of construction date, which are observable from any public highway, road, or publicly maintained trail will be painted in providing for paint that is uniform, non-contrasting, nonreflective color tones (similar to the Munsell Soil Color Coding System), and with colors matched to but slightly darker than the surrounding landscape. a listing of the operations' equipment, proposed fencing and screening. Plan shall indicate the location of all outdoor lighting on the site and any structures and include cut sheets of all proposed fixtures. Fencing shall be required around all well site equipment, including, but not limited to, storage tanks, well heads, and meters if the well site is visible from a subdivision west of Imboden Road. Such fencing shall screen equipment, provide safety precautions, and be compatible with the surrounding environment. Should fencing apply to a well site, the design and construction of such fencing shall be approved by the Community and Economic Development Department prior to the construction of any site. If a chain link fence is required to achieve safety requirements set by the COGCC, then landscaping and other screening mechanisms shall be required that comply with the County's Development Standards and Regulations and the Operator's safety requirements. Operator shall be responsible for obtaining consent by surface owner allowing any required fencing.
- Required sound walls shall comply with a color scheme

approved by the County, blending with natural background.

a-b. Operator shall submit landscaping and berming plan that includes maintenance and irrigation requirements for planted vegetation

Commented [GD5]: Visual Mitigation plan details relocated to the Development Application Guide, Appendix A.

Commented [GD6]: Landscaping and berming Plan details relocated to the Development Application Guide, Appendix A.

throughout the duration of operations, including production. Operator shall be

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required to provide maintenance funding through bonding to ensure funds are available for upkeep of any planted vegetation throughout the duration of operations, including production. Weed control is required at the facility and along access roads until final reclamation and abandonment. Required sound walls shall be included in the visual mitigation plan and shall comply with the color scheme approved by the County, blending with natural background. All landscaping shall be in compliance with County requirements and in compliance with the safety requirements of the Operator. Existing vegetation shall be minimally impacted. Motorized equipment shall be restricted to the well sites and access roads to the well sites. Operator is responsible for obtaining consent by surface owner allowing landscaping as well as automatic irrigation for landscaping in urban mitigation areas and/or parks/recreation areas. All plant materials shall be kept in a healthy growing condition at all times.

- b. Operator shall submit lighting mitigation plan for all phases of development and operation, which adheres to best management practices to minimize light escaping the facility including making all lighting downward-facing and fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture. Operator shall conduct a photometric study prior to start of construction to indicate impact on surrounding properties and measure the lumens emitted from the facility outside of the walls.
- c. Site access and security. Site shall be properly secured during all phases of operations, including, but not limited to, security fencing or barriers to prevent unauthorized access to site. Site shall be properly secured prior to the start of drilling. Proposed fencing, barriers, and screening shall be included in the visual mitigation plan.

19. Lighting. The Operator shall minimize light escaping the facility as follows:

- a. All lighting shall be directed downward and inward and use fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture.
- b. Operator shall follow COGCC Regulations for lighting standards.
- c. Operator shall provide sufficient on-site lighting to ensure the safety of personnel on or near the site.
- d. If the facility has a noise barrier (sound walls, etc.), the Operator shall install facility lighting beneath the noise barrier, except for drilling rig lights.
- e. To ensure the Operator controls light escaping from the facility, one or more of the following may be required based on the location, nature, and size of the facility:

Commented [GD7]: Lighting moved to a new section within DSR Chapter 4

- i. The use of timers or motion sensor lighting.
- ii. The use of full cut-off lighting.
- iii. The use of reduced light intensity colors and low-glare or no-glare lighting.

20. Community Outreach.

- a. The Operator shall hold quarterly neighborhood meetings from initial permit approval by the County, through the completion of the first wellbore, or longer as determined by the Director of Community and Economic Development for all oil and gas facilities located within one-half mile (1/2) of any existing residences, platted residential development, high occupancy building units, school facilities, or state licensed child care centers. Notice for quarterly neighborhood meetings shall be sent by the Operator to all property owners, current residents, or school facility or childcare center administrators within one-half mile (1/2) at a minimum or greater, as determined by the Director of Community and Economic Development, of the facility. Notice for the quarterly neighborhood meetings shall occur at least 14 days prior to the meeting.
- b. At the quarterly neighborhood meetings, the Operator will provide an update on the status of any pending permits with the County, state or federal agencies associated with facility, an overview of all planned or ongoing operations at the oil and gas facility and allow those in attendance to ask questions and provide input related to the facility.
- c. The location, timing, and format of the quarterly neighborhood meetings will be approved by the County.
- d. The County may require one or more of the following based on the location, nature, and size of the facility:
 - i. The Operator to provide written and digital materials in languages other than English
 - ii. The Operator to provide interpretation services at neighborhood meetings
 - iii. The Operator to hold additional neighborhood meetings to accommodate resident or property owner input.

21. Cumulative Impacts. Operators shall evaluate and address the potential cumulative impacts from the Oil and Gas Facility, and all reasonably foreseeable development associated with other oil and gas activity and heavy industrial operations within one mile (1), at a minimum, of the oil and gas facility. Operators shall minimize, avoid, mitigate, and offset cumulative impacts from oil and gas operations to the extent technically feasible. This may be achieved through a suite of best management practices, engineering or operations controls, and/or compensatory measures.

Commented [GD8]: Disproportionally impacted community identification is located in Development Application Guide, Appendix A

Commented [CJM5]: Is there an opportunity to align the cumulative impacts with the COGCC standards? If not, can it be a concurrent document that can satisfy submittal requirements for both the state and Adams County. We would ask if that could be a provision included in this code

~~a. The evaluation and review of cumulative impacts may require the submission of quantitative and/or qualitative analysis and data for the following impact areas, at a minimum:~~
~~i. Air Quality,~~
~~ii. Public Health and welfare,~~
~~iii. Traffic,~~
~~iv. Water resources,~~
~~v. Wildlife, Ecosystems, and Soil~~

controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.

- d. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department.

i. Requirements for the access permit may include the following:

1. A location that provides a safe entrance and exit that accommodates the type and volume of traffic using the access and reduces impact to residents on local roadways;
2. Haul route and traffic data;
3. Pre and post inspection of roadways used by the Operator;
4. Collateral or bond to ensure that road damage caused by the Operator is repaired;
5. Dust control (material used for dust control must be pre-approved by the County);
6. Road maintenance agreement during drilling phase; and
7. Payment of all applicable fees. ii. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m.

iii. Operator shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school buses when schools are in session.

iv. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.

- e. All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:

- i. Access permit fees
- ii. Oversize/overweight permit fees
- iii. Right of way construction permit fees; and
- iv. Traffic impact and road maintenance fees.

23. Water and Wildlife Protection.

a. Water Bodies and Water Quality:

Adams County Development Standards and Regulations

- i. ~~General Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Regulations, and applicable water quality standards set by the Colorado Department of Public Health and Environment and Colorado Water Quality Control Commission.~~
- ii. ~~The owner or Operator shall provide the County with the~~

Commented [GD9]: Water Quality Plan details relocated to the Development Application Guide, Appendix A.

- iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:
 - (1) One sample within six months after completion;
 - (2) One sample between twelve and eighteen months after completion; and
 - (3) One sample between sixty and seventy-two months after completion.
 - (4) For multi-well pads, collection shall occur annually during active drilling and completion.
- iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two downgradient water sources are collected. Operators should give
priority to the selection of water sources closest to the facility.
- v. An Operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 4-11-A, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.
- vi. The Operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the Director of Community and Economic Development that the applicant could not obtain access to the water source from the surface owner.
- vii. Testing for the analytes listed in Table 4-11-A, and subsequent testing as necessary or appropriate.
- viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.
- ix. Reporting the location of the water source using a GPS with sub-meter resolution.
- x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.

- ~~xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.~~
- ~~xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:
 - ~~(1) If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas~~~~

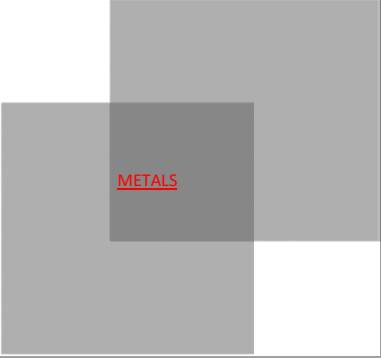
24. Flammable material. The area twenty-five feet around anything flammable shall be kept free of dry grass or weeds, conform to COGCC safety standards and applicable fire code. The operator's conceptual review application and application shall be reviewed by the serving fire district.

Table 4-11-A: Water Quality Analytes

<u>GENERAL WATER QUALITY</u>		<u>Alkalinity</u> <u>Conductivity & TDS</u> <u>pH</u> <u>Dissolved Organic Carbon</u> <u>(or Total Organic Carbon) Bacteria</u> <u>Hydrogen Sulfide</u>
<u>MAJOR IONS</u>		<u>Bromide</u> <u>Chloride</u> <u>Fluoride</u> <u>Magnesium</u> <u>Potassium</u> <u>Sodium</u> <u>Sulfate</u> <u>Nitrate + Nitrite as N (total)</u>

Commented [GD10]: Transportation and traffic related topics combined into another section in DSR Chapter 4

December 8, 2020

 <p><u>METALS</u></p>	<p><u>Arsenic</u> <u>Barium</u> <u>Boron</u> <u>Chromium</u> <u>Copper</u> <u>Iron</u> <u>Lead</u> <u>Manganese</u> <u>Selenium</u> <u>Strontium</u></p>
<p><u>DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS</u></p>	<p><u>Methane</u> <u>Ethane</u> <u>Propane</u> <u>BTEX as</u> <u>Benzene, Toluene, Ethylbenzene, Xylenes</u> <u>Total Petroleum Hydrocarbons (TPH)</u></p>
<p><u>OTHER</u></p>	<p><u>Water Level</u> <u>Stable isotopes of water (Oxygen, Hydrogen, Carbon)</u> <u>Phosphorus</u></p>

e. ~~Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two hours.~~

~~f. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6 road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and revegetated within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and~~

~~Sediment Control Plan while the roads are in use.~~

~~g. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department. Requirements for the access permit may include the following: a) access location providing for a safe entrance/exit and utilization of main roadways to minimize impact /conflict with residents on local roadways; b) haul route and traffic data; c) pre/post inspection of roadways used by the Operator; d) collateral or bond to insure that road damage caused by the Operator is repaired; e) dust control (material used for dust control must be pre-approved by the County); f) road maintenance agreement during drilling phase; and g) payment of all applicable fees. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m., and shall work with and show written evidence that the applicable school~~

~~district(s) has been consulted to minimize traffic conflicts with school buses when schools are in session. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from~~

~~the County's Public Works Department, for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.~~

~~20-25.~~ Removal of debris. All excess debris shall be removed during construction activities. Site shall remain free of debris and excess materials at all times during operations. Burning of debris and other materials is strictly prohibited at all times.

~~21-26.~~ Removal of equipment. No permanent storage of equipment. When no longer used, equipment shall be removed within thirty days unless a Temporary Use Permit for said storage is obtained from the County.

~~22-27.~~ Maintenance of machinery. Routine field maintenance of equipment involving hazardous materials within 300 feet of any water body is prohibited. All fueling shall occur over impervious material and shall not be done during storm events. Operator shall operate and maintain all equipment in accordance with manufacturer specifications. Regular maintenance checks are required for all equipment.

~~23-28.~~ Burning. No open burning of trash, debris or other flammable materials.

~~24-29.~~ Chains. Traction chains shall be removed from heavy equipment on public streets.

~~25-30.~~ Off-location flow lines and crude oil transfer lines

- a. Off-location flow lines and crude oil transfer lines regulated by the COGCC shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, applicant shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must conduct leak detection inspections or pressure testing in order to identify flowline leaks or integrity issues in accordance with COGCC Regulations.
- e. Operator must make available to County upon request all records required to be kept by COGCC
- f. Buried pipelines shall have a minimum of four feet cover.

~~26-31.~~ Gathering Lines

~~Well Connects. Well connects do not require a separate permit as long as the well connect was permitted under the original permit for the Oil and Gas Facility. Well connects are defined as a pipeline, 40" or less inside diameter and 2 miles or less in length, laid running from the custody transfer point or production facility for a new well(s) to an existing gathering line connection point.~~

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- a. Gathering lines shall be sited to avoid areas containing existing or

- proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, Operator shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
 - c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
 - d. Operator must make available to County upon request all records submitted to the Pipeline and Hazardous Materials Safety Administration (PHMSA) or the Public Utilities Commission (PUC) including those related to inspections, pressure testing, pipeline accidents and other safety incidents.

e.

27.32 Temporary surface water lines

- a. Operator shall use temporary surface water lines, unless infeasible.
- b. Operator may use County Road Right-of-Way, and County drainage culverts for the laying and operation of temporary water lines on the surface and in accordance with Adams County Standards and Regulations, unless infeasible.
- c. Operator will bury temporary water lines at existing driveway and gravel road crossings, or utilize existing culverts, if available, with County approval.

28.33 Financial Assurance.

- a. Operators shall be required to maintain environmental liability insurance to cover gradual pollution events.
- b. Operator shall be required to file and maintain financial assurance as determined on a site-specific basis prior to commencing operations, and thereafter during the active life of the facility, the operator shall post and maintain a performance bond or other approved financial instrument with Adams County. Should any corrective actions be required by the County in order to protect the health, safety, welfare, and the environment which result from failure of the operator to follow any regulations, standards, or conditions of approval, the performance bond shall be forfeited in an amount sufficient to defray the expense of said actions, including staff time expended by Adams County involved in such corrective actions.

December 8, 2020

~~29-34.~~ Mapping Information. Operator shall agree to provide coordinates and/or exact location of well sites to the County's GIS Department within forty-eight (48) hours of final completion of a well site in a format acceptable to the County. Any subsequent changes to a well site location shall also be provided to the County within forty-eight (48) hours of such changes.

4-11-02-03-03-04

INSPECTION AND ENFORCEMENT

1. Inspection: In recognition of the potential impacts associated with oil and gas facilities, all wells and accessory equipment and structures may be examined by the inspectors of the County at reasonable times to determine compliance with applicable provisions of this chapter, the International Fire Code, the International Building Code, and all other applicable standards in these Regulations. The County reserves the right in its discretion to make spot inspections or to inspect without notice in the event of an issue potentially involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another. For the purpose of implementing and enforcing the provisions of this chapter, the inspector and other authorized personnel have the right to enter upon private property. The County may use the information collected on the inspections to enforce the requirements of this chapter. The County may also report this information to appropriate state and federal officials, including but not limited to information regarding alleged violations of state and federal rules. Operator shall make available to County, upon request, all records required to be maintained by these regulations or to show compliance with these regulations, and the rules and regulations promulgated by the COGCC and the CDPHE, including permits, Air Pollutant Emission Notices (APENs) and other documents required to be maintained by the COGCC, CDPHE and these regulations. The County ~~will~~ ~~shall~~ charge a yearly inspection fee for all Oil and Gas Facilities in the County. Fees for Oil and Gas Facility inspections shall be assessed according to the County's adopted fee schedule.
2. State Notification of Violations: Adams County will cooperate fully with the State of Colorado by notifying the Oil and Gas Conservation Commission of any and all violations of the Colorado Laws and Regulations.
3. Delinquent Taxes: One condition of any oil and gas well building permit is that all taxes as provided by statute, shall be paid.

Rule Classification				
Degree of threatened or actual impact to public health, safety, welfare, the environment, or wildlife	Class 1: Paperwork other ministerial regulations, a violation of which presents no direct risk of harm to public health, safety, welfare, and the environment.	Performance Standards	Class 2: Regulations related at least indirectly to promoting the public health, safety, welfare, and the environment and wildlife resources, a violation of which presents a possibility of distinct, identifiable actual or threatened adverse impacts to those interests	Class 3: Regulations directly related to protecting public health, safety, welfare, the environment, and wildlife resources, a violation of which presents a significant probability of actual or identifiable adverse impacts to those interests.
Degree of threatened or actual impact to public health, safety, welfare, the environment, or wildlife	Major: Actual significant adverse impacts	\$5,000	\$10,000	\$15,000
	Moderate: Threat of significant adverse impacts, or moderate actual adverse impacts	\$1,500	\$5,000	\$10,000
	Minor: No actual adverse impact and little or no threat of adverse impacts	\$200	\$2,500	\$5,000

4. Penalties and Fines: The County has authority under C.R.S. § 29-20-104, as amended, to impose fines for leaks, spills, and emissions.¹ The following table summarizes the fine schedule for violations of these Development Standards and Regulations:

TABLE 4-

11-B: Fine Structure

6. County Violations: In addition to the fines outlined above, the County has authority to cite violations under its control pursuant to Section 1-05-06 Criminal Remedies and Enforcement.
7. Legal Non-conforming: Adams County recognizes that there are oil and gas operations that were legally established prior to the effective date of these regulations that may or may not conform to these regulations. These operations may continue, provided the facility is not substantially modified.
8. Hearing, Enforcement and Appeal Procedures for Air Quality Violations
 - a. Hearings:
 - i. Operators of OGFs may request a hearing in front of the BOCC to contest any alleged violations of the provisions contained in the Air Quality section of these Development Standards and

¹ Violations of Section 4-10-02-03-03(15) are capped at \$300/day per violation in accordance with the State Air Pollution Control Act, C.R.S. § 25-7-128.

Regulations or to contest permitting decisions involving the provisions contained in the Air Quality section of these Development Standards and Regulations. The BOCC shall grant request for a

hearing within 15 days of receipt of such request.

- ii. Hearing date ~~must~~will be set within 90 days iii. Notice ~~must~~will be printed in a newspaper of general circulation in the area where the OGF is located.

iv. Director of ~~CED—Community and Economic Development~~ shall appear as a party in all hearings adjudicating decisions of the ~~CED~~Community and Economic Development Department.

v. The Director of ~~CED—Community and Economic Development~~ shall have the same right to judicial review as other parties.

vi. All testimony ~~shall~~must be under oath or affirmation.

vii. A full and complete record of proceedings and testimony presented shall be taken and filed.

viii. Information related to secret processes or methods of manufacture or production must be kept confidential. The person seeking to keep information confidential has the burden of proof. Except as provided in the Clean Air Act, information claimed to be related to secret processes or methods of manufacture or production which is emissions data may not be withheld as confidential; except such information may be submitted under a claim of confidentiality and the County shall not disclose such information unless required under the Clean Air Act

ix. Any person who is affected and not adequately represented shall have an opportunity to be a party upon prior application to and approval by the BOCC in its discretion; such party shall have the right to be heard and cross-examine witnesses

x. BOCC shall make a decision within 30 days of completion of the hearing

xi. Burden of proof is on Director of ~~CED—Community and Economic~~

Development with respect to any hearings involving alleged violations.

xii. Where the Operator requests a hearing before the BOCC on a Permit involving provisions contained in the Air Quality section of these Development Standards and Regulations, the permit applicant bears

burden of proof with respect to justification therefor and information, data, and analysis supportive thereof or required with respect to the application

- b. **Judicial Review:**
 - i. Final orders or determinations of the Community and Economic Development Director or the BOCC are subject to judicial review

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- ii. Any party may move the court to remand the case to the ~~CED~~ Director

- ~~of Community and Economic Development~~ or the BOCC in the interests of justice for purpose of adducing additional evidence and findings; such party shall show reasonable grounds for failure to adduce such evidence previously
- iii. Any proceeding for judicial review shall be filed in the district court in which the OGF is located
- c. **Injunctions:**
- i. If any person fails to comply with a final order of the ~~CED~~-Director of ~~Community and Economic Development~~ or the BOCC that is not subject to a pending administrative or judicial review, or in the event of a violation of an emission control regulation, or term or condition of a permit, the ~~CED~~-Director ~~of Community and Economic Development~~ or the BOCC may request the District Attorney for the district court in which the air pollution source is located to bring suit for an injunction
- ii. In proceedings brought to enforce an order of the of the ~~CED~~-Director of ~~Community and Economic Development~~ or BOCC, a temporary restraining order or preliminary injunction, if sought, shall not issue if there is probable cause to believe granting such order or injunction will cause serious harm to the affected person or any other person and; (1) that the alleged violation or activity will not continue or be repeated; or (2) the granting of such temporary restraining order or preliminary injunction would be without sufficient corresponding public benefit.
- d. **Coordination with the Air Quality Control Commission**
- i. Pursuant to section 25-7-128(4), C.R.S., upon the issuance of any enforcement order or granting of any permit, the County shall transmit to the AQCC a copy of the order or permit. Pursuant to section 25-7128(6), C.R.S., the County shall confer and coordinate its activities regarding efforts to control or abate air pollution consistent with that provision.

4-11-02-03-03-05

RESIDENTIAL CONSTRUCTION STANDARDS

1. **Residential Construction Standards:** The Director of Community and Economic Development may impose any one (1) or more of the following standards on a specific site basis as a condition of subdivision approval and/or building permits on platted or unplatted land:
- a. The oil and gas well location shall include a two-hundred-fifty (250) foot buffer in the form of an easement on the Final Plat. No structures may be constructed within the buffer area.
- b. Access to the oil and gas well location shall be provided by a public street or recorded easement for private access.
- c. The Final Plat shall include notice to prospective buyers of the location of the oil and gas well and associated easements.
- d. All oil and gas well flow lines and/or easements shall be graphically depicted on the Final Plat.

- e. All surface and subsurface agreements shall be noted on the Final Plat by the recorded book and page number.
 - f. Pursuant to Section 4-06-01-02-01-12, where a new home and/or other permanent structure with plumbing is constructed within three hundred (300) feet of an existing oil and gas well, the property owner shall submit a signed waiver acknowledging the existence of the facility.
2. **Plugged and Abandoned, and Former Oil and Gas Production Sites:** This Section is enacted to protect and promote the health, safety, morals, convenience, order, prosperity, or general welfare of the present and future residents of the County. These regulations are based upon the land use authority of the County.
- a. Prior to submittal of a final plat or site-specific development plan, each plugged and abandoned well shall be located and surveyed. The plugged and abandoned well shall be permanently marked by a brass plaque set in concrete similar to a permanent benchmark to monument its existence and location. Such plaque shall contain all information required on a dry hole marker by the Colorado Oil and Gas Conservation Commission and the County.
 - b. As a condition of review of any final plat or site specific development plan which contains a plugged and abandoned well or former oil and gas production site or is within 200 feet of such well or site, the owner shall submit a location diagram of the location of the well.
 - c. On every final plat or site-specific development plan which contains a plugged and abandoned well, there shall be dedicated a well maintenance and workover setback depicted on the plat, the dimensions of which shall be not less than fifty feet in width and 100 feet in length. No structures shall be located within this setback. The plugged and abandoned well shall be located in the center of the setback. There shall be public access for ingress and egress to the setback of a width of not less than twenty feet.
 - d. Every final plat and site specific development plan which contains a plugged and abandoned well or a site specific development that includes a property that is less than 200 feet from a plugged and abandon well, shall include the following notation: "The owner shall disclose to prospective purchasers of lots within a radius of 200 feet of the plugged and abandoned well of (1) the location of the plugged and abandoned well, (2) the location of the maintenance and workover setback, and (3) the purpose for the well maintenance and workover setback."
 - e. As a condition of building permit review, no dwelling shall be constructed within fifty (50) feet of a plugged and abandoned well.
-
- f. Prior to issuance of a grading permit within a development containing a known reserve pit site, the reserve pit site shall be tested for expansive soils. Reserve pits containing expansive soils in

locations proposed for buildings shall be subject to the provisions of the International Building Code.

- g. No utility lines shall be installed within ten feet of any plugged and abandoned well.

4-11-02-03-03-06

COGCC AND COUNTY APPROVALS REQUIRED

Development of the OGF shall not commence unless and until applicant receives an approved OGF Permit, including any approved waiver(s), and receives all required approvals and permits from COGCC.

4-11-02-04 HEAVY INDUSTRY

4-11-02-04-01

GENERAL

1. *Outdoor Storage:* Materials may be stored outdoors, provided the storage area is consistent with the zone district allowances. All outdoor storage shall be screened in accordance with the Fencing, Walls and Screening section (See Section 4-11-01-03) of these standards and regulations.
2. *Garbage Storage:* Garbage area screening shall consist of a six (6) foot high minimum screen fence made of wood or masonry material. Fencing materials should be cleaned and maintained must be clean and maintained at all times to present an orderly appearance. No garbage storage area shall be located within twenty (20) feet of a public sidewalk
3. *Smoke and Odor Control:* Smoke and odor shall be controlled by filter, scrubbers, fans, or other means.
4. *Hours of Operation:* The hours of operation shall be from 7:00 a.m. to 7:00 p.m. for this use category when within two-hundred feet of a residentially used dwelling.

4-11-02-04-02

AUCTION YARDS, WITH LIVESTOCK

1. *Minimum Parcel Area:* one (1) acre
2. *Location:* All auction yards shall be located at least fifty (50) feet away from any on-property residence, fifty (50) feet from any right-of-way and five hundred (500) feet from any off-property residence.
3. *Operation in Accordance with County Tax Regulations:* The yard shall operate in accordance with the County Sales and Tax Department Regulations.

4-13 PARKING, LOADING, AND CURB CUT REQUIREMENTS

4-13-01 APPLICABILITY
Off-road parking and loading requirements in all new developments shall comply with the general access, circulation, and parking standards set forth in this Section.

4-13-02 GENERAL STANDARDS

4-13-02-01 SAFETY BARRICADES
A curb, rail, fence, guard, or other continuous safety barricade of a height or design sufficient to retain vehicles within the parking area shall be provided except for single-family residences and duplexes.

4-13-02-02 COMMERCIAL AND INDUSTRIAL PARKING LOT SCREENING/FENCING REQUIRED
For each boundary line of a commercial or industrial parking area abutting directly on a residential lot a wall, fence, or screen planting of a year-round nature shall be installed at least forty-eight (48) inches high to serve as a barrier for passage of persons and waste material, to conceal glare from headlights, and to reduce noise, fumes, and pavement heat.

4-13-02-03 PLANTINGS PROTECTED
Wheel or bumper guards shall be located so no part of any vehicle extends beyond the boundary lines of the parking area or comes in contact with walls, fences, plantings, or any other structures.

4-13-02-04 PARKING AREA LANDSCAPING REQUIREMENTS
Parking areas are required to meet standards for landscaping within the parking area and around the perimeter of the parking area. Landscaping requirements are found in Section 4-17 ~~Error! Reference source not found.~~ of these standards and regulations.

4-13-02-05 SURFACE OF PARKING AREA
Except for agricultural areas, off-road parking areas shall be surfaced and maintained with a portland or asphalt concrete surface, or other suitable surface as determined by the Director of Community and Economic Development. Drainage shall be subject to the approval of the Director of Community and Economic Development.
The surface of the parking area shall be maintained with the following minimum requirements:

1. Potholes shall not exceed six (6) inches deep or six (6) inches wide.
2. Cracks shall not exceed three (3) inches in width.

4-16 OFF-PREMISE ADVERTISING DEVICES (BILLBOARD)

4-16-01 PURPOSE

The Purpose of this section is to advance the County's legitimate and substantial interest in limiting the number and area of off-premise advertising devices permitted to maintain the visual appearance of scenic corridors, avoid clutter, and protect the health, safety, and welfare of the citizens of Adams County by mitigating traffic distractions.

4-16-02 APPLICABILITY

Off-premise advertising devices are permitted with an approved Conditional Use Permit in the C-5 and industrial zone districts. All off-premise advertising devices shall meet the standards contained in this Section ~~4-16-15~~.

A Conditional Use Permit or a Major Amendment to an existing Conditional Use Permit or Planned Unit Development shall be required to display, erect, relocate, or alter any off-premise advertising device excluding indirect lighting traditionally used and attached to a sign, but not internally located.

Provided any Off-Premise Advertising Device complies with all standards in this Section and allows off-premise commercial messages, the Off-Premise Advertising Device shall also be permitted to allow non-commercial messages to the same extent.

In conjunction with these Development Standards and Regulations, the Colorado Outdoor Advertising Act, C.R.S. 43-1-401 et. seq, and the Colorado Rules and Regulations promulgated thereunder by the Colorado Department of Transportation shall be adhered to. Nothing in these Standards and Regulations shall be construed to allow advertising devices which are prohibited, or otherwise non-conforming with the Colorado Outdoor Advertising Act.

4-16-03 MAXIMUM NUMBER OF SIGNS

Only one (1) two-faced off-premise advertising device shall be permitted per lot.

4-16-04 MAXIMUM SIZE

No off-premise advertising device shall exceed three hundred (300) square feet per face.

4-16-05 MAXIMUM HEIGHT AND MINIMUM CLEARANCE

No off-premise advertising device shall exceed forty (40) feet in height. Height shall be determined as the distance from the grade of the right-of-way on which the sign fronts to the top of the sign including all projections. If located within one thousand

3. **Required Trees and Shrubs:** A minimum of one (1) large tree and two (2) shrubs, or two (2) ornamental trees and two (2) shrubs, shall be required for each increment of fifteen hundred (1,500) square feet in western Adams County and three thousand (3,000) square feet in eastern Adams County.
4. **Parking Lot Landscaping:** All parking lots which consist of thirty (30) spaces or more must be designed to include landscaped islands between rows. This landscaping shall be credited toward the total landscaped area required.
5. **Required Tree Mix:** The selection of trees shall be a mix of large deciduous (10% - 50%) and ornamental (10% - 50%). Evergreens shall be considered ornamental.
6. Minimum size requirements for trees and shrubs shall be:

<i>Plant Type</i>	<i>Maturity Height</i>	<i>Minimum Plant Size at Planting</i>
Ornamentals	Less than 20'	1" to 1-1/2"
Large Deciduous	Over 20'	2" to 2 1/2"
Evergreens (Sm.)	Less than 20'	5' tall
Evergreens (Lg.)	Over 20'	6' tall
Low Shrubs	1' to 3'	5 gallon
Upright Shrubs	3' to 10'	5 gallon

7. **Irrigation System Required:** A fully automatic irrigation system is required.

4-17-09-01-05 **DWELLING, MANUFACTURED HOME PARK**

A twenty (20) foot strip around the boundary must be landscaped to provide a visual screen. All open spaces and other unimproved areas must be suitably landscaped. All landscaping must be maintained and furnished with an automatic sprinkler system.

4-17-09-01-06 **DWELLING, MOBILE HOME PARK**

A landscaping plan shall be submitted for review and approval. The setbacks of the development and any other area not covered by mobile homes, driveways, ingress and egress, or other structures, shall be landscaped.

4-17-09-02 **COMMERCIAL USES**

4-17-09-02-01 **AUTOMOBILE SERVICE STATIONS**

1. **Screening:** Service stations shall be separated from abutting residential properties by a six (6) foot high masonry wall and a Bufferyard as required in Section 4-~~17-16~~-06.

4-17-13 DEVELOPMENT ABUTTING ADAMS COUNTY TRAIL SYSTEM

Any new development abutting any portion of the designated Adams County Trail System, a public park, or limited access highway, shall be buffered from the trail, or park, using a Special Bufferyard (Type C), unless increased or decreased by the Director of Community and Economic Development.

4-17-14 REQUIRED LOT LANDSCAPING

In addition to the required bufferyards and bufferyard landscaping, the following site landscaping shall also be required:

4-17-15 ADMINISTRATIVE RELIEF

Administrative relief is provided to add flexibility in the application of the landscaping regulations in this Section 4-17-16 when a standard is inapplicable or inappropriate to a specific use or design proposal. However, the granting of administrative relief should not always mean a requirement is reduced without mitigation – be it landscaping combined with urban design elements (i.e. architectural elements within a parking lot that screen parking to provide shade pavement, sidewalk/tree lawn area, gathering space or plaza, or natural areas), concentrated/denser plant material within a reduced buffer yard width, or demonstrations of concepts that are equal to or superior in fulfilling the purpose of the landscaping requirements).

A written request for administrative relief shall be submitted to the Director of Community and Economic Development either before or in conjunction with the building permit review process. The written request shall:

Include a justification in terms of the findings necessary to grant administrative relief; and the written request shall close with a section for the Director of Community and Economic Development's use, which will include a block for the decision of approval/denial, the Director of Community and Economic Development's signature, and decision date.

The written request with decision shall be attached to the plan or retained in the applicable file, as appropriate. An example of this written request shall be available from the Director of Community and Economic Development.

The Director of Community and Economic Development must make all of the following findings in order to grant administrative relief:

The strict application of the regulations in question is unreasonable given the development proposal or the measures proposed by the applicant or the property has

extraordinary or exceptional physical conditions or unique circumstances which



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June 9, 2021

VIA EMAIL – NO ORIGINAL TO FOLLOW

ATTN:

Adams County Board of County Commissioners
Greg Dean, Local Governmental Designee
Katie Keefe, Environmental Program Manager, CED
Ryan Nalty, Interim Director of Community and Economic Development
Christy Fitch, Assistant County Attorney

RE: Colorado Oil & Gas Association – Comments to Adams County May 18, 2021
Draft Oil and Gas Regulatory Amendments

Dear Adams County Commissioners, Staff, and Counsel,

The Colorado Oil & Gas Association ("COGA") respectfully submits this letter regarding Adams County's May 18, 2021 proposed oil and gas regulatory amendments. COGA will continue to provide additional, constructive input as the County moves forward in drafting, and ultimately adopting, new regulations in accordance with state law, including the statutory requirement that local governments may enact regulations pertaining to the surface impacts of oil and gas operations only to the extent such regulations are reasonable and necessary.

While some positive changes have been made addressing certain of COGA's comments submitted on April 28, 2021, the majority of our concerns remain unaddressed. COGA again submits that many of the draft provisions continue to be in violation of state law, as they are neither reasonable nor necessary to protect public health, safety, welfare, the environment, and wildlife. Please note that the items discussed below do not represent all of COGA's concerns, nor are they presented in any particular order of importance. Also, as most of COGA's prior comments were not addressed in the County's most recent draft, COGA is re-submitting its April 28, 2021 comment letter and requests the recipients review it in conjunction with this updated letter.

Setbacks

As stated in our previous comments submitted on April 28, 2021, Adams County's draft setback provisions are extremely prohibitive of any new oil and gas development. Changes made in the May 18 draft have only exacerbated the effect of the setbacks. To begin, staff has significantly increased the draft setback through its proposed revision in Chapter 11 of the Adams County Code to add "Waters of the State," to the definition of "Environmentally Sensitive Areas," receptors for which the draft code calls for a 2,000' setback that cannot be administratively waived.

The County Code defines "Waters of the State of Colorado"¹ to mean, among other unspecified things, "streams, lakes, rivers, ponds, wells, impounding reservoirs, watercourses, **watercourses that are usually dry**, springs, drainage systems, and **irrigation systems**, all sources of water such as **snow, ice, and glaciers**; and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, located wholly or partially within or bordering upon this state and within the jurisdiction of this state." Section 11-02-649 (emphasis added).

As stated above, these areas would be subject to the 2,000' setback as outlined in the draft Chapter 4 amendments. We believe the County either has not considered or has vastly underestimated the impact applying a 2,000' setback to "Waters of the State" as the County's own Code defines that the concept. Among other problems, oil and gas facilities are often co-located (with the surface owner's consent) on agricultural land with irrigation systems. Applying this setback as drafted would remove rural areas with few residents from potentially hosting oil and gas development, a perverse result. COGA also does not understand how an operator could possibly comply with a 2,000' setback from snow. COGA asks staff to update the County's setback maps as previously presented to the Commissioners to show setbacks from ditches, canals, drainage systems, and all other features the Code classifies as "Waters of the State of Colorado" and therefore part of "Environmentally Sensitive Areas" subject to the 2,000' setback. Rather than implementing a strict setback from water features, Adams County should use the other tools it has to work with operators on implementing BMPs that protect water sources at distances closer than 2,000'.

Further increasing the difficulty of siting a new oil and gas facility is the new proposed requirement specifying how setbacks are measured. As stated in the May 18 draft of Chapter 4, the setbacks will be "measured from the edge of maximum disturbance

¹ The County does not have a definition for "Waters of the State," though the County's use of capitalization indicates the phrase is a defined term. COGA presumes the County is referring to "Waters of the State of Colorado," as that is a definition included in the County's Code. If Adams County intends something different, COGA asks that Adams County define "Waters of the State" in its Code and notes that having two different definitions for "Waters of the State" and "Waters of the State of Colorado" would be exceedingly confusing.

which includes the rough grading footprint of the Oil and Gas Facility, including the final landscaping boundary.” It is unclear why Adams County further increased the measurement distance and what the basis for doing so is. Landscaping does not pose health and safety risks. Instead, as COGA has previously noted, the County should consider where well-heads and production facilities are located on a proposed site and have those end points drive setback measurements.

As COGA has stated in previous stakeholder meetings, setbacks should not be the only tool considered to help mitigate potential impacts from oil and natural gas development. Setbacks are a blunt instrument, and the County should consider what BMPs operators can offer to reduce any impact.

Further, as Adams County was a Party during the Mission Change Rulemaking at the COGCC, Commissioners and Staff are aware of air quality data, health data, and other information presented to the Commission by third party engineers, scientists, and toxicologists that does not support a 2,000’ setback. CDPHE has also said regarding its last health study that it has found no levels of concern. State Toxicologist Kristy Richardson said, “To investigate those concerns that have been reported to us, we have collected approximately 5,000 samples in communities near oil and gas operations in Colorado. We have never measured levels that are above our health-based guideline values.” COGA would again point to Appendix A submitted in our previous comments that mentions specific communities along the Front Range and real-time data collected during oil and gas operations.

For the above and other reasons, COGA submits that the County’s 2,000’ setback is unreasonable and unnecessary and should be significantly modified to prevent an outright ban on oil and gas development.

Noise Requirements/Setback

Requirements for noise level compliance remain discriminatory against the oil and gas industry. It is still unclear to COGA why oil and gas development is proposed to be held to a different standard than other land uses within Adams County. The County has claimed that oil and gas is not being treated disparately from other industries, but the County has not pointed to any other Code provision requiring another type of use to comply with the maximum permissible noise levels for a differing land use or zone district within 2,000’. As we understand the draft, the Code would make it perfectly legal for a non-oil and gas use to be louder than oil and gas operations where the two uses are within the same zoning district and within 2,000’ of a different land use designation or zoning district. We again ask Adams County to recognize that noise is noise, regardless of the source, and to further acknowledge that noise impacts from oil and gas development are largely limited to the drilling and completions phases of development.

COGA appreciates the close attention paid to our concerns and we welcome additional opportunities to discuss them further with the Commissioners and staff.

Sincerely,

A handwritten signature in dark ink, appearing to read 'R. Seastrom', is positioned above the typed name.

Ryan Seastrom, Regulatory Affairs Manager, Colorado Oil & Gas Association

cc (via email):

Mark Mathews-Brownstein Hyatt Farber Schreck, LLP

Julia Rhine-Brownstein Hyatt Farber Schreck, LLP

Rich Coolidge-Colorado Oil & Gas Association

Dan Haley-Colorado Oil & Gas Association

Christy Woodward-Colorado Oil & Gas Association

CHAPTER 2-APPLICATION AND PERMITTING PROCEDURES

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2-02-14 OIL AND GAS FACILITY (OGF) PERMIT

2-02-14-01 PURPOSE

The purpose of the Oil and Gas Facility regulation is to allow for reasonable development of oil and gas in unincorporated Adams County while ensuring that facilities are sited in appropriate areas and utilize best practices to protect the health, safety, and welfare of our residents and the environment and wildlife.

The purpose of an OGF Permit is to regulate the surface land use of oil and gas production in order to protect the public safety, health, welfare and the environment of Adams County and its residents by ensuring that facilities are constructed and operated in accordance with best practices, to provide for sound environmental practices to protect the County's natural resources, to provide for the orderly siting and development of oil and gas operations, as well as to prevent damage to County roads and bridges.

The Colorado Oil and Gas Conservation Commission (COGCC), the Colorado Department of Public Health and the Environment (CDPHE) and the federal government have authority to regulate certain aspects of oil and gas mineral extraction. Requirements contained in this section shall not exempt the owner or operator of an oil and gas facility from compliance with the requirements of the COGCC, CDPHE, or any other regulatory authority.

The provisions of these standards and regulations shall apply to the construction, installation, alteration, repair, erection, location, maintenance, operation, and abandonment of all new or substantially modified oil and gas facilities within the unincorporated areas of the County. Substantially modified for the purposes of this section means anything requiring a Major Amendment.

Commented [COGA1]: Added May 2021 draft

2-02-14-02 APPLICABILITY

All uses that require an OGF must be processed in accordance with this Section. The Director of Community and Economic Development (CED) is the permit issuing authority for OGF Permits that do not require any waiver from approval criteria or performance standards. OGF Permits requiring waivers from approval criteria or performance standards must be approved by the Board of County Commissioners through the designated Waiver process.

2-02-14-03 WHO CAN INITIATE AN OGF PERMIT

An OGF Permit may be requested, without limitation, by any owner of, or person demonstrating a legal interest in property on which the OGF use is proposed to be located. The applicant has the burden of proof to demonstrate the use fully complies with these standards and regulations and meets the criteria for approval.

2.02-14-04 OGF PERMIT REVIEW PROCEDURES

An OGF Permit may be approved by the Director of Community and Economic Development if the application does not require waiver or modification from any approval criteria or performance standards. An OGF Permit requiring a waiver or modification from any of the approval criteria or performance standards, or as otherwise stated in these ~~must~~ regulations, must be approved by the Board of County Commissioners and requires a public hearing. The Director of Community and Economic Development or the Board of County Commissioners shall approve, approve with conditions, or deny the OGF Permit based on consideration of the staff report, the evidence from the public hearing (if applicable), and compliance with the criteria for approval.

Commented [COGA2]: Added May 2021 draft

2-02-14-04 OGF PERMIT REVIEW STEPS

The processing of a proposed OGF permit shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures (although not necessarily conducted in the following order) as follows:

1. **Conceptual Review.** Operator shall identify three (3) proposed locations for the Oil and Gas Facility for the Alternative Site Analysis process outlined below. For each location, Operator shall identify, and visually depict the same on a map, the following items that are located within a half-mile (1/2) radius of the parcel boundary of the proposed facility: existing or platted residences, occupied buildings, parks, open space, schools, future school facilities, state licensed daycares, known areas of environmental contamination such as superfund sites, hospitals, water bodies, floodplains, floodways, water supply facilities including wells, existing active and decommissioned wells, and roadways. Proposed access routes to the site should also be provided. This information must be submitted to Community and Economic Development for review. Following that, a conceptual review meeting shall be held with the Operator. Operators are encouraged to schedule a conceptual review prior to entering into any surface use agreements.
 - a. **Alternative Site Analysis:** Prior to submittal of Form 2, ~~or A,~~ or Oil and Gas Development Plan to the COGCC and during the conceptual review, the applicant must consult with the County on an Alternative Site Analysis as outlined below:
 - (1) In General. The County seeks to site OGFs in areas that have the least off-site impact possible in order to protect the health, safety, and welfare of its residents and to protect the environment and wildlife. In order to determine whether proposed siting is appropriate, CED staff ~~the Community~~

and Economic Development Department must evaluate alternative sites.

- (2) Description of potential sites. Applicant must submit descriptions of at least three (3) potential sites for the OF that were considered by applicant. All potential site descriptions shall include Geographic Information System (GIS) data. The GIS data shall include, at a minimum, the outline edge of maximum disturbance and the access road for each proposed site. The description shall include an explanation of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.

- (a) Potential sites ~~must be a minimum of~~ shall be: (1) a minimum of 5001,000 feet away from each other but can be located on the same parcel; and (2) uniquely distinct different from one another as determined by the Directory of the Community and Economic Development. Description must include description of site locations considered, whether mineral extraction is possible and reasonable from those sites, and why a particular site is proposed, if any.

Commented [COGA3]: Can the County please help operators understand what is meant by "uniquely distinct from one another" and state the criteria under which the Director will determine "unique" distinction among proposed sites?

- ~~(2)~~ (3) Evaluation materials. ~~CED staff~~ the Community and Economic Development Department will evaluate the potential sites to determine which site is likely to have the least off-site impacts. The ~~CED~~ Director of Community and Economic Development will determine whether applicant is required to provide traffic impact studies, engineering studies, Environmental Impact Analysis as defined in these standards and regulations, or other evaluation tools in order to adequately evaluate site options. If not required by the ~~CED~~ Director of Community and Economic Development as part of the alternative site analysis, these site-specific evaluation tools can be submitted by the applicant after site selection has occurred.

Commented [COGA4]: Operators are already required to provide a transportation plan and required to pay a traffic impact fee based on # of wells. What would the purpose be of an additional study?

- ~~(3)~~ (4) Evaluation criteria. In determining which sites are likely to have the least off-site impact, ~~CED the Community and Economic Development Department~~ may consider the following, at a minimum:

- (a) Distance from existing or platted residences, schools, state licensed daycares, high occupancy buildings, active open spaces, environmentally sensitive areas, public drinking water supply areas, or other areas likely to be adversely impacted;
- (b) Traffic impacts and impact to roads, bridges, and other infrastructure;
- (c) Access to water and other operational necessities;

- (d) Whether the site allows for utilization of impact mitigation, such as use of proximate pipelines;
- (e) Noise impacts;
- (f) The impact on the surrounding land;
- (g) The impact on wildlife; and
- (h) Impact on nearby environmental resources such as water bodies.

~~(4)(5)~~ Site Selection. The County shall review all proposed locations in order to determine which location(s) best protects public health, safety, welfare, ~~and~~ the environment, and wildlife resources and will choose the location that best satisfies this goal. The Director of Community and Economic Development will determine if any proposed sites meet this goal. If no location satisfies this goal, Operator shall submit three new proposed locations. The County may recommend denial of the OGF Permit if it does not believe that any of the proposed sites meet the siting goal. Site Selection as part of the Alternative Site Analysis, as outlined above, does not constitute the approval of an OGF application.

2. Neighborhood Meeting: Applicable. At the neighborhood meeting, the applicant shall provide an overview of its proposed oil and gas operation and allow those in attendance to provide input as to the proposed operation, including, but not limited to, issues that arise from application of these regulations to the proposed operation, and suggested mitigation to adequately ensure compliance with these regulations. Where Disproportionately Impacted Communities, as defined in COGCC rules, are located within one (1)-half mile of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns based on primary and secondary languages, culturally sensitive methods of communication and, other socio-economic factors that impact public availability and participation in neighborhood meetings. If any additional neighborhood meetings are required, those meetings shall comply with the requirements of Section 4-11-02-03-03-03. Any additional neighborhood meetings shall comply with the Community Outreach requirements of Adams County Development Standards and Regulations (Chapter 4).

2-3. Development Application Submittal: The Community and Economic Development Department has developed a checklist and development application guide for required submittals for OGF Permits that are subject to change (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed.

Commented [Author5]: What is the County's reasoning for extending the notice an extra half mile? What, if any, impacts does the County foresee at that distance?

Commented [COGA6]: Please provide guidance on what "adequate engagement" entails.

Commented [COGA7]: Added May 2021 draft

Commented [COGA8]: Please confirm that there will be a stakeholder process involved in any changes to the application guide and that operators will have an opportunity to participate with notice provided of the proposed changes.

~~3. Development Application Submittal: the Community and Economic Development Department has developed a check list and development application guide for of required submittals for OF Permits that are subject may changetochange from time to time (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed. At a minimum, the following items are required as part of an OF application submittal:~~

Commented [COGA9]: Added May 2021 draft, formatting only

~~4. Application Form: a completed OGF Permit application form~~

Commented [COGA10]: Application Form and fees relocated to OF Development application checklist:

~~5. Application Fee: OGF application fee~~

~~6.4. Operations Plan:~~

~~(1) Plan Format: Two hard copies of all plans shall be provided, and one copy of the plans shall be provided in digital format, on either a thumb drive or CD. No plans shall contain copyright restrictions or public use restrictions.~~

Commented [COGA11]: Operations Plan details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

~~(2) Cover Sheet: The cover sheet shall have a title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township and range. The cover sheet shall also include a legal description of the area, date of the drawing, existing zoning of the site, a sheet key, a vicinity map with north arrow (scale of 1"=2,000' preferred) with an emphasis on the major roadway network within two (2) miles of the proposal, and all applicable County notes, an approval signature block and a block to insert the COGCC Permit number when approved.~~

~~(3) Impact Area Map: The second sheet shall contain an Impact Area map that shows the proposed location of the Oil and Gas Facility, locations of all producing oil and gas wells and other oil and gas operations within the one mile (1) Impact area; locations of all abandones and shut in wells within one quarter (1/4) mile radius of the projected track of the borehole; locations of all permitted registered water wells within one half (1/2) mile of the proposed Oil and Gas Operation; existing improvements within 1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one mile impact area.~~

~~(4) Drilling Operations Plan: The third sheet shall provide a site plan of drilling operations with drilling equipment with existing and proposed finished grade topography at two foot (2') contours.~~

~~or less tied to a datum acceptable to the County. The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.~~

~~(5) Production Plan: The fourth sheet shall provide a site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished grade topography at two foot (2') contours or less tied to a datum acceptable to the County. The production plan shall also identify tentative drilling and completion schedules. A seed mix shall be provided for reseeding the well pad. Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility; if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.~~

~~(6) Signage Plan/Sign Detail: A dimensioned Signage Plan or Sign Detail shall be included on one of the sheets describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs. Directional signs for emergency responders and inspectors shall be included, along with a 24-hour, 7 days per week contact information to deal with all noise complaints. The sign with the 24-hour contact information must be placed close to the intersection of the access road and the right-of-way so that it is legible from the public right-of-way.~~

~~(7) Final Plan: Once the review process is complete and staff has determined that all outstanding issues been resolved, staff will request a final copy of the Oil and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the County staff.~~

~~b. **Emergency Preparedness and Response:** in accordance with the Emergency Preparedness and Response requirements in Section 4-10-02-03-03-03(9).~~

~~(1) Emergency Service Providers: The applicant must provide a commitment to serve ("will serve") letter from the authority having jurisdiction for providing~~

Commented [COGA12]: Emergency Preparedness and Response details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

~~emergency services (fire protection and emergency medical services) for that facility, or, where no authority has jurisdiction, from an emergency service provider with the ability to provide such emergency services.~~

~~e. **Engineering Documents:** The following technical Engineering documents are required by the CED staff unless otherwise waived:~~

- ~~(1) Construction Plans: If applicable, Construction Plans for the proposed Oil and Gas Operation's public improvements including road plan and profile sheets, storm drainage improvements plans and other public improvements, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9):~~
- ~~(2) Pavement Design Report: If applicable, a Pavement Design Report prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 7):~~
- ~~(3) Grading Erosion and Sediment Control: If applicable, a Grading, Erosion, Sediment Control Report and Plan as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9):~~
- ~~(4)(1) Transportation, roads, access standards, and fees:~~
 - (a) The applicant's transportation plan must be designed and implemented to ensure public safety and maintain quality of life for other users of the county transportation system, adjacent residents, and affected property owners.
 - (b) Where available, existing private roads shall be used to minimize land disturbance unless traffic safety, visual or noise concerns, or other adverse surface impacts clearly dictate otherwise.
 - (c) Access roads on the site and access points to public roads as identified in the application materials shall be reviewed by the [Community and Economic Development Department CED department](#) and shall be built and maintained in accordance with the engineering specifications and access road standards defined in the Adams County Development Standards and Regulations (Chapter 8).

Commented [COGA13]: Engineering Documents details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

- ~~(d) All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:~~
- ~~i. Access permit fees~~
 - ~~ii. Oversize/overweight permit fees~~
 - ~~iii. Right of way construction permit fees; and~~
 - ~~iv. Traffic impact and road maintenance fees.~~

Commented [COGA14]: Transportation fees relocated to DSR Chapter 4

~~(e)(d)~~ Oil and gas operations must minimize impacts to the physical infrastructure of the county transportation system. Any costs to improve county transportation system infrastructure necessitated by the proposed oil and gas operation shall be the responsibility of the Applicant. All transportation system infrastructure improvements and associated costs shall be determined by the [Community and Economic Development Department](#) ~~CED~~ department. The County shall perform the work or arrange for it to be performed. If the Applicant disagrees with the infrastructure improvements or associated costs as assessed by ~~CED~~ [the Community and Economic Development Department](#), it may request that the department approve a different route for its proposed oil and gas operation that avoids the need for such improvements. Alternatively, the Applicant may engage a licensed civil engineering firm to perform a traffic impact study in accordance with Chapter 8 of the Development Standards and Regulations to independently evaluate county transportation system infrastructure improvements necessitated by the proposed oil and gas operation.

Commented [COGA15]: Operators are already required to pay traffic impact fees for impacts to the county's transportation system infrastructure. Would there be additional costs assessed on top of that fee, and if so, what for?

Per C.R.S., Section 29-20-104.5: "No impact fee or other similar development charge shall be imposed except pursuant to a schedule that is... (c) intended to defray the projected impacts on capital facilities caused by proposed development....."

A local government shall quantify the reasonable impacts of proposed development on existing capital facilities and establish the impact fee or development charge at a level no greater than necessary to defray such impacts directly related to proposed development."

- ~~(5) Drainage study/technical drainage letter/plan: If applicable, a Drainage Study/Technical Drainage Letter/Plan prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~
- ~~(6) Floodplain Use Permit: The applicant must obtain a Floodplain Use Permit, in accordance with the latest version of the Adams County Development Standards and Regulations, if the proposed Oil and Gas construction disturbance or operation eneroaches into the 100-year floodplain, or the access is crossing a major drainage way, as defined by the latest version of the Adams County~~

~~Development Standards and Regulations (Chapter 9).~~

~~(7) Natural Resource Conservation Overlay (NRCO): if the Oil and Gas Facility is located in the NRCO, a Resource Review may be required.~~

~~d. **Water Supply:** the applicant must provide proof of adequate water supply. Operator shall identify a water resource lawfully available for industrial use, including oil and gas development, to be utilized by Operator and its suppliers.~~

~~e. **Surface Owner Documentation:** Documentation as to whether the surface owner and others with interest in the property have authorized the proposed OGF.~~

~~f. **Additional Information:** Community and Economic Development will develop an application check list that may require additional information to process an OF Permit application. In addition to the items required on the check list, the Director of Community and Economic Development may require additional information deemed necessary to evaluate particular applications.~~

7.5. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.

8.6 Staff Report: Applicable.

a. Concurrent Referral and Review. County staff may refer the complete application review by the various County Departments and the County Attorney's Office, as deemed appropriate. An application may require review by outside experts or agencies such as the U.S. Army Corps of Engineers, if the project impacts a floodplain, life-safety providers, adjacent jurisdictions, local public health departments, and others as may be deemed appropriate. Operator shall reimburse the County for reasonable costs incurred in connection with the use of third-party expert reviewers.

9.7. Notice: Applicable, except notice shall be sent by the applicant to all property owners and current residents within a one (1) half mile of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County, at a minimum, or greater, as determined by the Director of Community and Economic Development. The Notice shall meet the format prescribed by the County. The notice shall contain a statement informing the recipients of the notice that they may request written notification by the Applicant of the commencement of construction and commencement of drilling operations. The applicant shall provide written notification by U.S. Mail, which shall include an offer to consult, to any municipality, special district, or County whose boundaries are within

Commented [COGA16]: Water Supply requirements relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [COGA17]: Surface Owner Documentation relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [COGA18]: Additional Information relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [COGA19]: Added in May 2021 draft

one-half (1/2) mile of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County. Posted notice shall be required for all OGF Permits. The signs shall be posted by the County on the subject property in a manner and at a location to afford the best notice to the public. Posting for an OGF Permit shall take place no later than ten days after the Operator selects a site for the facility.

~~10-8.~~ **Public Hearing.** Applicable if the OGF Permit requires non-administrative waiver from any approval criteria or performance standards. In cases requiring a waiver, a public hearing shall be held in front of the Board of County Commissioners.

~~11-9.~~ **Standards:** Applicable.

~~12-10.~~ **Conditions of Approval:** Applicable. The Director of Community and Economic Development in approving a permit for an OGF may attach any conditions necessary to implement the Adams County Comprehensive Plan, ~~and to~~ ensure the compatibility with adjacent uses, and are protective to public health, safety, welfare, the environment, and wildlife resources. Conditions may include a requirement of an Access Permit or Oversize Load Permit prior to development of the Oil and Gas Facility, a Floodplain Use Permit prior to any work within the floodplain, or a building permit prior to construction of certain structures within the Oil and Gas Facility.

a. **Term:** The approving authority shall specify the term of the OGF Permit as three (3) years. If, at the expiration of the three (3) year period, a well is not completed or has not commenced production operations as defined by the COGCC Rules and Regulations, the approval of that well shall lapse. For any wells for which approval has lapsed, the applicant shall be required to apply for a new OGF Permit in accordance with these regulations. The following: provided that at least one well is drilled and completed during the initial three (3) year period following all required State and local approvals of the OF, such action permanently vests the permitted location for the number of wells contained within the initial permit approval. If wells permitted as part of the initial OF permit are to be drilled at the multi-well pad location following the expiration of the initial three (3) year period, those permit(s) for those wells shall be renewed following the OF permit process as outlined in these regulations.

~~13-11.~~ **Amendments.** Applicable. All amendments must be processed in accordance with Section 2-01-10, Amendments. Major Amendments for OGFs include, at a any minimum, any amendments to a Form 2A with the COGCC. For purposes of an OGF Permit, anything not identified as a major amendment shall be processed as a Minor Amendment.

Commented [COGA20]: Please clarify whether this means after the operator selects a site or after the Director of CED approves a site? It is unclear how this works with the alternative location analysis requirement.

Commented [COGA21]: Added in May 2021 draft

Commented [COGA22]: COGA encourages the County to have its permit expire at the same time the COGCC permits do.

Commented [COGA23]: Please provide a definition for "Major Amendment" and explain what amendments other than amendments to a Form 2A would qualify as a Major Amendment.

2-02-14-06 CRITERIA FOR APPROVAL

The Board of County Commissioners or Director of Community and Economic Development, in approving an OGF Permit, shall consider:

1. The OGF is consistent with the purposes of these standards and regulations.
2. The OGF will comply with the requirements of these standards and regulations including, but not limited to, all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
3. The siting of the OGF, after evaluation of alternative sites, is the most compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare, the environment and wildlife of the County.
4. The siting of the OGF does not create any site-specific conditions that present significant or material impacts to nearby land uses.
5. The OGF has addressed off-site impacts and complies with all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
6. The site is suitable for the use, including adequate usable space, adequate access, and adherence of environmental or wildlife stipulations.
7. The site plan for the proposed use will provide adequate parking, traffic circulation, fencing, screening, and landscaping.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are available and adequate to serve the needs of the OGF as designed and proposed.
9. Cultural and Historical Resources: the OGF does not cause significant degradation of cultural, historic, or archaeological sites eligible for County landmarking, or the National Historic Register.
10. Water Bodies and Water Quality: the OGF does not cause adverse impacts to surface or ground waters within Adams County. The [Operator](#) shall comply with all applicable water quality standards.
11. Emergency Preparedness and Response: the OGF does not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
12. Air Quality: The OGF meets all required air quality standards.

2-02-14-07 OIL AND GAS FACILITY PERMIT WAIVER**2-02-14-07-01 PURPOSE**

The purpose of this section is to establish criteria and detail the steps whereby the Board of County Commissioners, at public meeting, may grant waivers or modifications from approval criteria or performance standards normally required for OGF Permits, allow

the OGF use in an area not zoned for OGFs, or allow applicant to develop an OGF site not selected by Community and Economic Development.

2-02-14-07-02 *APPLICABILITY*

If the OGF permit application is denied based on noncompliance with the approval criteria or performance standards, if the applicant seeks to develop in an area not zoned for OGF development, or if an applicant seeks to develop on a site not approved by CED staff the [Community and Economic Development](#), an applicant may apply for an Oil and Gas Facility Permit Waiver.

Commented [COGA24]: I do not see in Chapter 4 the requirement that the OGF be in a zone district allowing for OGF development. This requirement is troubling because the AdCo code does not appear to allow OGFs in the Agricultural 1 District and certain other districts.

2-02-14-07-03 *WHO CAN INITIATE A WAIVER*

A waiver may be proposed by any applicant that may apply for an OGF. The applicant has the burden of proof to demonstrate that the waiver or proposed site selection meets the criteria for approval.

2-02-14-07-04 *WAIVER REVIEW PROCEDURES*

Any waiver shall be processed through a public hearing before the Board of County Commissioners (See Steps 1 through 10 below). Waiver applications will be heard by the Board of County Commissioners at a public hearing. At such public hearing, the Board of County Commissioners may waive or modify specific regulations or standards requested by the applicant and approve the application, may approve with conditions, or may deny the application.

Applicants may only seek a waiver after submitting a complete application for an OGF Permit and participating in a conceptual review meeting with Community and Economic Development staff. If applicant is unable to meet all approval criteria and comply with all performance standards required for an OGF Permit, applicant may choose to seek a waiver from the Board of County Commissioners. The processing of a waiver shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures as follows:

1. Conceptual Review: Must be completed prior to application for waiver as part of OGF Permit process.
2. Neighborhood Meeting: Director of Community and Economic Development will determine whether neighborhood meetings are required after evaluating steps taken as part of OGF process.
3. Development Application Submittal: In addition to all requirements for an OGF Permit, applicant must provide a request for waiver that articulates the specific waivers sought and explains why waivers are necessary.
4. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.
5. Staff Report: Applicable g'
6. Notice: Applicable.

7. Public Hearing: Applicable. A public hearing shall be held before the Board of County Commissioners. Any requested waiver shall be reviewed and acted upon by the Board of County Commissioners prior to issuance of an OGF Permit.
8. Standards: Applicable.
9. Conditions of Approval: Applicable. The Board of County Commissioners, in approving a waiver for an OGF Permit, may attach any conditions necessary to implement the Adams County Comprehensive Plan and to ensure the compatibility with adjacent uses.
10. Amendments: Applicable.

2-02-14-07-05 CRITERIA FOR APPROVAL

The Board of County Commissioners, in approving a waiver, shall find:

1. Extraordinary hardships or practical difficulties result from strict compliance with these standards and regulations
2. The purpose of these standards and regulations are served to a greater extent by the alternative proposal.
3. The waiver does not have the effect of nullifying the purpose of these standards and regulations.

Commented [COGA25]: Please clarify how this standard will be found for OGF waivers, particularly those where the waiver at issue seeks to site an OF within 2,000' of the receptors listed in Chapter 4 of the Code.

2-02-14-07-06 ADDITIONAL CRITERIA FOR A ZONE DISTRICT WAIVER

The Board of County Commissioners, in approving zone district waiver, in addition to the criteria outlined above, shall find:

1. The proposed Oil and Gas Facility is consistent with the Adams County Comprehensive Plan.
2. The proposed Oil and Gas Facility is compatible with the surrounding area, harmonious with the character of the neighborhood, and not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare or the environment of the inhabitants of the area and the County.

Commented [COGA26]: Please confirm that the operative Comprehensive Plan is the 2012 Comprehensive Plan, which states as follows regarding resource extraction, "Adams County contains sand, gravel, coal, oil and gas resources. The extraction of these resources contributes to the local economy, providing employment to County citizens and tax income to the government. Mining contributes to a healthy economy as readily available local sources lower the cost of shipping materials used in construction or to provide essential fuels. Sensitive extraction and reclamation practices are essential, however, to preventing potential negative impacts to the community from resource extraction activity"

2-02-15 AMENDMENT TO TEXT OF THE STANDARDS AND REGULATIONS AND/OR ZONING MAP (REZONING) AND/OR COMPREHENSIVE PLAN

2-02-15-01 PURPOSE

The purpose of this section is to detail the steps to follow for changing the text of these standards and regulations, or the boundaries of the zone districts shown on the Zoning Map (Rezoning), or the Comprehensive Plan.

Commented [COGA27]: Please clarify how operators may demonstrate this to secure such a finding.

2-02-15-02 APPLICABILITY

All amendments to the text of these standards and regulations and any changes to the Zoning Map or Comprehensive Plan must be processed in accordance with this section.

Only the Board of County Commissioners may, after recommendation of the Planning Commission, adopt a resolution amending the text of these standards and regulations, or the Zoning Map, or the Comprehensive Plan.

2-02-15-03 WHO CAN INITIATE A TEXT, ZONING MAP, OR COMPREHENSIVE PLAN AMENDMENT

2-02-15-03-01 AMENDMENT TO ZONING MAP (REZONING)

An amendment to the Zoning Map may be proposed, without limitation, by the Planning Commission, the Board of County Commissioners, or the owner(s) of the property to be rezoned.

In addition, a municipality, airport authority, or other owner or operator of an aviation facility available for public use may propose an amendment to the Zoning Map to establish or amend an Aviation Zone or Influence Area Overlay District for the area including area surrounding an aviation facility.

Commented [COGA28]: Please confirm this includes mineral owners.

2-02-15-03.02 AMENDMENT TO COMPREHENSIVE PLAN

An amendment to the Comprehensive Plan may be proposed, without limitation, by the Planning Commission, the Board of County Commissioners, the Director of Community and Economic Development or the owner(s) of the property to be amended on the plan.

Commented [COGA29]: Please clarify whether "owner(s) of the property to be amended" includes mineral owners. COGA does not see why they should be excluded.

CHAPTER 4 – DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

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Chapter 4—DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

4-01 DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

These regulations are applicable to all zone districts, including new and established districts, except as otherwise noted. In addition to compliance with other regulations imposed by these standards and regulations, all uses, structures, buildings, and accessory uses shall comply with the design requirements and performance standards required by this Chapter. Where a design requirement or performance standard for a specific use conflicts with a general design requirement or performance standard, the design requirement or performance standard for the specific use shall control. Where any design requirement or performance standard conflicts with another design requirement or performance standard, the more restrictive design requirement or performance standard shall control. Wherever residential use of adjacent property is related to restrictions or certain non-residential uses, determination of residential use shall be based on the classification of land by the County Assessor. All Variance requests are subject to Section 2-02-19 of the Adams County Standards and Regulations, excluding Sexually Oriented Businesses, Marijuana Businesses and Halfway Houses.' These regulations shall be subject to limitations regarding the number of marijuana businesses and/or the type of businesses as set forth by the BOCC in resolution.

- closure plan, and to effect remedial measures if environmental damage is found to be taking place.
- d. *Traffic Control Plan*: Provisions of the approved traffic control plan shall be followed.
 - e. *Appearance*: All sites shall maintain a clean, neat, and orderly appearance. Litter, dust, and odors may not leave the boundaries of the site.
 - f. *Vehicle Parking*: Transfer vehicles may not be parked on public streets.
 - g. *Vector Controls*: All sites shall maintain vector controls as prescribed by the approved plan.
 - h. *CDPHE Regulations*: Colorado Department of Public Health and Environment Regulations 6CCR 1007-2, Section 14 are hereby incorporated in these Zoning Regulations.
6. Infectious Waste Disposal Site and/or Processing Facility Standards (required in addition to General Standards)
- a. *Radiation Monitoring Program*: The operator shall operate a radiation monitoring program in accordance with an approved plan.
 - b. *General Monitoring Program*: The general monitoring program, approved by the County for each infectious waste disposal and/or processing facility, shall be adhered to.
 - c. *Temperature Operating Charts*: Temperature operating charts from an infectious waste disposal and/or processing facility shall be retained for two (2) years for review by the Director of Community and Economic Development. The County may require additional monitoring if a facility has problems maintaining a temperature or other operational standard.
 - d. *Truck Washing*: All trucks shall be washed at least once a week with a detergent and disinfectant to minimize nuisance conditions, unless spills or leaks are detected which must be disinfected immediately. All wash water shall be properly controlled to prevent runoff.
 - e. *Waste Incineration*: Infectious waste incineration facilities shall be permitted to burn infectious waste only. Incineration of wastepaper, contraband, or other materials is not permitted unless specifically approved as part of the wastestream.
7. *Hazardous Waste Disposal Site and Facility Standards*: All hazardous waste disposal sites and facilities shall meet the standards established by State and Federal regulatory requirements.

4-11-02-03-03

OIL AND GAS FACILITY

4-11-02-03-03-01

Purpose

This Section is enacted to protect and promote the health, safety, values, convenience, order, prosperity and general welfare of the current and future residents of the County. It is the County's intent by enacting this Section to

facilitate the development of oil and gas resources within the unincorporated area of the County while avoiding or mitigating potential land use conflicts between such development and existing, as well as planned, land uses. It is recognized that under state law the surface and mineral estates are separate and distinct interests in land and that one may be severed from the other. Owners of subsurface mineral interests have certain legal rights and privileges, including the right to use that part of the surface estate reasonably required to extract and develop their subsurface mineral interests from a consenting surface owner, subject to compliance with the provisions of this Section and any other applicable statutory and regulatory requirements. Similarly, owners of the surface estate have certain legal rights and privileges, including the right to have the mineral estate developed in a reasonable manner and to have adverse impacts upon their property, associated with the development of the mineral estate, avoided or mitigated through compliance with this Section.

4-11-02-03-03-02**Definitions**

Oil and Gas Facility means an oil and gas facility as defined by the rules and regulation ~~and regulations and regulations~~ of the Colorado Oil and Gas Conservation Commission ("COGCC"). For any other definition not listed in this section, the definitions listed in Chapter 11 of the Adams County Development Standards and Regulations and the COGCC's regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the COGCC's definitions, the COGCC's definitions shall prevail. If the term is not found in the COGCC's definitions or in Chapter 11, the term shall have its common meaning along with the spirit and intent of the Development Standards and Regulations and may be subject to interpretation by the Director of Community and Economic Development or his or her designee.

~~For any other definition not listed in this section, the definitions listed in Chapter 11 the Adams County Development Standards Regulations the of and Chapter 11 and the COGCC's definitions, the COGCC's definitions shall If prevail. the term is not found in the COCCC's definitions or in Chapter 11, the term sha I have its cororon meaning along with the seirit apel ifitent of the Develeernent Standards Regulations may be to interpretation by the Director and and subject Community Economic Development his her designee.~~

4-11-02-03-03-03**General Provisions**

1. Access: Oil and gas well installation shall be located to provide convenient access, shall accommodate the traffic and equipment related to the oil and gas operations and emergency vehicles, and shall conform to COGCC rules and Adams County Development Standards and Regulations. ~~comply with~~ Oil and gas operations ~~shall must~~ avoid or minimize impacts to the physical infrastructure of the county transportation system.

Commented [COGA1]: This is an inaccurate statement of the law. While operators strive to obtain surface owner consent for development locations and surface owner consent is commonplace, the law does not require the surface owner to consent to the development. It is exactly for that reason that the doctrine of reasonable accommodation arose and has been statutorily codified at Section 34-60-127, C.R.S. The statute speaks to the operator's and surface owner's respective rights in the absence of a contractual agreement, such a Surface Use Agreement, whereby the surface owner consents to the development. Should the surface owner not consent, the operator may nonetheless develop from the surface, so long as the operator only uses that portion of the surface estate reasonably required to develop the minerals and is otherwise authorized to develop by state and local law.

Please refer to the COGCC's April 14, 2021 presentation entitled, "Staff Informational Presentation on Interaction of Surface Rights & Mineral Development" for more information explaining that surface owner consent is not a legal requirement for mineral development.

Commented [COGA2]: **Commented [GDI]:** Added May 2021, formatting change only.

~~1-2.~~ Signage: A sign with the 24-hour, 7-days per week contact information shall be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way. Signage shall conform to follow COGCC regulations for signage and posting.

~~2-3.~~ Building Permit Required: For all new or substantially modified wells, a building permit is required for the installation of permanent electrical, pumps, tank batteries, and all other above-ground structures as well as any other applicable permits including, but not limited to, culvert permits, oversized-load permits, and floodplain use permit.

~~3-4.~~ Setbacks: Oil and Gas Facilities shall be at least 2,000 ~~1,000~~ feet from the property line of any existing residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, ~~and~~ environmentally sensitive areas, ~~and~~ designated parks and open spaces. Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

a. Setbacks will be measured from the edge of maximum disturbance which includes the rough grading footprint of the Oil and Gas Facility, including the final landscaping boundary. The measurement of setbacks will not include the access road.

b. Administrative Waiver from Setback Requirements: an administrative waiver may be obtained from the setback requirements if the Operator receives a written waiver from each primary resident and property owner located within the setback. Staff will evaluate the granting of an Administrative Waiver from setback requirements based on criteria including, but not limited to: the number of receptors, location, nature, and size of the facility.

i. No Administrative Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.

c. For Oil and Gas Facilities that do not meet the above setback requirements: A waiver may be granted by the Board of County Commissioners after a public hearing if the Oil and Gas Facility is deemed to provide substantially equivalent protections to public health, safety, welfare, the environment, and wildlife resources that are equal to or more effective to satisfy the criteria of approval. The criteria for determining substantially equivalent protections may include, but are not limited to:

i. The location of receptors and proximity of those receptors;

ii. The location, nature, and size of the facility;

Commented [COGA3]: Commented [GD2]: Added in May 2021 draft

Commented [COGA4]: PLEASE SEE FULL COMMENT FOR THIS SECTION AT THE END OF THE DOCUMENT
THE WORD "ROAD" IS HYPERLINKED TO TAKE YOU TO THE COMMENT

Commented [COGA5]: Commented [GD3]: Added in May 2021 draft

Commented [COGA6]: Commented [GD4]: Added in may 2021 draft

- iii. The duration and intensity of all phases of operation at the Oil and Gas Facility;
- iv. The extent to which the Oil and Gas Facility design, and planned best management practices, best available control measures and technologies, and conditions of approval avoid, minimize, and mitigate adverse impacts;
- v. The extent to which the Oil and Gas Facility is compatible with the surrounding area, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County;
- vi. The level of consent or waivers obtained from primary resident(s), landowners, or applicable Public Water Systems) located within the setback and;
- vii. The extent to which the Oil and Gas Facility will minimize, avoid, mitigate, and offset cumulative impacts.

Commented [COGA7]: Please provide clarity regarding what “not detrimental” means.

4.5. Fees and Permits: All applicable County fees adopted by the County, including postage fees and inspection fees, must be paid at time of application and prior to issuance of a building permit, including for all applicable permits required by the Adams County Development Standards and Regulations.

5.6. Oil and Gas Road Impact and Maintenance Fees:

- a. Operators ~~shall~~ **must** pay oil and gas road impact and maintenance fees, as approved by the Board of County Commissioners, for all proposed oil and gas wells and pads. This fee shall be paid at the time of issuance of an Oil and Gas Facilities Permit **or at the time of issuance of a building permit and prior to the commencement of an ground disturbing activities.** Any person or entity required to pay the oil and gas road impact fee may elect to submit an independent study and fee calculation to demonstrate that the nature, timing, or location of the proposed oil and gas development is likely to generate impacts costing less to mitigate than the amount of the fee that would be generated by the use of the fee schedule. Any independent fee study for oil and gas development shall generally follow the methodology established in the Adams County Oil & Gas Traffic Impact Study.
 - i. The preparation of the independent fee calculation study shall be the sole responsibility of the electing party.
 - ii. Any person or entity who requests to perform an independent fee calculation study shall pay an application fee for administrative review. An administrative decision related to the independent study may be appealed to the Board of County Commissioners.

Commented [COGA8]: COGA continues to believe that non-application fees should only be required to be paid before the operator begins construction at a location and not at the time of the application. Local governments can only enact impact fees that recoup the cost of actual impacts. In the scenario where the permitted operations do not take place, there are no impacts and therefore no need for the fee.

Commented [COGA9]: **Commented [GD5]:** Added in May 2021 draft

The appeal shall be filed within 14 days of staff decision and shall follow the appeal process established for OGF Permit Waivers.

6.7. Safety Standards:

- a. Operator shall implement a safety management plan and maintain a safety management system applicable to all covered processes. Upstream facilities consisting of a standard, repeatable design may be covered with a single safety management plan. The safety management system shall provide for employees and systems to oversee implementation and periodic revision of the plan. The plan shall include the following elements and describe the manner in which each of the following elements will be applied to the covered processes:
 - i. Process safety information. Compilation of written process safety information needed to conduct process hazard analysis. Process safety information shall include information pertaining to hazards of substances and chemicals used by the process, information pertaining to the technology of the process, information pertaining to the equipment used in the process, and information pertaining to the hazards of the substances or chemicals in the process. Documentation that equipment used in the process complies with recognized and generally accepted good engineering practices;
 - ii. Operating procedures. Written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information, and at least annual review of operating procedures to ensure they reflect current operating practices;
 - iii. Employee participation. Plan for ensuring employee participation in conduct and development of process hazards analysis and access to process hazards analysis;
 - iv. Training. Written procedures detailing initial and refresher employee training requirements and documentation of employee training;
 - v. Mechanical integrity. Written procedures designed to maintain the on-going integrity of process equipment, ensure employees involved in maintenance are properly trained to ensure the ongoing integrity of process equipment, ensure that process equipment is tested and inspected in accordance with manufacturer specifications, correct deficiencies in equipment in a safe and timely manner, and ensure that new equipment is installed or constructed properly;
 - vi. Management of change. Written procedures to manage changes to covered processes, technologies, equipment and procedures;

- vii. Pre-startup reviews. Written procedures regarding pre-startup safety reviews;
- viii. Compliance audits. Written procedures requiring an audit every five years to verify compliance with the procedures and practices developed under the safety management plan, and procedures requiring correction of any deficiencies identified in audit; operator will make results of audit available to inspector upon request;
- ix. Incident investigation. Written procedures requiring investigations of all near-misses and incidents, including root cause analysis of all incidents resulting in fatalities or serious environmental harm, establishing a system to promptly address and resolve the incident, and requiring that all employees and contractors whose job tasks are relevant to the investigation of the near miss or incident review the investigation report.
- x. Hot work. The facility shall ensure that all hot work complies with local and state fire prevention and protection requirements.
- xi. Contractors. Written procedures describing how operator screens, oversees, shares process safety and emergency response and preparedness information with contractors;
- xii. Process hazard analysis. Process hazard analysis for each covered process;
- xiii. Incident history. List of all reportable safety events as defined by the COGCC rules and regulations that have occurred at the operator's facilities within the last five years, along with any investigation reports, root cause analysis and operational or process changes that resulted from the investigation of the accident;
- xiv. Safety culture assessment. Written procedures requiring operator periodically review safety culture, and at a minimum conduct such review after each major accident; and
- xv. Inherently safer systems analysis. Require analysis at least every five years, whenever a change is proposed at the facility that could result in an incident, after an incident if recommended by the investigation report or root cause analysis, and during the design of new processes, equipment or facilities.
- xvi. Operator shall make available the safety management plan to Adams County at the County's request. Adams County may retain outside consultants to review safety management plan and may request modifications to safety management plan based on its review. Operator [shall](#)

Commented [COGA10]: Please provide clarity on what the undefined term "near miss" means. Doesn't the fact that the incident was "missed" mean that the safety processes worked appropriately?

- ~~must~~ reimburse County for any costs associated with retaining outside consultants.
- b. Automatic safety protective systems and surface safety valves. Operator is required to install automated safety system prior to commencement of production. Automated safety system shall include the installation, monitoring and remote control of a surface safety valve or a wellhead master control valve and shall be able to remotely shut in wells on demand. Surface safety valve or a wellhead master control valve shall be equipped to operate remotely via the automated safety protective system. Operator shall test the automated safety system ~~quarterly to~~ quarterly to ensure functionality and provide results of testing to County quarterly within 14 days of such testing.
- c. Incident and accident reporting.
- i. Incidents. As soon as practicable, but no more than Within a week three (3) days of any reportable safety event or emergency situation as defined by the COGCC, ~~Operator~~ shall submit a report to the County including the following, to the extent available:
- (a) Fuel source, location, proximity to residences and other occupied buildings, cause, duration, intensity, volume, specifics and degree of damage to properties, if any beyond the facility, injuries to persons, emergency response, impacts, if any, to public health, safety, welfare, the environment or wildlife resources, and remedial and preventative measures to be taken within a specified amount of time.
- ~~(a)(b)~~ If public health, safety, welfare, the environment or wildlife resources are threatened, the Operator responsible for the operation causing the threat shall immediately notify the County's Local Government Designee ("LGD") electronically and orally.
- ii. County may require operator to conduct root cause analysis of any incidents or Grade 1 gas leaks, as defined by the COGCC.
- iii. Operator shall keep a daily incident log that shall be made available to Adams County upon request. Any spill or release that is reportable to the COGCC shall be simultaneously reported to the County's LGD and applicable fire district.
- iv. The Operator shall notify ~~Notification to~~ the County's LGD within 24 hours of discovery of ~~all~~ spills of one barrel or more that leaves the facility or released outside of berms or secondary containment, all spills of any

Commented [COGA11]: Adams County should ensure that this frequency of testing does not cause any unintended consequences with the wells.

material or volume on permeable ground at the facility that has a reportable spill quantity under any law, all spills or releases required to be reported by COGCC regulations and copies of any self-reporting submissions that operator provides to the COGCC.

Commented [COGA12]: COGA thanks Adams County for making this important clarification.

v. Notification of the surface owner or the surface owner's tenant, and the water rights holder if applicable, of spills and releases in conformance with COGCC Rules.

vi. The Operator may be required to obtain additional permits from the County, such as an inert fill or access permits, for site remediation as defined in Chapter 4 of the Adams County Development Standards and Regulations

Commented [COGA13]: Commented [GD6]: Added May 2021 draft

d. Worker Training and Records

- i. Workers at an OGF shall have nationally recognized certifications for the work they are performing. This includes, but is not limited to, Hazard Communications Training, Hazardous Waste Operations Certifications, heavy equipment operator training, and welding certifications per API 1104 and/or ASME Section 9.
- ii. All workers at an OGF shall have completed a nationally recognized occupational safety and health training program.
- iii. Upon request from the County, the Operator shall supply the County written procedures detailing employee training requirements and training records.

8.7. Spill Prevention and Containment. Oil and gas operations shall be in compliance with COGCC safety and spill and release requirements.

a. Requirements to minimize and prevent liquid spills and releases include the following:

- i. Berms or other secondary containment devices around crude oil, condensate, and produced water storage tanks enclosing an area sufficient to contain and provide secondary containment for 150+10% of the largest single tank.
- ii. Berms or other secondary containment devices shall be sufficiently impervious to contain any spilled or released material.
- iii. Inspection of all berms and containment devices at regular intervals, but not less than monthly. Berms shall be inspected within forty-eight (48) hours of a precipitation event of 1.0" or more, and Operator shall make necessary repairs as soon as possible, but not more than seventy-two (72) hours after the event.
- iv. Maintain all berms and containment devices to ensure they are in good condition.

Commented [COGA14]: Commented [GD7]: Added in May 2021 draft

Commented [COGA15]: Operators can comply with the 48 hour obligation to inspect following a 1" precipitation event, but having an obligation to then make necessary repairs within 72 hours of the event (which may be only 24 hours after the inspection) is not always feasible and there may be additional impediments due to wet ground. There is no identified need for ensuring that repairs are made within 72 hours of the event. Further, certain weather events may make it impossible to try a repair immediately or the attempt to immediately repair could even cause further damage because the ground is too wet or other circumstances.

- v. A prohibition on the storage or use of ignition sources inside the secondary containment area unless the containment area encloses a fired pressure vessel.
- vi. Construction of containment berms using steel rings, designed and installed to prevent leakage and resist degradation from erosion or routine operation.
- vii. Construction of secondary containment areas with a synthetic or engineered liner that contains all primary containment vessels and flowlines and is mechanically connected to the steel ring to prevent leakage.
- viii. For locations within 500 feet and upgradient of a surface water body or ground water source, tertiary containment, such as an earthen berm, around oil and gas facilities. Alternatively, the County may require Operator to install retention ponds for stormwater management.
- ix. Discharge valves shall be secured, inaccessible to the public and located within the secondary containment area. Open-ended discharge valves shall be placed within the interior of the tank secondary containment.
- b. Anchoring. Anchoring is required within floodplain or geological hazard areas, as needed to resist flotation, collapse, lateral movement, sinking, or subsidence, and in compliance with Federal Emergency Management Agency (FEMA). All guy line anchors left buried for future use shall be identified by a marker of bright color not less than four feet in height and not greater than one (1) foot east of the guy line anchor.

8.9. Chemical Handling and Requirements

- a. The owner or operator of any installation that is required to prepare or have available a safety data sheet for a hazardous chemical under the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 et seq., and regulations promulgated under that Act, shall submit both a safety data sheet (SDS) for each such chemical and an annual emergency and hazardous chemical inventory form to the Local Emergency Planning Commission (LEPC) and the local fire district. A comprehensive and universal listing of all hazardous chemicals stored, handled, and/or used on site must be maintained in an inventory list and must be made available to the County upon request.
- b. Drilling and completion chemicals shall be removed at most sixty days after completion.
- c. Operator shall provide to the County a copy of the chemical disclosure registry form provided to the COGCC pursuant to the COGCC's "Hydraulic Fracturing Chemical Disclosure" rule prior to conducting hydraulic fracturing.

- d. The following toxic, including orally toxic chemicals shall not be added to the hydraulic fracturing fluid:
1. Benzene
 2. Lead
 3. Mercury
 4. Arsenic
 5. Cadmium
 6. Chromium
 7. Ethylbenzene
 8. Xylene
 9. 1,3,5-trimethylbenzene
 10. 1,4-dioxane
 11. 1-butanol
 12. 2-butoxyethanol
 13. N,N-dimethylformamide
 14. 2-ethylhexanol
 15. 2-mercaptoethanol
 16. Benzene, 1, 1'-oxybis-,tetrapropylene derivatives, sulfonated, sodium salts
 17. Butyl glycidyl ether
 18. Polysorbate 80
 19. Quaternary ammonium compounds, dicoco alkyldimethyl, chlorides
 20. Bis hexa methylene triamine penta methylene phosphonic acid
 21. Diethylenetriamine penta
 22. FD&C blue no 1.
 23. Tetrakis (triethanolaminate) zirconium (IV) (TTZ) 97

9-10 Emergency Preparedness and Response |

- a. In General. Oil and gas operations shall not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
- b. Emergency Preparedness Plan. Each Applicant with an operation in the County is required to implement an emergency preparedness plan for each specific oil and gas facility. The plan shall be referred to the Office of Emergency Management (OEM), and the applicable fire district, filed with the County and updated on an annual basis or as conditions change (responsible field personnel change, ownership changes, etc.). The emergency preparedness plan shall consist of at least the following information:
 - i. Name, address and phone number, including 24-hour emergency numbers for at least two persons located in or

- near Adams County who are responsible for emergency field operations.
- ii. An as-built facilities map in a format suitable for input into the County's GIS system depicting the locations and type of above and below ground facilities including sizes, and depths below grade of all oil and gas gathering and transmission lines and associated equipment, isolation valves, surface operations and their functions, as well as transportation routes to and from exploration and development sites, for emergency response and management purposes. The information concerning pipelines and isolation valves shall be held confidentially by the County's OEM, and shall only be disclosed in the event of an emergency. The County shall deny the right of inspection of the as-built facilities maps to the public pursuant to C.R.S. § 24-72-204.
 - iii. Detailed information addressing each potential emergency that may be associated with the operation. This may include any or all of the following: explosions, fires, gas, oil or water pipeline leaks or ruptures, hydrogen sulfide or other toxic gas emissions, or hazardous material vehicle accidents or spills. For each potential emergency, threshold / trigger levels shall be pre-identified that govern when an emergency state is declared by the Applicant.
 - iv. The plan shall include a provision that any spill outside of the containment area or which has the potential to leave the facility or to threaten a water body shall be reported to the emergency dispatch and the Director immediately.
 - v. Detailed information identifying site access, evacuation routes as determined by first responders, impact zones for each emergency scenario identifying impacted facilities, and buildings and health care facilities anticipated to be used.
 - vi. Project specific emergency preparedness plans are required for any project that involves drilling or penetrating through known zones of hydrogen sulfide gas.
 - vii. The plan shall include a provision that obligates the Applicant to reimburse the appropriate emergency response service providers for costs incurred in connection with any emergency.
 - viii. Detailed information that the Applicant has adequate personnel, supplies, and funding to implement the emergency response plan immediately at all times during

construction and operations. Supplies can include adsorption boom, granulated materials, and coordination of foam supplies with the local first responders.

- ix. The plan shall include provisions that obligate the Applicant to keep onsite and make immediately available to any emergency responders the identification and corresponding Safety Data Sheets (SDS) of all products used, stored or transported to the site. The SDS sheets shall be provided immediately upon request to the Director, a public safety officer, or a health professional. In cases of spills or other emergency events, the plan shall include provisions establishing a notification process to emergency responders of potential products they may encounter, including the products used in the hydraulic fracturing fluids.
- x. The plan shall establish a process for informing surrounding neighbors and schools identified as being within the emergency impact zone of applicable emergency response plan and procedures.

~~10-11.~~ Recycle, Reuse and Disposal of Fluids:

- a. Operator shall recycle drilling, completion, flowback and produced fluids unless technically ~~infeasible~~ or prohibited by contract private contract.
- b. Exploration & Production (E&P) Waste may be temporarily stored in tanks while awaiting transportation to licensed disposal or recycling sites.
- c. Produced Water must be transported by pipelines unless economically or technically infeasible.

Commented [COGA16]: Operators frequently have agreements in place with surface owners to purchase fresh water from landowners for oil and gas drilling. Requiring recycling could result in a breach of these agreements and/or result in substantial loss of income to surface owners. For this reason, COGA requests that AdCo add the phrase that COGA has inserted and highlighted.

~~11-12.~~ Stormwater Controls:

- a. Oil and gas operations shall be in compliance with COGCC rules related to stormwater management regulations and Adams County Stormwater Quality Regulations as contained in the Adams County Development Standards and Regulations / Ordinances and other applicable federal, state, and county requirements.
- b. The Owner or Operator must provide a stormwater management plan that identifies possible pollutant sources that may contribute pollutants to stormwater, best management practices, sampling procedures (if required), and inspections that, when implemented, will reduce or eliminate any possible water quality impacts.

~~12.~~ Water Bodies and Water Quality:

- a. ~~General. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Rules, Specifically with respect to spills and releases in floodplains~~

Commented [COGA17]: Commented [GD8]: Water Bodies and Water Quality relocated to a new section in DSR Chapter 4.

- and/or water bodies, and applicable water quality standards set by the Colorado Department of Public Health and Environment.
- b. ~~Water quality plan. Operators shall implement a water quality plan and make available to Adams County upon request. Such plan shall include details such as operator's plans for water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies. The owner or operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Rules. The owner or operator shall provide all water source test results to the county and maintain records of such results. The owner or operator shall make available to the County upon approval of the COGCC, its plans concerning downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.~~
- e. ~~Wastewater Injection wells used for produced water disposal are prohibited in Adams County.~~
- d. ~~Floodplain. Any disturbance within a 100 year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all the County's legally adopted floodplain and engineering regulations. A "100 year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.~~

Commented [COGA18]: Commented [GD9]: Water Quality Plan details relocated to the Development Application Guide, Appendix A.

13. Well Plugging and Abandonment:

- a. ~~An Operator shall comply with all COGCC rules regarding well abandonment and reclamation, including, but not limited to, removal of all equipment from the location and restoring the surface of the land to its original state. Notice of well plugging and abandonment shall be submitted by the Operator to the Community and Economic Development Department within seven (7) days forty eight (48) hours. Notice shall include, at a minimum, the surveyed coordinates of the decommissioned well or facility, planned or proposed access route(s), planned duration of activities, planned hours of operation, and a list of equipment to be utilized at the site.~~
- b. ~~The Operator shall submit the COGCC required Notice of Intent to Abandon report to the County concurrently with the COGCC.~~
- a-c. ~~Notice shall be sent by the Operator or contractor to all property owners and current residents within one-half (1/2) mile of the Oil and Gas Facility, well, or site being decommissioned or plugged and abandoned. Notice shall occur at least seven (7)~~

Commented [COGA19]: Commented [GD10]: Added in May 2021 draft

Commented [COGA20]: Adams County should include carve-outs for when 7-days' notice may not be operationally possible.

Commented [COGA21]: Commented [GD11]: Added in May 2021 draft

days prior to commencement of decommissioning or plugging operations.

~~b-d.~~ Decommissioned oil and gas well assessment. Prior to any hydraulic fracturing, and at periods following hydraulic fracturing, the Operator shall must perform assessment and monitoring of plugged and decommissioned or removed from use, and dry and removed from use oil and gas wells (abandoned wells) within one-quarter mile of the projected track of the borehole of a proposed well. The assessment and monitoring includes:

- i. Identification of all abandoned wells located within one-quarter mile of the projected track of the borehole of a proposed well based upon examination of COGCC and other publicly available records,
- ii. A Risk assessment of leaking gas or water to the ground surface or into subsurface water resources, taking into account plugging and cementing procedures described in any recompletion or plugged and abandoned (P&A) report filed with the COGCC.
- iii. Notification to the County and COGCC of the results of the risk assessment of the plugging and cementing procedures.
- iv. Permission from each surface owner who has an abandoned well on the surface owner's property to access the property in order to test the abandoned well. If a surface owner has not provided permission to access after thirty days from receiving notice, the applicant shall not be required to test the abandoned well.
- v. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well prior to hydraulic fracturing
- vi. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well within ninety (90) days after completion, and then every year after production has commenced if initial survey results suggest increased risk of leaking gas or water from the abandoned well.
- vii. Notification of the results of the soil gas survey to the County and the COGCC within three weeks of conducting the survey or advising the County that access to the abandoned wells could not be obtained from the surface owner.
- viii. In the event that contamination is detected during any soils testing, no further operations may continue until the cause of the contamination is detected and resolved and

Commented [COGA22]: COGA believes this provision is unreasonable and unnecessary in light of the fact that that the COGCC, the technical expert in this area and the sole entity with jurisdiction over downhole issues, already requires an offset well evaluation in COGCC Rule 308.b.7. That rule requires all Form 2s (Applications for Permits to Drill) to include an offset well evaluation in which the Operator must evaluate the construction and integrity of all offset wells within 1,500 feet (a little greater than ¼ of a mile) of the proposed wellbore and provide a plan to address offset wells within 1,500' feet that do not meet isolation requirements. Given this state requirement, there is no need for this regulation because the County's concerns will be addressed by the offset well plan required by the expert in well-integrity, the COGCC.

the County has given its approval for additional operations to continue.

~~e-e.~~ Marking of plugged and abandoned wells. The ~~O~~operator shall permanently mark by a brass plaque set in concrete, similar to a permanent bench mark to monument the plugged and abandoned well's existence and location. Such plaque shall contain all information required by the COGCC and the County.

14. Noise. The Operator shall control noise levels as follows:

- a. Prior to operations ~~O~~operator ~~will—shall~~ obtain a baseline noise study that encompasses at least ~~five (5) three~~ days, one of those days being a weekend. The Operator may use the baseline noise study submitted with the Development Application to fulfill this requirement, if that noise study is completed within twelve (12) months of any ground disturbing activities.
- b. Beginning with construction and up to production, the County ~~will may~~ require continuous noise monitoring for all oil and gas facilities located with one-half mile (1/2), or greater depending on the location, nature, and size of the facility, of the property line of any existing residences, schools, state licensed daycares or high occupancy building units. and may require that this ~~The County may require continuous noise monitoring~~ be conducted by an approved third-party consultant based on the location, nature, and size of the facility.
- c. The Operator ~~must shall~~ conform to follow COGCC Regulations for noise level.
- ~~d.~~ The Operator shall post 24-hour, 7 days per week contact information to deal with all noise complaints arising from Operator's oil and gas facility. Such posting shall be visible from the public rights-of-way.
- e. ~~For Oil and Gas facilities located within 2,000 feet of a land use or zoning designation boundary the Operator shall be required to comply with the lower maximum permissible noise level as defined in COGCC regulations for noise of that corresponding land use or zone district.~~
 - i. For locations within 2,000 feet of a land use or zoning designation boundary, noise must be attenuated to the maximum permissible noise levels for the corresponding land use or zone district, as specified in COGCC rules, at the land use designation boundary as determined by the Director of Community and Economic Development.

Commented [COGA23]: COGA submits this requirement is unreasonable because it treats oil and gas operations disparately from other industrial activities. It is unreasonable to subject oil and gas operations to a more stringent noise limit than other activities within the same zone. The source of the noise is irrelevant; it is the decibel level that matters. Under this regulation, a use could be more noisy than an oil and gas facility and yet perfectly legal. There is no justification for treating noise from oil and gas operations differently from noise from other uses. It is qualitatively identical.

At a study session, a Commissioner commented that oil and gas was not being treated differently from other uses. If this is the case, COGA apologizes for its misread of the county code and requests that the County please point to its code provisions that require other uses to comply with the land use or zoning designations of properties within 2,000' of where the use is located.

Commented [COGA24]: Commented [GD121: Added in May 2021 draft

~~d-f.~~ The Operator shall update the noise modeling study or noise impact analysis if the planned or actual equipment at the Oil and Gas Facility is expected to produce noise levels that will exceed those previously presented to the County or if the noise modeling study or noise impact analysis was completed more than twelve (12) months prior to any ground disturbing activities.

Commented [COGA25]: Commented [GD13]: Added in May 2021 draft

~~e-g.~~ To ensure the Operator controls noise to the allowable levels set forth above, one or more of the following may be required based on the location, nature, and size of the facility:

- i. Acoustically insulated housing or cover enclosing the motor or engine;
- ii. Noise management plan identifying hours of maximum noise emissions, type, frequency, and level of noise to be emitted, and proposed mitigation measures;
- iii. Obtain all power from utility line power or renewable sources;
- iv. Utilize the most current equipment to minimize noise impact during drilling, completions, and all phases of operation including the use of "Quiet Fleet" noise mitigation measures for completions;
- v. Sound walls around well drilling and completion activities to mitigate noise impacts;
- vi. Restrictions on the unloading of pipe or other tubular goods between 6:00 p.m. and 8:00 a.m.;
- vii. Any abatement measures required by COGCC for high-density areas, if applicable.
- viii. The use of electric drill rigs.
- ix. Tier 4 or better diesel engines, diesel and natural gas co-fired Tier 2 or Tier 3 engines, natural gas fired spark ignition engines, or electric line power for hydraulic fracturing pumps.
- x. Use of quiet design mufflers (also referred to as hospital grade or dual dissipative) or equivalent.
- xi. The use of liquefied natural gas dual fuel hydraulic fracturing pumps.

~~f-h.~~ All noise studies and assessments required by the County shall be completed by a qualified sound professional. Professional Consultant(s) Required: The baseline noise study and noise modeling shall be prepared by one (1) or more professionals deemed professionally qualified by the Community and Economic Development Department. Each professional shall be deemed qualified by the Department of Community and Economic Development based on education, professional certifications, experience in the field, and their understanding of the Adams County oil and gas regulations and COGCC rules

Commented [COGA26]: Commented [GD14]: Added in May 2021 draft.

Commented [COGA27]: COGA asks that Adams County share the qualifications that they will be looking at when determining who a "professionally qualified" consultant is.

pertaining to noise. The County shall maintain a list of qualified professional consultants. The applicant for an Oil and Gas Facility shall select one (1) or more individuals from the County's list of qualified consultants to prepare the required baseline noise studies and noise modeling reports.

Commented [Author28]: COGA asks that operators be able to submit contractors/consultants to be looked at and verified by the County for future use.

15. Air Emissions: Air contaminant emission sources shall comply with the permit and control provisions of the state air quality control program (C.R.S. § 25-7-101 et seq.) and the rules and regulations promulgated by the State Air Quality Control Commission. The Operator shall employ the following control measures and operating procedures to avoid or minimize all emissions into the atmosphere.
- a. Air quality action days. Operator shall respond to air quality action day advisories posted by the CDPHE for the front range area by implementing suggested air emission reduction measures as feasible. Emissions reduction measures shall be implemented for the duration of an air quality action day advisory and may include measures such as:
 - i. Minimize vehicle and engine idling;
 - ii. Reduce truck traffic and worker traffic;
 - iii. Delay vehicle refueling;
 - iv. Suspend or delay use of fossil fuel powered ancillary equipment; and
 - v. Postpone construction or maintenance activities, if feasible.
 - vi. Postpone well maintenance and liquids unloading activities that would result in emission to the atmosphere.
 - b. Leak Detection and Repair (LDAR). Operator shall develop and maintain an LDAR program using modern leak detection technologies for equipment used at the facility that complies with the following requirements:
 - i. Inspections must occur at least semi-annually; more frequent inspections may be required based on the nature, location and size of the facility.
 - ii. Any leaks discovered by operator, including any verified leaks that are reported to operator by a member of the public, shall be reported to the County no later than twenty-four hours after discovery. The operator shall maintain a weekly log of all reported leaks and shall make that log available upon request from the County.
 - iii. Operator shall repair leaks as soon as possible, but at least within seventy-two hours, unless technically or operationally infeasible. If the leak presents an imminent hazard to persons or property, the operator may not operate the affected component, equipment or pipeline segment until the operator has corrected the

problem and notified the County of the successful repair. In the event of leaks that do not pose an imminent hazard to persons or property, if more than 48 hours repair time is needed after a leak is discovered, operator shall contact the County and provide an explanation of why more time is required.

- iv. Plan shall include detailed recordkeeping of the inspections for leaking components.
- v. At least once per year, the operator shall notify the County five business days prior to an LDAR inspection of its facilities to provide the County the opportunity to observe the inspection.
- c. Well Completions and Emissions **Control**
 - i. Operators shall utilize EPA Reduced Emission Completions for oil wells and gas wells.
 - ii. Operators ~~shall must~~ utilize closed loop, pitless drilling, completions systems without permanent on-site storage tanks for containment and/or recycling of all drilling, completion, and flowback fluids. Any emissions must be routed to and controlled by a flare or combustor operated with at least a 98% destruction removal efficiency.
- d. Combustion Devices
 - i. For any flares or combustion devices used, manufacturer test or other data must be maintained and demonstrate that the device has a destruction removal efficiency of 98% for hydrocarbons.
 - ii. To the extent used, all flares, thermal oxidizers, or combustion devices shall be designed and operated as follows:
 - (a) The flare and or combustor shall be fired with natural gas.
 - (b) The flare and or combustor shall be designed and operated in a manner that will ensure no visible emissions during normal operation. Visible emissions is defined as the observation of smoke for any period or periods of duration greater than or equal to one minute in any fifteen minute period during normal operation, pursuant to EPA Method 22. Visible emissions do not include radiant energy or water vapor.
 - (c) The flare and or combustor shall always be operated with a flame present -when emissions may be vented to it.
 - (d) All combustion devices shall be equipped with an operating auto-igniter.

Commented [COGA29]: With respect to utilizing completions and production systems without permanent on-site storage tanks for containment, COGA has strong objections to this requirement as it relates to both completion and production. First, while a significant portion of the completions activities utilize skid-mounted temporary frac tanks, operators do, depending on circumstances, seek to employ permanent equipment on-site during the completion process in order to reduce emissions. These permanent storage tanks (which are controlled by combustion devices) would be prohibited by this provision. Such prohibition could result in an increase in emissions during the completions process.

The requirement to use production systems without permanent on-site storage tanks appears to be an attempt to mandate tankless operations. Such a requirement is technologically and economically infeasible and could result in operators being unable to develop their mineral resources. While operators continue to look for opportunities to utilize tankless operations, there are significant impediments to doing so including the availability of oil pipelines that are capable of and willing to transport liquids with a high Reid vapor pressure and in the amount needed to remove tanks from the facility. Further, companies that cannot transport their own liquids face more significant costs in operating tankless facilities.

COGA submits that these provisions should be encouraged where feasible but not absolute mandates.

- (e) If using a pilot flame ignition system, the presence of a pilot flame shall be monitored using a thermocouple or other equivalent device to detect the presence of a flame. A pilot flame shall be maintained at all times in the flare's pilot light burner. A telemetry system shall be in place to monitor pilot flame and shall activate a visible and audible alarm in the case that the pilot goes out.
 - (f) If using an electric arc ignition system, the arcing of the electric arc ignition system shall pulse continually, and a device shall be installed and used to continuously monitor the electric arc ignition system.
- e. Well Liquids Unloading
 - i. Best management practices during liquids unloading activities are required including the installation of artificial lift, automated plunger lifts and at least 90% emissions reductions when utilizing combustion to control any venting.
 - ii. If manual unloading is permitted, Operator shall remain onsite.
- f. General air quality protection measures.
 - i. Operators should work to limit truck traffic to and from the site.
 - ii. Hydrocarbon emissions control of at least 98% or better for crude oil, condensate, and produced water tanks with uncontrolled actual emissions of Volatile Organic Compounds (VOCs) greater than two tons per year (TPY) VOCs.
 - iii. No venting other than if necessary for safety or during an emergency or as otherwise allowable in COGCC rules.
 - iv. Operators should consolidate product treatment and storage facilities within a facility.
 - v. Operators should centralize compression equipment within a facility.
- g. Site-specific air quality protection measures. To eliminate or minimize air emissions, the County may require any or all of the following depending on the size, location and nature of the facility:
 - i. Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during the drilling, completion and production phases of development. The plan may include monitoring for all potential emissions,

Commented [COGA30]: Thank you for making this important clarification.

Commented [COGA31]: **Commented [GD15]:** Added in May 2021 draft

including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NO_x), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall be able to alert the operator of increases in monitored air pollutant concentrations.

- ii. Implementation of tankless production techniques.
- iii. The use of zero emission dehydrators.
- iv. Use of a pressure-suitable separator and vapor recovery unit (VRU) where applicable.
- v. Pipeline infrastructure for produced water, natural gas, crude oil and condensate constructed and placed into service prior to the start of any fluid flow from any wellbore.
- vi. The use of no-bleed continuous and intermittent pneumatic devices. This requirement can be met by replacing natural gas with electricity or instrument ~~air~~ ~~air or~~ routing the discharge emissions to a closed loop system or process.
- vii. Automated tank gauging.
- viii. Flaring shall be eliminated other than during emergencies or upset conditions; all flaring shall be reported to the county

16. Odors:

- a. Operator ~~must shall~~ implement and maintain ~~and make available to the County upon request~~, an odor mitigation plan that demonstrates how ~~the~~ the Operator will minimize odors from its operations and comply with Colorado Department of Public Health and Environment, Air Quality Control Commission, Regulation No. 2 Odor Emissions, 5 CCR 1001-4, Regulation No. 3, 5 CCR 1001-5, and Regulation No. 7, 5 CCR 1001-9 sections VII and VIII. The plan shall also provide a plan for timely responding to odor complaints from the community, and for identifying and implementing additional odor control measures to control odors emanating from the Oil and Gas ~~Facility~~.
- b. Operator ~~must shall~~ notify the County's LGD no later than 24 hours after receiving odor complaint.
- c. Operator ~~shall must~~ prevent odors from oil and gas facilities from affecting the health and welfare of the public by proactively addressing and, to the fullest extent, resolving complaints filed by members of the community, in coordination with County and Tri-County Health Department staff.

- d. In response to an odor-related complaint, the County may require the Operator to provide a complete description of all activities occurring at the Oil and Facility and measures or actions taken to reduce odors to the County's LGD within 24 hours upon request.
 - e. The Director of Community and Economic Development may require an Operator to collect and analyze a speciated air sample to measure for volatile organic compounds or hazardous air pollutants in response to an odor-related complaint. Speciated air sample collection shall be done utilizing a third-party vendor approved by the County.
 - f. To ensure compliance with the odor mitigation plan, the County may require the Operator to implement any of the following measures depending on the size, location and nature of the facility:
 - i. Adding an odorant which is not a masking agent or adding chillers to the mud systems.
 - ii. Using filtration systems or additives to minimize odors from drilling and fracturing fluids except that operator shall not mask odors by using masking fragrances.
 - iii. Enclose shale shaker to contain fumes from exposed mud, where safe and feasible,
 - iv. Wipe down drill pipe each time drilling operation "trips" out of hole
 - v. Increasing additive concentration during peak hours provided additive does not create a separate odor. Additive must be used per manufacturer's recommended level.
 - vi. Requiring the use of, at a minimum, low odor Category III drilling fluid.
- ~~17. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant will be required to identify and offer to sample all available water sources located within one half mile of the proposed well or facility. All sampling must be conducted by third party consultant approved of by the County. Sampling requirements include:~~
- ~~i. Initial baseline samples and subsequent monitoring samples.~~
 - ~~ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.~~

Commented [COGA32]: Commented [GD16]: Added to May 2021 draft: from 'shall' to 'may'

Commented [Author33]: Please clarify the connection between a speciated air sample and odor.

Commented [COGA34]: Commented [GD17]: Water source sampling and testing 1 relocated to a new section in DSR Chapter 4.

- ~~iii. Post stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:
 - ~~i. One sample within six months after completion;~~
 - ~~ii. One sample between twelve and eighteen months after completion; and~~
 - ~~iii. One sample between sixty and seventy two months after completion~~
 - ~~iv. For multi well pads, collection shall occur annually during active drilling and completion.~~~~
- ~~iv. Operator shall collect a sample from at least one up gradient and two down gradient water sources within a one half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up gradient and two down gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.~~
- ~~v. An operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurements of all of the constituents measured in Table 1, and there has been no significant oil and gas activity within a one mile radius in the time period between the original sampling and the commencement of drilling the well.~~
- ~~vi. The operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the CED Director that the applicant could not obtain access to the water source from the surface owner.~~
- ~~vii. Testing for the analytes listed in Table 1, and subsequent testing as necessary or appropriate.~~
- ~~viii. Standard industry procedures in collecting samples, consistent with COGCC model Sampling and Analysis Plan, shall be followed.~~
- ~~ix. Reporting the location of the water source using a GPS with sub meter resolution.~~
- ~~x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.~~

- ~~xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.~~
- ~~xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:~~
 - ~~i. If free gas or dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).~~
 - ~~ii. If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.~~
 - ~~iii. Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l~~
 - ~~iv. Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.~~
 - ~~v. Further water source sampling in response to complaints from water source owners.~~

~~Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the CED Director, the COGCC and the water source owners.~~

~~18.17.~~ Dust:

- a. Operator shall minimize dust pollution associated with onsite activities and traffic.
- b. No untreated produced water or other process fluids shall be used for dust suppression.
- c. The Operator ~~will~~ shall avoid creating dust or dust suppression

Table 4.11 A: Water Quality Analytes

General Water Quality	Alkalinity Conductivity & TDS pH Dissolved Organic Carbon (or Total Organic Carbon) Bacteria Hydrogen Sulfide
MAJOR IONS	Bromide Chloride Fluoride Magnesium Potassium Sodium Sulfate Nitrate + Nitrite as N (total)
METALS	Arsenic Barium boron Chromium Copper Iron Lead Manganese Selenium Strontium
DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS	Methane Ethane Propane BTEX as Benzene, Toluene, Ethylbenzene, Xylenes Total Petroleum Hydrocarbons (TPH)
OTHER	Water Level Stable isotopes of water (Oxygen, Hydrogen, Carbon) Phosphorus

activities

within 300 feet of the ordinary high-water mark of any water body, unless the dust suppressant is water.

Commented [COGA35]: **Commented [GD181]:** Table 4.1 1A: Water Quality Analytes relocated to new section in DSR Chapter 4.

Commented [COGA36]: Avoiding dust completely as this provision mandates is unreasonable as all activities can create some de minimis amount of dust.

COGA proposes rewording as follows: "The operator will minimize creating dust and avoid dust suppression activities within 300 feet of the ordinary high-water mark of any water body, unless the dust suppressant is water."

COGA's proposed minor revisions protect public health, safety, welfare, and then environment by reflecting a duty to minimize dust creation and avoid any dust suppression activities other than water within 300 feet of the high-water mark.

- i. Safety Data Sheets (SDS) for any chemical-based dust suppressant shall be submitted to the County prior to use.
- d. To ensure the Operator controls dust, one or more of the following may be required based on the location, nature, and size of the facility:
- i. Ceasing all earthwork activities when wind speeds equal or exceed 30 MPH at any time measured by onsite anemometer.
 - ii. The use of reduced speed restrictions.
 - iii. Approved dust suppression activities.
 - iv. Ceasing ongoing truck traffic causing fugitive dust, until Operator has minimized dust to acceptable levels.

19.18. Visual Aesthetics.

- a. Operator shall submit a visual mitigation plan in compliance with colors for the Facilities, regardless of construction date, which are observable from any public highway. All permanent equipment on an Oil and Gas Facility, regardless of construction date, which are observable from any public highway, road, or publicly maintained trail will be painted in providing for paint that is—uniform, non-contrasting, nonreflective color tones (similar to the Munsell Soil Color Coding System), and with colors matched to but slightly darker than the surrounding landscape, a listing of the operations' equipment, proposed fencing, and screening. Plan shall indicate the location of all outdoor lighting on the site and any structures and include cut sheets of all proposed fixtures. Fencing shall be required around all well site equipment, including, but not limited to, storage tanks, well heads, and meters if the well site is visible from a subdivision west of Imboden Road. Such fencing shall screen equipment, provide safety precautions, and be compatible with the surrounding environment. Should fencing apply to a well site, the design and construction of such fencing shall be approved by the Community and Economic Development Department prior to the construction of any site. If a chain link fence is required to achieve safety requirements set by the COGCC, then landscaping and other screening mechanisms shall be required that comply with the County's Development Standards and Regulations and the Operator's safety requirements. Operator shall be responsible for obtaining consent by surface owner allowing any required fencing.
- i. Required sound walls shall comply with a color scheme approved by the County, blending with natural background.

Commented [COGA37]: Commented [GD19]: Visual Mitigation plan details relocated to the Development Application Guide, Appendix A.

Commented [COGA38]: COGA asks that the County not retroactively apply equipment color standards. Particularly when an OGF is in a low traffic area where there are no visual concerns, requiring retroactive paint jobs is a waste of resources.

Commented [COGA39]: COGA believes it is appropriate to use all reasonable efforts to obtain authorization from the surface owner to install a fence; however, if an operator cannot do so or the surface owner demands unacceptable fees for erecting the fence as required by the County, then operators must have relief from this provision.

Commented [COGA40]: Commented [GD20]: Landscaping and berating Plan details relocated to the Development Application Guide, Appendix A.

~~production.~~ Operator shall be required to provide maintenance funding through bonding to ensure funds are available for upkeep of any planted vegetation throughout the duration of operations, including production. Weed control is required at the facility and along access roads until final reclamation and abandonment. Required sound walls shall be included in the visual mitigation plan and shall comply with the color scheme approved by the County, blending with natural background. All landscaping shall be in compliance with County requirements and in compliance with the safety requirements of the Operator. Existing vegetation shall be minimally impacted. Motorized equipment shall be restricted to the well sites and access roads to the well sites. Operator is responsible for obtaining consent by surface owner allowing landscaping as well as automatic irrigation for landscaping in urban mitigation areas and/or parks/recreation areas. All plant materials shall be kept in a healthy growing condition at all ~~times.~~

- b. ~~Operator shall submit lighting mitigation plan for all phases of development and operation, which adheres to best management practices to minimize light escaping the facility including making all lighting downward facing and fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture. Operator shall conduct a photometric study prior to start of construction to indicate impact on surrounding properties and measure the lumens emitted from the facility outside of the walls.~~
- c. Site access and security. Site shall be properly secured during all phases of operations, including, but not limited to, security fencing or barriers to prevent unauthorized access to site. Site shall be properly secured prior to the start of drilling. ~~Proposed fencing, barriers, and screening shall be included in the visual mitigation plan.~~

19. Lighting. The Operator shall minimize light escaping the facility as follows:

- a. All lighting shall be directed downward and inward and use full shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture.
- b. Operator shall conform to follow COGCC Regulations for lighting standards.
- c. Operator shall provide sufficient on-site lighting to ensure the safety of personnel on or near the site.
- d. If the facility has a noise barrier (sound walls, etc.), the Operator shall install facility lighting beneath the noise barrier, except for drilling rig lights.

Commented [COGA41]: COGA requests the County delete the requirement that "All plant materials shall be kept in a healthy growing condition at all times."

COGA notes that operators (and most of the general population) cannot ensure that no plants will die. Natural occurrences such as hailstorms, sun exposure, and natural plant death make this requirement infeasible. While operators will maintain their landscaping and may be required to replant or weed out dead plants or things like that, the requirement as written is unreasonable, and COGA requests rewording.

Finally, please provide guidance as to what qualifies as a "recreation area."

Commented [COGA42]: **Commented [GD21]:** Lighting moved to a new section within DSR Chapter 4

- e. To ensure the Operator controls light escaping from the facility, one or more of the following may be required based on the location, nature, and size of the facility:
 - i. The use of timers or motion sensor lighting.
 - ii. The use of full cut-off lighting.
 - iii. The use of reduced light intensity colors and low-glare or no-glare lighting.

20. Community Outreach.

- a. The Operator shall hold quarterly neighborhood meetings from initial permit approval by the County, through the completion of the first wellbore, or longer as determined by the Director of Community and Economic Development for all oil and gas facilities located within one-half mile (1/2) of any existing residences, platted residential development, high occupancy building units, school facilities, or state licensed child care centers. The Operator shall hold additional quarterly neighborhood meetings for each subsequent return to the Oil and Gas Facility for any drilling or completion operations if there have been no neighborhood meetings held for a period of six consecutive (6) months or more. Notice for quarterly neighborhood meetings shall be sent by the Operator to all property owners, current residents, or school facility or childcare center administrators within one-half mile (1/2) at a minimum, or greater, as determined by the Director of Community and Economic Development, of the facility. Notice for the quarterly neighborhood meetings shall occur at least 14 days prior to the meeting.
- b. At the quarterly neighborhood meetings, the Operator shall provide an update on the status of any pending permits with the County, state or federal agencies associated with facility, an overview of all planned or ongoing operations at the Oil and Gas Facility and allow those in attendance to ask questions and provide input related to the facility.
- c. The location, timing, and format of the quarterly neighborhood meetings will be approved by the County.
- d. The Operator shall provide a recording or summary of the neighborhood meeting, which includes, at a minimum, a list of attendees and their contact information, if provided, format of the meeting, an overview of comments or questions received, and the Operator's responses to the County within seven (7) days of the meeting.
- e. The County may require one or more of the following based on the location, nature, and size of the facility:

Commented [COGA43]: Commented [GD22]: Disproportionately Impacted Community identification is located in Development Application Guide, Appendix A

Commented [COGA44]: COGA notes that a quarter of a year or even longer may pass from the date the permit is approved by the County until the date there is any activity on the well pad. Where there are no operations to report on and there is no change of plans to notify the community of, COGA believes that this requirement should not apply. There is no need or reason to have a meeting to say "nothing is happening and we are still on the schedule we provided earlier; we still anticipate starting construction on xxx date."

Commented [COGA45]: Commented [GD23]: Added in May 2021 draft

Commented [COGA46]: Commented [GD24]: Added in May 2021 draft

- i. The Operator to provide written and digital materials in languages other than English.
 - ii. The Operator to provide interpretation services at neighborhood meetings and
 - iii. The Operator to hold additional neighborhood meetings to accommodate resident or property owner input.
- 21. Cumulative Impacts. Operators shall evaluate and address the potential cumulative impacts from the Oil and Gas Facility, and all reasonable foreseeable development associated with other oil and gas activity and heavy industrial operations within one mile (1), at a minimum, of the Oil and Gas Facility. Operators shall minimize, avoid, mitigate, and offset cumulative impacts from oil and gas operations to the extent technically feasible. This may be achieved through a suite of best management practices, engineering or operations controls, and/or compensatory measures.
 - a. The evaluation and review of cumulative impacts may require the submission of quantitative and/or qualitative analysis and data for the following impact areas, at a minimum:
 - i. Air Quality,
 - ii. Public Health and welfare, including nuisance-type impacts,
 - iii. Traffic,
 - iv. Water resources,
 - v. Wildlife, Ecosystems, and Soil
 - b. The Operator shall follow all COGCC regulations and standards that address cumulative impacts related to noise, odor, dust, and light.
 - c. An Operator may submit substantially equivalent plans, data, or analyses as required in COGCC rules for addressing and evaluating cumulative impacts.
- 22. Transportation and Traffic
 - a. General: Oil and gas operations shall minimize impacts to the physical infrastructure of the County transportation system.
 - b. Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two four hours.
 - c. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells.

Commented [COGA47]: Commented [GD25]: Added in May 2021 draft

Commented [COGA48]: Thank you for clarifying this.

Commented [COGA49]: Commented [GD26]: Added in May 2021 draft

Commented [COGA50]: COGA appreciates the extension in this draft but continues to believe four hours is unreasonable. Such timing may be impossible, particularly during an ongoing storm event or for other reasons. As drafted, this requirement will result in many unnecessary truck trips for operators to check on tracking after any precipitation. Thus, it has unintended consequences that do not benefit public health.

unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6 road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and reseeded with an appropriate native seed mixture within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.

d. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department.

i. Requirements for the access permit may include the following:

1. A location that provides a safe entrance and exit that accommodates the type and volume of traffic using the access and reduces impact to residents on local roadways;
2. Haul route and traffic data;
3. Pre and post inspection of roadways used by the Operator;
4. Collateral or bond to ensure that road damage caused by the Operator is repaired;
5. Dust control (material used for dust control must be pre-approved by the County);
6. Road maintenance agreement during drilling phase; and
7. Payment of all applicable fees.

ii. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m.

Commented [COGA51]: There should be flexibility for the operator to repair roads within 10 days in case there are issues outside of operators' control (such as obtaining the appropriate materials) that prevent repair within that timeframe. The County would not want an operator to use sub-standard materials in the repair to meet the aggressive timeline. COGA recommends adding "unless otherwise agreed to by the county and operator" to this 10-day provision.

Commented [COGA52]: Please delete this provision, as operator already pays a traffic impact fee for impact to roads and the County may not seek double recovery.

Commented [COGA53]: Is this something different than the traffic fees discussed elsewhere?

- iii. Operator shall work with and show written evidence that t14 applicable school district(s) has been consulted to minimize traffic conflicts with school buses when schools are in session.
 - iv. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.
 - e. All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:
 - i. Access permit fees
 - ii. Oversize/overweight permit fees
 - iii. Right of way construction permit fees; and
 - iv. Traffic impact and road maintenance fees.
23. Water and Wildlife Protection.
- a. Water Bodies and Water Quality:
 - i. General. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams Counts. Operators shall comply with all Adams County rule<, COGCC Regulations, and applicable water quality standards set by the Colorado Department of Public Healt3 and Environment and Colorado Water Quality Control Commission.
 - ii. The owner or Operator shall provide the County with the [information] it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Regulations.
 - iii. The owner or Operator shall provide all water source test results to the County and maintain records of such results
 - iv. The owner or Operator shall make available to the County upon approval by the COGCC, its plans concerning; downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.
 - v. Wastewater Injection Wells used for produced water disposal are prohibited in Adams County.
 - vi. Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering

Commented [COGA54]: **Commented [GD27]:** Water Quality Plan details relocated to the Development Application Guide. Appendix A.

Commented [COGA55]: This prohibition must be deleted. The Commission maintains exclusive authority over subsurface Class II underground injection control ("UIC") wells. C.R.S. § 34-60-106(9). That authority is delegated exclusively to the Commission from the U.S. Environmental Protection Agency. 42 U.S.C. § 300h-4; 40 C.F.R. § 147.300. This provision remains operationally preempted, even after SB 19-181.

- regulations. A "100-year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.
- b. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant shall be required to identify and offer to sample all available water sources located within one-half mile of the proposed facility. All sampling must be conducted by third-party consultant approved of by the County. Sampling requirements include:
- i. Initial baseline samples and subsequent monitoring samples.
 - ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.
 - iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:
 - (1) One sample within six months after completion;
 - (2) One sample between twelve and eighteen months after completion; and
 - (3) One sample between sixty and seventy-two months after completion.
 - (4) For multi-well pads, collection shall occur annually during active drilling and completion.
 - iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.
 - v. An Operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 4-11-A, and there has been no significant oil and gas activity within a one-mile radius in the time period

- between the original sampling and the commencement of drilling the well.
- vi. The Operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the Director of Community and Economic Development that the applicant could not obtain access to the water source from the surface owner.
 - vii. Testing for the analytes listed in Table 4-11-A, and subsequent testing as necessary or appropriate.
 - viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.
 - ix. Reporting the location of the water source using a GPS with sub-meter resolution.
 - x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.
 - xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.
 - xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:
 - (1) If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).
 - (2) If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.
 - (3) Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l.
 - (4) Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.
 - (5) Further water source sampling in response to complaints from water source owners.

Commented [COGA56]: What would be considered a credible complaint to require further testing? Further testing on the basis of an uncredible complaint would be unreasonable and unnecessary.

- (6) Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the Director of Community and Economic Development, the COGCC, and the water source owners.
- c. Wildlife. Operators shall avoid, minimize, and mitigate adverse impacts to wildlife resources.
 - i. Operators shall comply with all COGCC Regulations for wildlife impacts.
 - ii. Operators shall actively engage Colorado Parks and Wildlife, where applicable, for the sake of avoiding, minimizing, and mitigating wildlife impacts.
 - iii. Operators shall share all findings, recommendations, and reports resulting from any consultation with Colorado Parks and Wildlife with the County within seven (7) days.

Commented [COGA57]: COGA requests that this requirement be limited to FINAL findings to avoid confusion or false alarms.

24. Flammable material. The area twenty-five feet around anything flammable shall be kept free of dry grass or weeds, conform to COGCC safety standards and applicable fire code. The operator's conceptual review application and application shall be reviewed by the serving fire district.

Table 4-11-A: Water Quality Analytes

<u>GENERAL WATER QUALITY</u>	<u>Alkalinity</u> <u>Conductivity & TDS</u> <u>Ph</u> <u>Dissolved Organic Carbon</u> <u>(or Total Organic Carbon) Bacteria</u> <u>Hydrogen Sulfide</u>
<u>MAJOR IONS</u>	<u>Bromide</u> <u>Chloride</u> <u>Fluoride</u> <u>Magnesium</u> <u>Potassium</u> <u>Sodium</u> <u>Sulfate</u> <u>Nitrate + Nitrite as N (total)</u>
<u>METALS</u>	<u>Arsenic</u> <u>Barium</u> <u>Boron</u> <u>Chromium</u> <u>Copper</u> <u>Iron</u> <u>Lead</u> <u>Manganese</u> <u>Selenium</u> <u>Strontium</u>
<u>DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS</u>	<u>Methane</u> <u>Ethane</u> <u>Propane</u> <u>BTEX as</u> <u>Benzene, Toluene, Ethylbenzene, Xylenes</u> <u>Total Petroleum Hydrocarbons (TPH)</u>
<u>OTHER</u>	<u>Water Level</u> <u>Stable isotopes of water (Oxygen, Hydrogen, Carbon)</u> <u>Phosphorus</u>

- ~~e. Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two hours.~~

Commented [COGA58]: **Commented [GD28]:** Transportation and traffic related topics combined into another section in DSR Chapter 4

- ~~f. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6 road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. The Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and revegetated within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.~~
- ~~g. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department. Requirements for the access permit may include the following: a) access location providing for a safe entrance/exit and utilization of main roadways to minimize impact /conflict with residents on local roadways; b) haul route and traffic data; c) pre/post inspection of roadways used by the Operator; d) collateral or bond to insure that road damage caused by the Operator is repaired; e) dust control (material used for dust control must be pre-approved by the County); f) road maintenance agreement during drilling phase; and g) payment of all applicable fees. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m., and shall work with and show written evidence that the applicable school district(s) has been consulted to minimize the traffic conflicts~~

~~with school buses when schools are in session. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department, for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.~~

~~20-25.~~ Removal of debris. All excess debris shall be removed during construction activities. Site shall remain free of debris and excess materials at all times during operations. Burning of debris and other materials is strictly prohibited at all times.

~~24-26.~~ Removal of equipment. No permanent storage of equipment. When no longer used, equipment shall be removed within thirty days unless a Temporary Use Permit for said storage is obtained from the County.

~~22-27.~~ Maintenance of machinery. Routine field maintenance of equipment involving hazardous materials within 300 feet of any water body is prohibited. All fueling shall occur over impervious material and shall not be done during storm events. Operator shall operate and maintain all equipment in accordance with manufacturer specifications. Regular maintenance checks are required for all equipment.

~~23-28.~~ Burning. No open burning of trash, debris or other flammable materials.

~~24-29.~~ Chains. Traction chains shall be removed from heavy equipment on public streets.

~~25-30.~~ Off-location flow lines and crude oil transfer lines

- a. Off-location flow lines and crude oil transfer lines regulated by the COGCC shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, applicant shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must conduct leak detection inspections or pressure testing in order to identify flowline leaks or integrity issues in accordance with COGCC Regulations.
- e. Operator must make available to County upon request all records required to be kept by COGCC
- f. Buried pipelines shall have a minimum of four feet cover.

~~26-31.~~ Gathering Lines

Commented [COGA59]: This may not be possible and also is at odds with section 30.b. immediately below. Operators should be encouraged to, where safe and feasible, locate off-location flow lines and crude oil transfer lines in areas containing those receptors if the overall environmental impact will be less or if operators can take advantage of exiting right-of-way or for other reasons, such as surface owners' desires or other concerns. As drafted, this appears to be a setback for off-location flow lines and off crude oil transfer lines and may very well be applied to function as a de facto ban.

- a. Gathering lines shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, Operator shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must make available to County upon request all records submitted to the Pipeline and Hazardous Materials Safety Administration (PHMSA) or the Public Utilities Commission (PUC) including those related to inspections, pressure testing, pipeline accidents and other safety incidents.

~~e. Well Connects. Well connects do not require a separate permit as long as the well connect was permitted under the original permit for the Oil and Gas Facility. Well connects are defined as a pipeline, 10" or less inside diameter and 2 miles or less in length, laid running from the custody transfer point or production facility for a new well(s) to an existing gathering line connection point.~~

~~27-32.~~ Temporary surface water lines

a. Operator shall use temporary surface water lines, unless infeasible.

~~b. Operator shall not use County drainage culverts or ditches for laying and operation of temporary water lines.~~

~~b.c. Operator may use County Road Right-of-Way, and County drainage culverts for the laying and operation of temporary water lines on the surface and in accordance with Adams County Standards and Regulations only after the approval of all applicable County permits, unless infeasible.~~

~~e.d. Operator will bury temporary water lines at existing driveway and gravel road crossings, or utilize existing culverts, if available, with County approval.~~

~~28-33.~~ Financial Assurance.

- a. Operators shall be required to maintain environmental liability insurance to cover gradual pollution events.
- b. Operator shall be required to file and maintain financial assurance as determined on a site-specific basis prior to commencing operations, and thereafter during the active life of the facility, the operator shall post and maintain a performance bond or other approved financial instrument with Adams County. Should any corrective actions be required by the

Commented [COGA60]: Commented [GD29]: Added May 2021 draft

Commented [Author61]: COGA does not understand this provision. The County encourages temporary water lines to help reduce truck traffic and associated nuisances but is also making it more difficult for these types of lines to be used. This provision will complicate routing and potentially end up with much longer lines to avoid culverts or ditches.

Commented [COGA62]: This type of insurance can be very difficult or impossible for operators to obtain. To be sure, financial assurance is of utmost importance but flexibility in how it is demonstrated is needed. An absolute requirement is unreasonable and unnecessary.

County in order to protect the health, safety, welfare, and the environment which result from ~~failure~~ of the operator to follow any regulations, standards, or conditions of approval, the performance bond shall be forfeited in an amount sufficient to defray the expense of said actions, including staff time expended by Adams County involved in such corrective actions.

Commented [COGA63]: COGA requests that the County add after the word failure "not involving a force majeure event." Without this change, this provision is unreasonable

~~29-34.~~ Mapping Information. Operator shall agree to provide coordinates and/or exact location of well sites to the County's GIS Department within forty-eight (48) hours of final completion of a well site in a format acceptable to the County. Any subsequent changes to a well site location shall also be provided to the County within forty-eight (48) hours of such changes.

4-11-02-03-03-04 **INSPECTION AND ENFORCEMENT**

1. Inspection: In recognition of the potential impacts associated with oil and gas facilities, all wells and accessory equipment and structures may be examined by the inspectors of the County at reasonable times to determine compliance with applicable provisions of this chapter, the International Fire Code, the International Building Code, and all other applicable standards in these Regulations. The County reserves the right in its discretion to make spot inspections or to inspect without notice in the event of an issue potentially involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another. For the purpose of implementing and enforcing the provisions of this chapter, the inspector and other authorized personnel have the right to enter upon private property. The County may use the information collected on the inspections to enforce the requirements of this chapter. The County may also report this information to appropriate state and federal officials, including but not limited to information regarding alleged violations of state and federal rules. Operator shall make available to County, upon request, all records required to be maintained by these regulations or to show compliance with these regulations, and the rules and regulations promulgated by the COGCC and the CDPHE, including permits, Air Pollutant Emission Notices (APENs) and other documents required to be maintained by the COGCC, CDPHE and these regulations. The County ~~will~~ shall charge a yearly inspection fee for all Oil and Gas Facilities in the County. Fees for Oil and Gas Facility inspections shall be assessed according to the County's adopted fee ~~schedule~~.
2. State Notification of Violations: Adams County will cooperate fully with the State of Colorado by notifying the Oil and Gas Conservation Commission of any and all violations of the Colorado Laws and Regulations.
3. Delinquent Taxes: One condition of any oil and gas well building permit is that all taxes as provided by statute, shall be paid.

Commented [COGA64]: This provision is over broad and could have safety consequences. COGA asks that the County delete "upon private property" and replace it with "the oil and Gas Facility provided that they have provided twenty-four (24) hours notice to operator (except in the case of an emergency situation involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another), received the appropriate safety training from the operator, are outfitted in the appropriate personal protective equipment, and comply with all applicable federal, state, and local occupational safety laws while on the oil and Gas Facility."

Commented [COGA65]: COGA requests that the County here add, "Any information collected from the inspection shall be provided to the operator and list the contact information of the inspecting party." The operator has a right to know what is alleged and to have a point of contact to discuss the inspector's observations. This will also facilitate a quicker return to compliance, should a legitimate issue be identified.

Commented [COGA66]: Would the County please provide a fee schedule? All fees must be reasonable, necessary, and adopted in accordance with applicable Colorado law.

4. Penalties and Fines: The County has authority under C.R.S. § 29-20-104, as amended, to impose fines for leaks, spills, and emissions.¹ The following table summarizes the fine schedule for violations of these Development Standards and Regulations:

		<i>Rule Classification</i>		
		Class 1: Paperwork other ministerial regulations, a violation of which presents no direct risk of harm to public health, safety, welfare, and the environment.	Class 2: Regulations related at least indirectly to promoting the public health, safety, welfare, and the environment and wildlife resources, a violation of which presents a possibility of distinct, identifiable actual or threatened adverse impacts to those interests	Class 3: Regulations directly related to protecting public health, safety, welfare, the environment, and wildlife resources, a violation of which presents a significant probability of actual or threatened adverse impacts to those interests.
<i>Degree of threatened or actual impact to public health, safety, welfare, the environment, or wildlife</i>	<u>Major:</u> Actual significant adverse impacts	\$5,000	\$10,000	\$15,000
	<u>Moderate:</u> Threat of significant adverse impacts, or moderate actual adverse impacts	\$1,500	\$5,000	\$10,000
	<u>Minor:</u> No actual adverse impact and little or no threat of adverse impacts	\$200	\$2,500	\$5,000

TABLE 4-11-8: Fine Structure

6. County Violations: In addition to the fines outlined above, the County has authority to cite violations under its control pursuant to Section 1-05-06 Criminal Remedies and Enforcement.
7. Legal Non-conforming: Adams County recognizes that there are oil and gas operations that were legally established prior to the effective date of these regulations that may or may not conform to these regulations. These operations may continue, provided the facility is not substantially modified.

¹ violations of Section 4-10-02-03-03(15) are capped at \$300/day per violation in accordance with the State Air Pollution Control Act, C.R.S. § 25.7.128.

Commented [COGA67]: COGA is concerned that the County may seek to duplicate fines that the COGCC may also assess.

Specifically, in many instances, operators anticipate conditions of approval or best management practices required on its County OGF Permit to mirror requirements included on a COGCC Form 2A or Form 2. At other times, the local and state rules are exactly duplicative. This could lead to an operator being assessed the same fine twice, once by the County and once by the state, for the exact same violation. This would lead to fines disproportionate to the conduct and raises concerns similar to double jeopardy where the State and County disagree about whether a violation did in fact occur and how the penalty policy should be assessed. COGA's members would appreciate more guidance on the County's proposed penalty schedule as well as how it will be implemented. The COGCC's penalty policy, for example, allows fines to be reduced where there are mitigating factors.

COGA also notes that this provision appears to be in conflict with Adams County's existing code. Specifically, Section 1-05-06 provides that any entity violating the Development Standards Regulations, of which these oil and gas regulations are a part, will be "punished by a fine in an amount not to exceed one hundred dollars (\$100) for each day of violation...." That section further provides for civil penalties in the range of \$500-\$1,000 dollars. This section does not contemplate the high figures quoted below. Thus, this section is in conflict with Adams County's own code.

8. Hearing, Enforcement and Appeal Procedures for Air Quality Violations

a. **Hearings:**

- i. Operators of OGFs may request a hearing in front of the BOCC to contest any alleged violations of the provisions contained in the Air Quality section of these Development Standards and Regulations or to contest permitting decisions involving the provisions contained in the Air Quality section of these Development Standards and Regulations. The BOCC shall grant request for a hearing within 15 days of receipt of such request.
- ii. Hearing date ~~must~~will be set within 90 days
- iii. Notice ~~must~~will be printed in a newspaper of general circulation in the area where the OGF is located.
- iv. Director of ~~CEC~~Community and Economic Development shall appear as a party in all hearings adjudicating decisions of the ~~CEC~~Community and Economic Development Department.
- v. The Director of ~~CEC~~Community and Economic Development shall have the same right to judicial review as other parties.
- vi. All testimony ~~shall~~must be under oath or affirmation.
- vii. A full and complete record of proceedings and testimony presented shall be taken and filed.
- viii. Information related to secret processes or methods of manufacture or production must be kept confidential. The person seeking to keep information confidential has the burden of proof. Except as provided in the Clean Air Act, information claimed to be related to secret processes or methods of manufacture or production which is emissions data may not be withheld as confidential; except such information may be submitted under a claim of confidentiality and the County shall not disclose such information unless required under the Clean Air Act
- ix. Any person who is affected and not adequately represented shall have an opportunity to be a party upon prior application to and approval by the BOCC in its discretion; such party shall have the right to be heard and cross-examine witnesses
- x. BOCC shall make a decision within 30 days of completion of the hearing
- xi. Burden of proof is on Director of ~~CEC~~Community and Economic Development with respect to any hearings involving alleged violations.
- xii. Where the Operator requests a hearing before the BOCC on a Permit involving provisions contained in the Air Quality section of these Development Standards and Regulations, the permit applicant bears burden of proof with respect to justification therefor and information, data, and analysis supportive thereof or required with respect to the application

b. **Judicial Review:**

- i. Final orders or determinations of the Community and Economic Development Director or the BOCC are subject to judicial review

Commented [COGA68]: Please explain the process for contesting non air quality alleged violations.

Commented [COGA69]: What does “affected” mean? Please provide parameters on how “affected” status will be determined.

- ii. Any party may move the court to remand the case to the CED Director of Community and Economic Development or the BOCC in the interests of justice for purpose of adducing additional evidence and findings; such party shall show reasonable grounds for failure to adduce such evidence previously.
- iii. Any proceeding for judicial review shall be filed in the district court in which the OGF is located
- c. **Injunctions:**
 - i. If any person fails to comply with a final order of the GED-Director of Community and Economic Development or the BOCC that is not subject to a pending administrative or judicial review, or in the event of a violation of an emission control regulation, or term or condition of a permit, the CED Director of Community and Economic Development or the BOCC may request the District Attorney for the district court in which the air pollution source is located to bring suit for an injunction
 - ii. In proceedings brought to enforce an order of the of the CED Director of Community and Economic Development or BOCC, a temporary restraining order or preliminary injunction, if sought, shall not issue if there is probable cause to believe granting such order or injunction will cause serious harm to the affected person or any other person and; (1) that the alleged violation or activity will not continue or be repeated; or (2) the granting of such temporary restraining order or preliminary injunction would be without sufficient corresponding public benefit.
- d. **Coordination with the Air Quality Control Commission**
 - i. Pursuant to section 25-7-128(4), C.R.S., upon the issuance of any enforcement order or granting of any permit, the County shall transmit to the AQCC a copy of the order or permit. Pursuant to section 25-7-128(6), C.R.S., the County shall confer and coordinate its activities regarding efforts to control or abate air pollution consistent with that provision.

Commented [COGA70]: A party may protest this motion, however. This potential should be codified in the Code for clarity.

4-11-02-03-05 RESIDENTIAL CONSTRUCTION STANDARDS

- 1. **Residential Construction Standards:** The Director of Community and Economic Development may impose any one (1) or more of the following standards on a specific site basis as a condition of subdivision approval and/or building permits on platted or unplatted land:
 - a. The oil and gas well location shall include a two-hundred-fifty (250) foot buffer in the form of an easement on the Final Plat. No structures may be constructed within the buffer area.
 - b. Access to the oil and gas well location shall be provided by a public street or recorded easement for private access.
 - c. The Final Plat shall include notice to prospective buyers of the location of the oil and gas well and associated easements.

- d. All oil and gas well flow lines and/or easements shall be graphically depicted on the Final Plat.
 - e. All surface and subsurface agreements shall be noted on the Final Plat by the recorded book and page number.
 - f. Pursuant to Section 4-06-01-02-01-12, where a new home and/or other permanent structure with plumbing is constructed within three hundred (300) feet of an existing oil and gas well, the property owner shall submit a signed waiver acknowledging the existence of the facility.
2. **Plugged and Abandoned, and Former Oil and Gas Production Sites:** This Section is enacted to protect and promote the health, safety, morals, convenience, order, prosperity, or general welfare of the present and future residents of the County. These regulations are based upon the land use authority of the County.
- a. Prior to submittal of a final plat or site-specific development plan, each plugged and abandoned well shall be located and surveyed. The plugged and abandoned well shall be permanently marked by a brass plaque set in concrete similar to a permanent benchmark to monument its existence and location. Such plaque shall contain all information required on a dry hole marker by the Colorado Oil and Gas Conservation Commission and the County.
 - b. As a condition of review of any final plat or ~~site-specific site-specific~~ development plan which contains a plugged and abandoned well or former oil and gas production site or is within 200 feet of such well or site, the owner shall submit a location diagram of the location of the well.
 - c. On every final plat or site-specific development plan which contains a plugged and abandoned well, there shall be dedicated a well maintenance and workover setback depicted on the plat, the dimensions of which shall be not less than fifty feet in width and 100 feet in length. No structures shall be located within this setback. The plugged and abandoned well shall be located in the center of the setback. There shall be public access for ingress and egress to the setback of a width of not less than twenty feet.
 - d. Every final plat and site specific development plan which contains a plugged and abandoned well or a site specific development that includes a property that is less than 200 feet from a plugged and abandon well, shall include the following notation: "The owner shall disclose to prospective purchasers of lots within a radius of 200 feet of the plugged and abandoned well of (1) the location of the plugged and abandoned well, (2) the location of the maintenance and workover setback, and (3) the purpose for the well maintenance and workover setback."

- e. As a condition of building permit review, no dwelling shall be constructed within fifty (50) feet of a plugged and abandoned well.
- f. Prior to issuance of a grading permit within a development containing a known reserve pit site, the reserve pit site shall be tested for expansive soils. Reserve pits containing expansive soils in locations proposed for buildings shall be subject to the provisions of the International Building Code.
- g. No utility lines shall be installed within ten feet of any plugged and abandoned well.

4-11-02-03-06

COGCC AND COUNTY APPROVALS REQUIRED

Development of the OGF shall not commence unless and until applicant receives an approved OGF Permit, including any approved waiver(s), and receives all required approvals and permits from COGCC.

4-11-02-04

HEAVY INDUSTRY

4-11-02-04-01

GENERAL

- 1. *Outdoor Storage:* Materials may be stored outdoors, provided the storage area is consistent with the zone district allowances. All outdoor storage shall be screened in accordance with the Fencing, Walls and Screening section (See Section 4-11-01-03) of these standards and regulations.
- 2. *Garbage Storage:* Garbage area screening shall consist of a six (6) foot high minimum screen fence made of wood or masonry material. Fencing materials should be cleaned and maintained must be clean and maintained at all times to present an orderly appearance. No garbage storage area shall be located within twenty (20) feet of a public sidewalk.
- 3. *Smoke and Odor Control:* Smoke and odor shall be controlled by filter, scrubbers, fans, or other means.
- 4. *Hours of Operation:* The hours of operation shall be from 7:00 a.m. to 7:00 p.m. for this use category when within two-hundred feet of a residentially used dwelling.

4-11-02-04-02

AUCTION YARDS, WITH LIVESTOCK

- 1. *Minimum Parcel Area:* one (1) acre
- 2. *Location:* All auction yards shall be located at least fifty (50) feet away from any on-property residence, fifty (50) feet from any right-of-way and five hundred (500) feet from any off-property residence.
- 3. *Operation in Accordance with County Tax Regulations:* The yard shall operate in accordance with the County Sales and Tax Department Regulations.

4-13 PARKING, LOADING, AND CURB CUT REQUIREMENTS

4-13-01 APPLICABILITY

Off-road parking and loading requirements in all new developments shall comply with the general access, circulation, and parking standards set forth in this Section.

4-13-02 GENERAL STANDARDS

4-13-02-01 SAFETY BARRICADES

A curb, rail, fence, guard, or other continuous safety barricade of a height or design sufficient to retain vehicles within the parking area shall be provided except for single-family residences and duplexes.

4-13-02-02 COMMERCIAL AND INDUSTRIAL PARKING LOT SCREENING/FENCING REQUIRED

For each boundary line of a commercial or industrial parking area abutting directly on a residential lot a wall, fence, or screen planting of a year-round nature shall be installed at least forty-eight (48) inches high to serve as a barrier for passage of persons and waste material, to conceal glare from headlights, and to reduce noise, fumes, and pavement heat.

4-13-02-03 PLANTINGS PROTECTED

Wheel or bumper guards shall be located so no part of any vehicle extends beyond the boundary lines of the parking area or comes in contact with walls, fences, plantings, or any other structures.

4-13-02-04 PARKING AREA LANDSCAPING REQUIREMENTS

Parking areas are required to meet standards for landscaping within the parking area and around the perimeter of the parking area. Landscaping requirements are found in Section [4-17](#) ~~Error! Reference source not found.~~ of these standards and regulations.

4-13-02-05 SURFACE OF PARKING AREA

Except for agricultural areas, off-road parking areas shall be surfaced and maintained with a portland or asphalt concrete surface, or other suitable surface as determined by the Director of Community and Economic Development. Drainage shall be subject to the approval of the Director of Community and Economic Development.

The surface of the parking area shall be maintained with the following minimum requirements:

1. Potholes shall not exceed six (6) inches deep or six (6) inches wide.
2. Cracks shall not exceed three (3) inches in width.

4-16 OFF-PREMISE ADVERTISING DEVICES (BILLBOARD)

4-16-01 PURPOSE

The Purpose of this section is to advance the County's legitimate and substantial interest in limiting the number and area of off-premise advertising devices permitted to maintain the visual appearance of scenic corridors, avoid clutter, and protect the health, safety, and welfare of the citizens of Adams County by mitigating traffic distractions.

4-16-02 APPLICABILITY

Off-premise advertising devices are permitted with an approved Conditional Use Permit in the C-5 and industrial zone districts. All off-premise advertising devices shall meet the standards contained in this Section 4-~~16-5~~.

A Conditional Use Permit or a Major Amendment to an existing Conditional Use Permit or Planned Unit Development shall be required to display, erect, relocate, or alter any off-premise advertising device excluding indirect lighting traditionally used and attached to a sign, but not internally located.

Provided any Off-Premise Advertising Device complies with all standards in this Section and allows off-premise commercial messages, the Off-Premise Advertising Device shall also be permitted to allow non-commercial messages to the same extent.

In conjunction with these Development Standards and Regulations, the Colorado Outdoor Advertising Act, C.R.S. 43-1-401 et. seq, and the Colorado Rules and Regulations promulgated thereunder by the Colorado Department of Transportation shall be adhered to. Nothing in these Standards and Regulations shall be construed to allow advertising devices which are prohibited, or otherwise non-conforming with the Colorado Outdoor Advertising Act.

4-16-03 MAXIMUM NUMBER OF SIGNS

Only one (1) two-faced off-premise advertising device shall be permitted per lot.

4-16-04 MAXIMUM SIZE

No off-premise advertising device shall exceed three hundred (300) square feet per face.

4-16-05 MAXIMUM HEIGHT AND MINIMUM CLEARANCE

No off-premise advertising device shall exceed forty (40) feet in height. Height shall be determined as the distance from the grade of the right-of-way on which the sign fronts to the top of the sign including all projections. If located within one thousand

3. *Required Trees and Shrubs:* A minimum of one (1) large tree and two (2) shrubs, or two (2) ornamental trees and two (2) shrubs, shall be required for each increment of fifteen hundred (1,500) square feet in western Adams County and three thousand (3,000) square feet in eastern Adams County.
4. *Parking Lot Landscaping:* All parking lots which consist of thirty (30) spaces or more must be designed to include landscaped islands between rows. This landscaping shall be credited toward the total landscaped area required.
5. *Required Tree Mix:* The selection of trees shall be a mix of large deciduous (10% - 50%) and ornamental (10% - 50%). Evergreens shall be considered ornamental.
6. Minimum size requirements for trees and shrubs shall be:

<i>Plant Type</i>	<i>Maturity Height</i>	<i>Minimum Plant Size at Planting</i>
Ornamentals	Less than 20'	1" to 1-1/2"
Large Deciduous	Over 20'	2" to 2-1/2"
Evergreens (Sm.)	Less than 20'	5' tall
Evergreens (Lg.)	Over 20'	6' tall
Low Shrubs	1' to 3'	5 gallon
Upright Shrubs	3' to 10'	5 gallon

7. *Irrigation System Required:* A fully automatic irrigation system is required.

4-17-09-01-05 DWELLING, MANUFACTURED HOME PARK

A twenty (20) foot strip around the boundary must be landscaped to provide a visual screen. All open spaces and other unimproved areas must be suitably landscaped. All landscaping must be maintained and furnished with an automatic sprinkler system.

4-17-09-01-06 DWELLING, MOBILE HOME PARK

A landscaping plan shall be submitted for review and approval. The setbacks of the development and any other area not covered by mobile homes, driveways, ingress and egress, or other structures, shall be landscaped.

4-17-09-02 COMMERCIAL USES

4-17-09-02-01 AUTOMOBILE SERVICE STATIONS

1. *Screening:* Service stations shall be separated from abutting residential properties by a six (6) foot high masonry wall and a Bufferyard as required in Section 4-~~1716~~-06. |

4-17-13 DEVELOPMENT ABUTTING ADAMS COUNTY TRAIL SYSTEM

Any new development abutting any portion of the designated Adams County Trail System, a public park, or limited access highway, shall be buffered from the trail, or park, using a Special Bufferyard (Type C), unless increased or decreased by the Director of Community and Economic Development.

4-17-14 REQUIRED LOT LANDSCAPING

In addition to the required bufferyards and bufferyard landscaping, the following site landscaping shall also be required:

4-17-15 ADMINISTRATIVE RELIEF

Administrative relief is provided to add flexibility in the application of the landscaping regulations in this Section 4-17-15 when a standard is inapplicable or inappropriate to a specific use or design proposal. However, the granting of administrative relief should not always mean a requirement is reduced without mitigation — be it landscaping combined with urban design elements (i.e. architectural elements within a parking lot that screen parking to provide shade pavement, sidewalk/tree lawn area, gathering space or plaza, or natural areas), concentrated/denser plant material within a reduced buffer yard width, or demonstrations of concepts that are equal to or superior in fulfilling the purpose of the landscaping requirements).

A written request for administrative relief shall be submitted to the Director of Community and Economic Development either before or in conjunction with the building permit review process. The written request shall:

Include a justification in terms of the findings necessary to grant administrative relief; and the written request shall close with a section for the Director of Community and Economic Development's use, which will include a block for the decision of approval/denial, the Director of Community and Economic Development's signature, and decision date.

The written request with decision shall be attached to the plan or retained in the applicable file, as appropriate. An example of this written request shall be available from the Director of Community and Economic Development.

The Director of Community and Economic Development must make all of the following findings in order to grant administrative relief:

The strict application of the regulations in question is unreasonable given the development proposal or the measures proposed by the applicant or the property has extraordinary or exceptional physical conditions or unique circumstances which

COGA Comment to Setbacks: 4-11-02-03-03-03 General Provisions – 4.a

“COGA continues to have grave reservations over this draft setback. The 2,000’ setback from the listed receptors and the 1,000’ setback from the listed receptors are unconstitutional ultra vires regulations because they exceed the County’s authority under the Local Government Land Use Control Enabling Act, to enact land use regulations pertaining to oil and gas that are “necessary and reasonable.” § 29-20-104(1)(h), C.R.S. The setback is “hard” for the 1,000’ feet and the “off-ramp” added below does not appear attainable with such subjective criteria as the “extent to which the Oil and Gas Facility is compatible with the surrounding area...” COGA is unaware of any evidence suggesting that a 2k feet setback from residents and a 1,000’ setback from groundwater wells, environmentally sensitive areas or designated parks and open space is necessary and reasonable in light of the fact that operators can and do employ Best Management Practices (“BMPs”) that avoid, minimize, and mitigate potential adverse impacts from operations.

On this point of the strength of modern technology and BMPs, during the COGCC “Mission Change” Rulemaking, COGA and other industry parties put on voluminous, un-rebutted testimony and other evidence based on real, not-modeled, state and third-party gathered air quality data to show that benzene, for example, was benign at distances past 500 feet. COGA encourages Adams County to look at the real data.

In addition to COGA’s prior comments on this issue, which remain in full force other than that the County has added a “substantially equivalent protections” theoretical carveout, COGA again reminds the County that that given the way the setbacks are measured (that is, from the property line, not a residential building, and to the oil and gas facility, not a well head or production facility), the as-drafted setback will be as large, if not larger, than the one Colorado voters, including 59% of Adams County residents, soundly defeated when they rejected Proposition 112 in 2018.

In fact, this new draft makes the setback arguably even larger than the first draft’s setback and comes even further to eclipsing the rejected Proposition 112 as this draft has clarified that the measurement edge includes “the rough grading footprint” and the “final landscaping boundary.” COGA does not understand what health and safety impacts arise from landscaping and does not understand why landscaping should be included in the setback distance.

of ‘environmentally sensitive areas’ now includes “waters of the state,” which Adams County defines to mean, “Any and all surface waters which are contained in or flow in or through the State of Colorado, including, but not limited to, streams, lakes, rivers, ponds, wells, impounding reservoirs, watercourses, watercourses that are usually dry, springs, drainage systems, and irrigation systems, all sources of water such as snow, ice, and glaciers; and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, located wholly or partially within or bordering upon this state and within the jurisdiction of this state. This does not include waters in sewerage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed. This definition includes water courses that are usually dry.”

Adams County cannot seriously expect operators to have a 2,000’ from snow or dry streams. To be sure, COGA believes that protecting water is of extreme importance, but COGA believes the County may not have appreciated the implications of its latest modification.

Unless Adams County modifies its definition of environmentally sensitive areas, not only is this regulation unnecessary and unreasonable, but it also may be unlawful on the additional bases that (1) the regulation acts as a ban and is therefore operationally preempted by state law, rendering it unconstitutional; and (2) the ban operates as a regulatory “taking” and is therefore unconstitutional.”

CHAPTER 11—DEFINITIONS

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11-02-179 ELECTRONIC MANUFACTURING

An industrial establishment or area for the purpose of manufacturing electronics. This includes the manufacturing and assembly of small electronic appliances.

11-02-180 ELECTROPLATING

The process of plating or coating objects with a metal through electrolysis or an industrial establishment or where such processing occurs.

11-02-181 ENAMELING, LACQUERING, OR GALVANIZING OF METAL

The process of bonding a glassy substance, usually opaque, to the surface of metal through the process of fusion or an industrial establishment or area where such processing occurs.

11-02-182 ENCROACHMENT LINES

Limits of obstruction to flood flows. These lines are generally parallel to the stream. The lines are established by assuming the area landward (outside) of the encroachment lines may be ultimately developed in such a way it will not be available to convey flood flows. The stream channel and adjoining floodplains between these lines will be maintained as open space and will be adequate to flood heights, such increase under any condition not exceeding one-half (1/2) foot.

11-02-183 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally sensitive areas include, but are not limited to, wetlands, biological resources, habitats, **waters of the State**, national parks, archaeological/historic sites, natural heritage areas, tribal lands, drinking water sources, intakes, marinas/boat ramps, and wildlife areas.

Commented [GD1]: Added to May 2021 draft

11-02-184 EQUAL DEGREE OF ENCROACHMENT

Equal degree of encroachment is determining the loss of hydraulic carrying capacity due to encroachment on each side of the floodplain such that the loss of capacity on one side equals the loss of capacity due to encroachment on the other. Determination of the equal degree of encroachment on the floodplain shall be performed along a significant reach of the stream.

Appendix A:

Oil and Gas Facility Permit (OGF) – Guide to Development Application Submittal

All development application submittals shall comprise of one (1) electronic copy (emailed or delivered on a USB). **Application submittals that do not conform to these guidelines will not be accepted.**

General Format:

- All applications shall be submitted electronically or delivered to the One-Stop Customer Service Center on a flash drive.
- All documents submitted to the County are subject to the Colorado Open Records Act (CORA), C.R.S. § 24-72-201, et seq. All documents that may be subject to an exemption of CORA must be identified. The County does not guarantee confidentiality of documents. No plans or information within shall contain copyright restrictions or public use restrictions.

Operations Plan:

Cover Sheet:

- Title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township, and range.
- Legal description of the area, date of the drawing, existing zoning of the site, a sheet key, a vicinity map with north arrow (scale of 1" = 2,000' preferred) with an emphasis on the major roadway network within two (2) miles of the proposal.
- All applicable County notes, an approval signature block and a block to insert the COGCC Permit number when approved.

Impact Area Map:

- Map that shows the proposed location of the Oil and Gas Facility, locations of all producing oil and gas wells and other oil and gas operations within the one-mile (1) impact area; locations of all abandoned and shut-in wells within one quarter mile (1/4) radius of the projected track of the borehole; locations of all permitted registered water wells within one-mile (1) of the proposed Oil and Gas Operation; existing improvements within 1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one-mile impact area.

GIS Information:

- The applicant shall submit all geographic information systems (GIS) data for the proposed facility in a format and scale acceptable to the County.
- The GIS data shall include, at a minimum, the outline of the edge of maximum disturbance for the proposed site, the access road, and the location of any proposed sound walls, if applicable.

Drilling Operations Plan:

- Site plan of drilling operations with drilling equipment with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum acceptable to the County.
- The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

Production Plan:

- Site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum acceptable to the County.
- Identify tentative drilling and completion schedules.
- A seed mix shall must be provided for reseeding the well pad.
- Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility; if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

Commented [COGA1]: Added in May 2021 draft

Commented [COGA2]: COGA appreciates this addition insofar as it acknowledges CORA and indicates that documents may be held confidentiality. COGA requests, however, that the County clarify the process for determining whether the County intends to honor the operator's designation as confidential ahead of the documents being submitted in hard copy or electronic format to the County.

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Signage Plan/Sign Detail:

- A dimensioned Signage Plan or Sign Detail shall be included describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs.
- Directional signs for emergency responders and inspectors, along with a 24-hour, 7-days per week contact information to deal with all complaints.

Final Plan:

- Once the review process is complete and staff has determined that all outstanding issues have been resolved, staff will request a final copy of the Oil and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the Community and Economic Development Department.

Emergency Preparedness and Response Plan:

- In accordance with the Emergency Preparedness and Response requirements in Section 4-11-02-03-03(9).
- Emergency Service Providers: The applicant must provide a commitment to serve ("will serve") letter from the authority having jurisdiction for providing emergency services (fire protection and emergency medical services) for that facility, or, where no authority has jurisdiction, from an emergency services provider with the ability to provide such emergency services.

Transportation Plan:

- Plan must be designed and implemented to ensure public safety and maintain quality of life for other users of the County transportation system, adjacent residents, and affected property owners.
- Traffic Impact Study must satisfy the requirements of Adams County Development Standards and Regulations, Chapter 8, and provide:
 - Project lifetime truck trip estimates during each phase of operations, both cumulatively and along each proposed access route.
 - Map(s) and discussion of each proposed access route, any road weight restrictions, local government jurisdiction(s), access and egress of

location, necessary turning radii for equipment, trucks or emergency vehicles, and plans for staging and waiting of vehicles during operations.

- Plan for use of temporary and permanent pipelines, if applicable, for transporting products on or off location (oil, natural gas, produced water, etc.).

Noise Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Ambient Baseline Noise Study:

- Encompass at least five days, one of those days being a weekend.
- Shall measure noise for A-weighted and C-weighted sound pressure levels.

Noise modeling study/noise impact assessment:

- Shall estimate and predict environmental noise levels and impacts during each phase of operations and present both mitigated and unmitigated noise estimates.
- Shall estimate noise levels for reasonably expected or realistic worst-case scenarios.
- Shall present noise estimated for A-weighted and C-weighted sound pressure levels.
- Shall present noise estimates at the proposed facility and cumulatively with ambient background noise levels
- Shall include a list of equipment and manufacturer's specifications the noise modeling is based on.
- Shall include a low frequency (C-weighted) noise impact analysis and identification of available control measures for low frequency sound.
- Topographic considerations of noise and noise propagation at the proposed site.
- Plan for continuous noise monitoring and measurements at the proposed facility, if applicable, including the placement of equipment and data sharing and reporting.
- Shall include all raw and adjusted noise data upon request from the County

Commented [COGA3]: Added in May 2021 draft.

Commented [COGA4]: Added in May 2021 draft

- [Shall include proposed points of compliance for both County and COGCC noise provisions](#)

Lighting Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Methods to ensure adequate lighting for onsite safety
- Facility lighting type, anticipated location, mounting, height, and orientation during each phase of operations.
- Photometric study indicating impact on surrounding properties and measure of lumens and lumens per square foot of the facility emitted during each phase of operations.
- Cut sheets for all proposed fixtures.
- Any applicant-proposed mitigation measures to reduce impacts associated with light.

Odor Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Type(s) of fluid to be utilized during each phase of drilling.
- All potential odor sources during each phase of operations.
- Planned methods for responding to odor-related complaints.
- Any applicant-proposed mitigation measures to reduce impacts associated with odor.

Dust Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- The amount of total area disturbed for construction, proposed access road coverage type (dirt, gravel, pavement, etc.), and soil type.
- Predominant wind patterns including wind speeds and direction for each scheduled phase of earthmoving operations.
- Any applicant-proposed mitigation measures to reduce impacts associated with dust.

Visual Aesthetics Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Visual Mitigation Plan:

- Listing of all operations' equipment, including required sound walls, equipment heights, proposed colors for all equipment, and whether equipment is observable from any public highway, roadway, or trail.
- Renderings of the proposed facility and the surrounding areas during drilling and production operations.
- Methods for site access and security including proposed fencing, barriers, and screening during each phase of operations.

Landscaping and Berming Plan:

- Proposed landscaping and berming type, height of mature landscaping, location of berming placement, and maintenance and irrigation requirements for planted vegetation throughout the duration of operations, including production.
- Any applicant-proposed mitigation measures to reduce impacts associated with visual aesthetics.

Community Outreach Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Identification of any Disproportionately Impacted Communities, [as defined in COGCC rules](#), within one mile (1), or greater as determined by the Director of Community and Economic Development, of the proposed site with plans for engagement and a description of measures taken to directly mitigate impacts to those communities.
- Plans for regularly updating residents within one mile (1), or greater of the proposed site (public meetings, access to information, website creating, meeting notifications, etc.).
- Plans for providing written or digital materials to residents within one mile (1) or greater including materials in languages other than English.

Commented [COGA5]: Added in May 2021 draft.

Cumulative Impacts Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Evaluation and discussion of the cumulative impacts from all reasonably foreseeable development associated with oil and gas activity and other heavy industrial operations within one mile (1) of the proposed site and all incremental increases to the following impacts, at a minimum:

- **Air Quality:** a qualitative and quantitative evaluation, discussion, and emission estimate for air pollutants during all pre-production operations and for the first year of production from the proposed site.

- **Public health and welfare:** a qualitative or quantitative evaluation of short-term and long-term cumulative impacts to noise, light, odor, and dust.

Quantitative evaluation of total hazardous air pollutant emissions estimated during pre-production operations and for the first year of production from the proposed site.

- **Traffic:** a quantitative and qualitative evaluation and discussion of short-term and long-term cumulative impacts associated with traffic to and from the proposed site.

- **Water resources:** an identification of all potential contaminant migration pathways including distances from the proposed site to the nearest downstream riparian corridors, wetlands, surface waters, and environmentally sensitive areas.

Qualitative evaluation of potential impacts to public water systems and intakes.

Qualitative evaluation of anticipated volume of surface and groundwater to be used and plans for the reduction, reuse, and recycling of water for all operations.

- **Wildlife, Ecosystems, and Soil:** the identification and listing of all high priority habitats and total acreage of

surface disturbance within those habitats.

A quantitative evaluation and measurement of total topsoil disturbance necessary for the proposed site and qualitative evaluation of impacts on ecosystems and vegetative communities as a result of surface disturbance from the proposed site.

Plans for short-term and long-term revegetation of disturbed areas. Plans and volume estimates for bringing in inert fill from offsite.

- For proposed locations within one (1) mile of any Disproportionately Impacted Communities, this plan should also discuss any cumulative impacts, if any, to those communities and plans for avoiding mitigating, and offsetting such impacts.

- Plans for addressing, mitigating, and offsetting cumulative impacts, including specific measures proposed by the applicant.

Water and Wildlife Protection Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Water Supply:

- Proof of adequate water supply. Operator shall identify a water resource lawfully available for industrial use, including oil and gas development, to be utilized by Operator and its suppliers.

Water Quality Plan:

- Details on water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies.

Natural Resources Evaluation:

- Identification of the location, size, and status of any wetlands, Colorado Parks and Wildlife classified high priority habitats, other wildlife classified high priority habitats (non-eagle habitats/nests, prairie dog burrows, etc.), wildlife movement corridors, floodplains, surface waters, tributaries, intermittent and ephemeral streams, drainage canals, and groundwater wells.

Commented [COGA7]: Added in May 2021 draft.

Commented [COGA8]: Please clarify that this submittal requirement can be satisfied by the operator certifying it has contracts with water suppliers for adequate water supply. These contracts are often confidential.

Commented [COGA6]: Recycling/re-use isn't always possible and at times can lead to more impacts. COGA requests that the County add the language "if the water is proposed to be reused and recycled." This change is necessary for this document to be consistent with the County's own acknowledgment in its draft of Chapter 4 that recycling isn't always technically feasible. In Chapter 4, the pertinent Adams County provision provides, "Operator shall recycle drilling, completion, flowback and produced fluids unless technically infeasible."

Commented [COGA9]: Added in May 2021 draft.

- Plans for consultation and engagement with Colorado Parks and Wildlife.
- Any applicant-proposed mitigation measures to reduce impacts to water resources and wildlife.

Natural Resource Conservation Overlay (NRCO):

- If the oil and Gas Facility is located in the NRCO, a Resource Review will be required

Substantially Equivalent Protections Plan (optional):

For locations that do not meet setback requirements in Adams County Development Standards and Regulations Chapter 4: Plan should demonstrate how the Oil and Gas Facility will provide substantially equivalent protections that are equal to or more effective at protecting public health, safety, welfare, the environment and wildlife resources in the form of:

- Planned mitigation and Best Management Practices
- Implementation of best available control measures and technologies
- How the proposed Oil and Gas Facility is compatible with the surrounding area
- The extent to which the proposed Oil and Gas Facility will mitigate, avoid, or offset cumulative impacts

Engineering Documents:

The following technical engineering documents are required by the Community and Economic Development unless otherwise waived:

Construction Plans:

- If applicable, plans for the proposed Oil and Gas Operation's public improvements including road plan and profile sheets, storm drainage improvement plans and other public improvements, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Pavement Design Report:

- If applicable, prepared in accordance with the latest version of the Adams County Development Standards - and Regulations- (Chapter 7).

Grading Erosion and Sediment Control:

- If applicable, as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Drainage study/technical drainage letter/plan:

- If applicable, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Floodplain Use Permit:

- The applicant must obtain a Floodplain Use Permit, in accordance with the latest version-of the Adams County Development Standards and Regulations, if the proposed Oil and Gas construction disturbance or operation encroaches into the 100-year floodplain, or the access is crossing a major drainage way, as defined by the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Surface Owner Documentation:

- Documentation as to whether the surface owner and others with interest in the property have authorized the proposed OF

Additional documentation as determined by the Director of Community and Economic Development Department:

- Community and Economic Development may require additional information to process an OGF Permit application. In addition to the items required on the check list, the Director of Community and Economic Development may require additional information deemed necessary to evaluate particular applications.

Commented [COGA10]: Added in May 2021 draft: formatting change only.

Commented [COGA11]: Added in May 2021 draft.



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April 28, 2021

VIA EMAIL – NO ORIGINAL TO FOLLOW

ATTN:

Adams County Commissioners
Greg Dean, Local Governmental Designee
Katie Keefe, Environmental Program Manager, CED
Jill Jennings Golich, Director, CED
Christy Fitch, Assistant County Attorney

RE: Colorado Oil & Gas Association – Initial Comments to Adams County April 6, 2021
Draft Oil and Gas Regulatory Amendments

Dear Adams County Commissioners, Staff, and Counsel,

The Colorado Oil & Gas Association ("COGA") respectfully submits this letter regarding Adams County's proposed oil and gas regulatory amendments. COGA looks forward to providing additional, constructive input as the County moves forward in drafting, and ultimately adopting, new regulations in accordance with state law, including the statutory requirement that local governments may enact regulations pertaining to the location and siting of an Oil and Gas Facility or Oil and Gas Location only to the extent such regulations are reasonable and necessary. This letter serves as COGA's preliminary comments to the draft regulations, and we will continue to provide constructive feedback during the ongoing stakeholder process.

When considering our comments, it is important that the County acknowledge that it has not received a single permit application for a new Oil and Gas Facility in over a year and a half. More precisely, the County has not received a single permit application for a new Oil and Gas Facility in Adams County since Adams County adopted its current regulations over COGA's vehement disapproval in 2019. Adams County has continually publicly stated that it is a business-friendly jurisdiction, yet it continues to implement rules and draft proposed regulations that move closer toward an illegal ban on future oil and gas development. These two concepts cannot co-exist, and the County's purported intent to align with the January 15, 2021 Colorado Oil and Gas Conservation Commission ("COGCC") rules is a fallacy if the regulations are adopted in their current form.

In particular, COGA and its members have identified several provisions within the draft regulations that make the location and siting and permitting of future Oil and Gas Facilities and Oil and Gas Locations extremely difficult, if not impossible. Prohibitive siting requirements, noise setbacks, and limited waiver provisions are just a few of the items COGA and our members would like the County to address and revise. As currently drafted, COGA submits that these and other provisions are not reasonable or necessary to protect public health, safety, welfare, the environment, and wildlife. Please note that the items discussed below do not represent all of COGA's concerns, nor are they presented in any particular order of importance.

Setbacks

As currently drafted, Adams County's 2,000' hard setback from the total disturbed area of an Oil and Gas Facility to a variety of receptors, including the property boundary line of a residence and the property line of a platted residential lot, and hard 1,000' setback from various water wells are extremely prohibitive for new oil and gas development. Coupled with the County's draft Alternative Location Analysis ("ALA") requirement for operators to identify three "uniquely different" sites with the additional 500' limitation between alternative sites, the setback provisions pose an even greater challenge to find potential locations that satisfy the mandated setbacks, the ALA criteria, the surface owners' desires, and the mineral owners' interests. While COGA recognizes that local governments may enact stricter regulations than the state, stricter regulations must still be necessary and reasonable. Adams County's proposed setbacks are unreasonable and excessive, especially as compared to the 2,000' siting requirements adopted by the state.

Specifically, Adams County's proposed regulations measure and apply its setbacks differently and more conservatively than the COGCC in several ways. First, the County measures from total disturbed area of an Oil Gas Facility to the property line of a residence or other noted receptor. By contrast, the COGCC measures from the "Working Pad Surface" of an Oil and Gas Location to the residence itself. Those two distinctions make Adams County's setback effectively far greater than the state requirements. For example, the COGCC definition of "Working Pad Surface" expressly excludes, among other things, cut and fill slopes, stockpiles, and stormwater controls, whereas Adams County staff informed COGA at an April 26, 2021 meeting that Adams County intends to measure from items like those, specifically referencing storage and staging areas.

The distinction between measuring to the residence versus the property line of the residence is also significant. Consider the farmer who resides on the land she farms. Extensive agricultural fields may separate her "property boundary line" from her residence. Adams County's proposed measuring start and end points would result in setbacks that will often be in excess, sometimes greatly so, of the 2,500' setback proposed by Proposition 112 that was soundly rejected by 59% of Adams County voters in 2018. When viewed from this perspective, Adams County's proposal is nothing more

than a backdoor effort to enact a ban on oil and gas development that the Adams County voters overwhelmingly voted down.

Not only is Adams County's draft setback effectively much larger than the state's due to how the setback is measured, but Adams County's attempts at "off-ramps" truly do nothing to support development within the excessive and unreasonable setbacks. For example, Adams County, unlike the COGCC, does not consider the placement of specific oil and gas equipment at an Oil and Gas Facility. Specifically, the COGCC allows the Working Pad surface of an Oil and Gas Location to be within 2,000' of residences when wells, tanks, separation equipment, and compressors at the Location will be more than 2,000' from residences. COGCC Rule 604.b.(3). The County's draft regulations provide for no such consideration and attendant carveout. The County further does not recognize the benefit of oil and gas locations being approved as part of a larger Comprehensive Area Plan. COGCC Rule 604.b.(2). Also, while the County has asserted that it would consider approving development within 2,000' of a receptor if an Operator provides "substantially equivalent protections," that potential is not codified in the draft regulations, nor does COGA have any idea what "substantially equivalent protections" means. The protections must be "substantially equivalent" to what?

The only identified "off-ramp" in the proposed regulations is where an operator obtains written waivers from each and every primary resident and property owner. Achieving written waivers from each primary resident and property owner will often be impossible, and a single dissenting resident could completely prohibit development for any reason, including political motivation. As you consider surface owners and tenants, Adams County should also consider the hundreds to thousands of potential mineral owners who could be adversely affected by one person's decision not to provide a written waiver.

Of note, during the COGCC "Mission Change" Rulemaking at which the COGCC adopted its 2,000' "soft" siting requirement that is subject to no less than four explicit, codified exceptions, COGA and other industry parties made it abundantly clear through hours of un rebutted testimony and evidence based on *real, not-modeled*, state and third-party air quality data that specific VOC levels from oil and gas development at distances past 500' were benign. To the extent the County is concerned with nuisance impacts, such impacts are covered by substantive standards applicable to the type of impact. The blunt tool of a setback is not necessary to mitigate impacts when Best Management Practices ("BMPs") can have the same effect.

For the above and other reasons, COGA submits that the County's version of the 2,000' setback is unreasonable and unnecessary and should be significantly modified to prevent an outright ban on oil and gas development.

Noise Requirements/Setback

COGA would like for Adams County to clarify further the draft noise requirements, which the County has described as a "pseudo-setback" for future oil and gas

development. As currently drafted, the noise requirements discriminate against the oil and gas industry by treating oil and gas disparately from other industries through requiring compliance with adjacent zoning standards, regardless of how the property where the development is located is zoned. When asked why oil and gas development is proposed to be held to a different standard than other land uses in Adams County, the County's answers were unclear. We ask Adams County to recognize that noise is noise, regardless of the source, and to further acknowledge that noise impacts from oil and gas development are largely limited to the drilling and completions phases of development. That is, for the majority of the development's life, noise is not a material concern. Further, we ask Adams County to clarify at what distance sound will be measured at for compliance. These clarifications are necessary to analyze whether compliance with the proposed requirements is even possible. COGA submits that a regulation that cannot be complied with is on its face unreasonable. COGA also questions why the draft regulation is necessary, given that Operators apply Best Management Practices and mitigation measures to minimize adverse impacts of noise and these are used at all Oil and Gas Facilities. COGA submits that a regulation that cannot be complied with is on its face unreasonable.

Odor

COGA suggests that Adams County make several changes to its proposed odor regulations. Specifically, there is a lack of clarity in how the County will verify and confirm odor complaints. As written, an odor complaint within *any* proximity of the Oil and Gas Facility would trigger the requirement that the operator provide a description of their activities and potentially acquire a speciated air sample for HAPs and VOCs, even if the complainant was 2,000' or more away from the Oil and Gas Facility. COGA requests that the County confirm that any odor complaint over 2,000' from the Oil and Gas Facility be considered an illegitimate complaint, which remains aligned with the COGCC regulations. See COGCC Rule 423.

Further, the potential requirement for an operator to sample for HAPs and VOCs is a fundamental misunderstanding of air quality and air quality monitoring. Adams County seems to be confusing the odor *nuisance* aspect (smell) with air monitoring and sampling (not smell). Based on any results from HAP and VOC samples, how does the County intend to interpret those results as a perceptible smell or not? This is not within the County's expertise to determine and the County should defer to the experts at the Colorado Department of Health and Environment ("CDPHE") for these matters.

Dust

It is understandable that Adams County would like to limit the impact of dust to areas surrounding an Oil and Gas Facility. However, the requirement to cease "all earthwork activities" and to cease "ongoing truck traffic" is unreasonable and could unintentionally cause substantial impacts and significant delays on oil and gas operations. The determination of when to cease these activities and how it will be enforced is also unclear. For example, do gusts of wind over 30 MPH trigger this provision, or does it need to be a sustained wind? These provisions seem again to single out oil and gas

development. Are other industries that utilize earthwork and/or trucking subject to the same requirement? Like noise, dust is dust, regardless of the source.

Water

Regarding water sampling and testing, it is unclear why an operator must offer to sample "all available water sources" within ½ mile of the proposed facility when non-waivable setbacks require an operator to already be 1,000' away from a groundwater well. Further, the County has already offered to test and tested a number of water sources near existing oil and gas development through its water sampling program with Tri-County health. This requirement is neither reasonable nor necessary.

Wildlife

COGA is concerned with the requirement that operators must "share all finding, recommendations, and reports...within seven (7) days" to the County. Some of these discussions may be confidential per Colorado Parks and Wildlife ("CPW") and could be part of negotiations for which such disclosure could be harmful to Surface use Agreement negotiations or other agreements necessary for the location of the Oil and Gas Facility. Specific findings must be allowed to remain confidential, and COGA requests the County not inadvertently insert itself into private negotiations. Finally, COGA requests that findings are only reported to Adams County once they are final.

COGA thanks Adams County in advance for its close attention to the issues addressed above and in the attached redline. Please consider COGA and our membership as resource when having discussions related to the oil and natural gas industry and during any potential future regulatory changes.

Sincerely,



Ryan Seastrom, Regulatory Affairs Manager, Colorado Oil & Gas Association

cc (via email):

Mark Mathews-Brownstein Hyatt Farber Schreck, LLP

Julia Rhine-Brownstein Hyatt Farber Schreck, LLP

Rich Coolidge-Colorado Oil & Gas Association

Dan Haley-Colorado Oil & Gas Association

Christy Woodward-Colorado Oil & Gas Association

Appendix A – Supplement to COGA Redlines – Chapter 4 Draft Amendments

CDPHE (2020) (Broomfield) —Air monitoring of VOC levels ~700 feet away from wells at multi-well well pad shows no risk or acceptable risk for both short-term and long-term health effects. The Oil and Gas Health Information and Response Program (“OGHIR”) at the Colorado Department of Public Health and Environment (“CDPHE”)’s Toxicology and Risk Assessment Section deployed the Colorado Air Monitoring Mobile Laboratory (“CAMML”) approximately 700 feet from 18 wellheads at Extraction Oil & Gas’s Livingston location to conduct air sampling at baseline levels and then during all stages of operations: drilling, hydraulic fracturing, millout, and Next Generation flowback/production. Comparing the results of over 4,000 hours of monitored data to state and federal guidelines regarding acceptable health levels of VOCs, the state concluded that VOCs were “below health guideline values” and that emissions were “below what we expect would cause short- and long-term harmful health effects” for general health.

CDPHE (2020) (Weld County), —1,565 hours of initial air monitoring and 364 hours of additional air monitoring measured minimal risk or EPA “acceptable” risk for both short-term and long-term health effects at distance of 1,400 feet from multi-well well pad. In 2019 and 2020 CDPHE deployed its CAMML to the Bella Romero Academy located approximately 1,400 feet from Extraction’s Vetting location. The state concluded as follows regarding the levels of VOCs measured in the state’s first analysis period of 1,566 hours’ worth of data, “The levels of VOCs measured in all the other samples (1,565 hours) were below what we expect would cause short- and long-term non-cancer health impacts.” The state did note in a single sample taken on November 5, 2019, that there was a marginally elevated level of benzene for approximately ten minutes in the hour window compared to short-term, but not long-term, risk guidelines. The state’s report explained that the one-time anomaly “does not mean people will have negative health impacts.” To follow-up on the one-time aberration, CDPHE conducted an additional 364 hours of CAMML monitoring, concluding that “[t]he amounts of specific VOCs measured during follow-up sampling were below short- and long-term health guideline values[,]” and that “[a]dditional ‘total’ VOC monitors at the school after the CAMML left also indicate that the elevated level seen on Nov. 5 is not a common occurrence.”

CDPHE (2020) (Boulder County) —The OGHIR deployed the CAMML to collect hourly air samples and measure VOCs associated with oil and gas emissions during the Rinn Valley West flowback and early production phases. The results concluded that the “measured air concentrations of each VOC was below short-term or long-term health guideline values[,]” and that “estimates for carcinogenic VOCs, benzene and ethylbenzene, were less than 10 in one million,” which falls well within EPA’s “acceptable” risk range of 1 to 100 in one million.

CDPHE (2018) (Brighton) —Evaluation of six priority VOCs showed all individual VOCs well below short and long-term health guideline values where VOCs were measured approximately 1,500 feet from oil and gas development. In 2019 the OGHIR deployed the CAMML approximately 1,500 feet from the Dittmer location for 50 hours of continuous monitoring during drilling operations and was “unable to document conditions that suggest an ongoing health hazard at this time” due to the low VOC levels.

CDPHE (2018) (Erie), —Analysis of 60 VOC substances and found all air concentrations below short- and long-term health guideline values at a distance of approximately 1,500-2000' feet from two oil and gas locations; follow-up sampling had same result. The OGHIR collected two air samples in the early morning on May 23, 2018, when VOC levels are typically the highest. One sample was approximately 1,500-2000' feet from two oil and gas locations while the other sample was obtained from approximately 3,000 feet away. Despite the early morning sampling, the state concluded, "The levels of VOCs measured during this air sampling investigation are unlikely to cause non-cancer health effects or increased cancer risks and were below the average VOC levels that have been measured in the region." The state also observed, "All air concentrations of individual VOCs were lower than the average air concentrations measured at the regional background location for the same month." The OGHIR conducted follow-up sampling later in the year and reached the same conclusion as it previously had, determining, "The levels of VOCs measured during this air sampling investigation are unlikely to cause non-cancer health effects or increased cancer risks and were consistent with previous sampling."

CDPHE (2017)(Greeley) —Samples taken at locations 1,200-1,500 feet from oil and gas development demonstrated all oil and gas related VOCs to be at levels of low risk for short- and long-term health impacts. The OGHIR provided an air sampling canister to a Greeley resident with instructions to collect an air sample during a future incident where they perceived strong odors and/or had health concerns about emissions from the nearby Triple Creek location. The state found, "Of the 60 substances analyzed, isoprene was the only substance that slightly exceeded (2.8ppb) its long-term health-based reference level (2.0ppb). Isoprene is primarily emitted from vegetation and humans. Published information indicates that isoprene is not emitted at significant amounts from oil and gas operations and therefore, it is unlikely that Triple Creek oil and gas operation would be the main source of this substance. The results for the other 59 substances analyzed indicated that all air concentrations of individual and combined VOCs were below short- and long-term health-based reference values and approximately the same or below the average air concentrations along the Front Range."

CDPHE (2020) (Lafayette) —In 2019 the OGHIR used newly acquired technologies to collect measurements of "total" VOCs at a Lafayette residence where the resident had complained of oil and gas related health concerns. Measurements were taken from the resident's porch to measure outdoor VOCs as well as indoors due to concerns that the ventilation system was drawing volatile organic compounds from outside air into the home. The measurements revealed that most of the time VOCs were typically ten times higher indoors than outside the home, due to everyday activities like cooking, cleaning, and using nail polish. The outdoor VOCs "followed a typical pattern that is expected based on daily changes in temperature and sunlight, where the amount of 'total' VOCs increases overnight and reaches the highest point in the early morning." The state did not recommend any additional sampling due to the outdoor VOC measurements.

CHAPTER 2—APPLICATION AND PERMITTING PROCEDURES

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DRAFT

2-02-14 OIL AND GAS FACILITY (OGF) PERMIT**2-02-14-01 PURPOSE**

The purpose of the oil and gas facility regulation is to allow for reasonable development of oil and gas in unincorporated Adams County while ensuring that facilities are sited in appropriate areas and utilize best practices to protect the health, safety, and welfare of our residents and the environment and wildlife.

The purpose of an OGF Permit is to regulate the surface land use of oil and gas production in order to protect the public safety, health, welfare and the environment of Adams County and its residents by ensuring that facilities are constructed and operated in accordance with best practices, to provide for sound environmental practices to protect the County's natural resources, to provide for the orderly siting and development of oil and gas operations, as well as to prevent damage to County roads and bridges.

The Colorado Oil and Gas Conservation Commission (COGCC), the Colorado Department of Public Health and the Environment (CDPHE) and the federal government have authority to regulate certain aspects of oil and gas mineral extraction. Requirements contained in this section shall not exempt the owner or operator of an oil and gas facility from compliance with the requirements of the COGCC, CDPHE, or any other regulatory authority.

The provisions of these standards and regulations shall apply to the construction, installation, alteration, repair, erection, location, maintenance, and abandonment of all new or substantially modified oil and gas facilities within the unincorporated areas of the County. Substantially modified for the purposes of this section means anything requiring a Major Amendment.

2-02-14-02 APPLICABILITY

All uses that require an OGF must be processed in accordance with this Section. The Director of Community and Economic Development (CED) is the permit issuing authority for OGF Permits that do not require any waiver from approval criteria or performance standards. OGF Permits requiring waivers from approval criteria or performance standards must be approved by the Board of County Commissioners through the designated Waiver process.

2-02-14-03 WHO CAN INITIATE AN OGF PERMIT

An OGF Permit may be requested, without limitation, by any owner of, or person demonstrating a legal interest in property on which the OGF use is proposed to

be located. The applicant has the burden of proof to demonstrate the use fully complies with these standards and regulations and meets the criteria for approval.

2-02-14-04 OGF PERMIT REVIEW PROCEDURES

An OGF Permit may be approved by the Director of Community and Economic Development if the application does not require waiver or modification from any approval criteria or performance standards. An OGF Permit requiring a waiver or modification from any of the approval criteria or performance standards must be approved by the Board of County Commissioners and requires a public hearing. The Director of Community and Economic Development or the Board of County Commissioners shall approve, approve with conditions, or deny the OGF Permit based on consideration of the staff report, the evidence from the public hearing (if applicable), and compliance with the criteria for approval.

2-02-14-05 OGF PERMIT REVIEW STEPS

The processing of a proposed OGF permit shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures (although not necessarily conducted in the following order) as follows:

1. **Conceptual Review.** Operator shall identify three (3) proposed locations for the **Oil and Gas** Facility for the Alternative Site Analysis process outlined below. For each location, **Operator** shall identify, and visually depict the same on a map, the following items that are located within a half-mile (1/2) radius of the parcel boundary of the proposed facility: existing or platted residences, occupied buildings, parks, open space, schools, future school facilities, state licensed daycares, known areas of environmental contamination such as superfund sites, hospitals, water bodies, floodplains, floodways, water supply facilities including wells, existing active and decommissioned wells, and roadways. Proposed access routes to the site should also be provided. This information must be submitted to Community and Economic Development for review. Following that, a conceptual review meeting shall be held with the **Operator**. Operators are encouraged to schedule a conceptual review prior to entering into any surface use agreements.

- a. **Alternative Site Analysis:** Prior to submittal of Form 2 **or 2A**, **or Oil and Gas Development Plan** to the COGCC and during the

conceptual review, the applicant must consult with the County on an Alternative Site Analysis as outlined below:

(1) In General. The County seeks to site OGFs in areas that have the least off-site impact possible in order to protect the health, safety, and welfare of its residents and to protect the environment and wildlife. In order to determine whether proposed siting is appropriate, ~~CEC staff~~ the Community and Economic Development Department must evaluate alternative sites.

(2) Description of potential sites. Applicant must submit descriptions of at least three (3) potential sites for the OGF that were considered by applicant. All potential site descriptions shall include Geographic Information System (GIS) data. The GIS data shall include, at a minimum, the outline, size of maximum disturbance and the access road for each proposed site. The description shall include an explanation of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.

(a) Potential sites ~~must be a minimum of~~ shall be: (1) a minimum of 5004,000 feet away from each other but can be located on the same parcel; and (2) uniquely different from one another as determined by the Director of Community and Economic Development. Description must include explanation of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.

~~(b)~~ Evaluation materials. ~~CEC staff~~ the Community and Economic Development Department will evaluate the potential sites to determine which site is likely to have the least off-site impacts. The CEC Director of Community and Economic Development will determine whether applicant is required to provide traffic impact studies, engineering studies, Environmental Impact Analysis as defined in these standards and regulations, or other evaluation tools in order to adequately evaluate site options. If not required by the ~~CEC~~ Director of Community and Economic Development as part of the alternative site analysis, these

Commented [Author1]: Can the County please help operators understand what is meant by "uniquely different from one another" and state the criteria under which the Director will determine unique differentiation among proposed sites?

Commented [Author2]: Operator is already required to provide a transportation plan and required to pay a traffic impact fee based on # of wells. What would the purpose be of an additional study?

site-specific evaluation tools can be submitted by the applicant after site selection has occurred.

~~(3)~~(4) **Evaluation criteria.** In determining which sites are likely to have the least off-site impact, ~~and the Community and Economic Development Department~~ may consider the following, at a minimum:

- (a) Distance from existing or platted residences, schools, state licensed daycares, high occupancy buildings, active open spaces, environmentally sensitive areas, public drinking water supply areas, or other areas likely to be adversely impacted;
- (b) Traffic impacts and impact to roads, bridges, and other infrastructure;
- (c) Access to water and other operational necessities;
- (d) Whether the site allows for utilization of impact mitigation, such as use of proximate pipelines;
- (e) Noise impacts;
- (f) The impact on the surrounding land;
- (g) The impact on wildlife; and
- (h) Impact on nearby environmental resources such as water bodies.

~~(4)(1)~~ **Site Selection.** The ~~County~~ shall review all proposed locations in order to determine which location(s) best protects public health, safety, welfare, ~~and~~ the environment, and wildlife resources and will choose the location that best satisfies this goal. The Director of Community and Economic Development will determine if any proposed sites meet this goal. If no location satisfies this goal, Operator shall submit three new proposed locations. The County may recommend denial of the OGF Permit if it does not believe that any of the proposed sites meet the siting goal. Site Selection as part of the Alternative Site Analysis, as outlined above, does not constitute the approval of an OGF application.

2. **Neighborhood Meeting:** Applicable. At the neighborhood meeting, the applicant shall provide an overview of its proposed oil and gas operation and allow those in attendance to provide input as to the proposed operation, including, but not limited to, issues that arise from application of these regulations to the proposed operation, and suggested mitigation to adequately ensure compliance with these regulations. Where Disproportionately Impacted Communities are

located within one-half mile of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns. Any additional neighborhood meetings shall comply with the Community Outreach requirements of Adams County Development Standards and Regulations (Chapter 4).

3. **Development Application Submittal:** the Community and Economic Development Department has developed a check list and development application guide for of required submittals for OGF Permits that are subject may change to change from time to time (see Appendix A). Application submittals that do not include all items outlined in the checklist, do not conform to the development application guide, and do not conform to the following guidelines will not be reviewed. At a minimum, the following items are required as part of an OGF application submittal:

4. **Application Form:** a completed OGF Permit application form.

5. **Application Fee:** OGF Application fee

6.3. **Operations Plan:**

(1) **Plan Format:** Two hard copies of all plans shall be provided, and one copy of the plans shall be provided in digital format, on either a thumb drive or CD. No plans shall contain copyright restrictions or public use restrictions.

(2) **Cover Sheet:** The cover sheet shall have a title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township and range. The cover sheet shall also include a legal description of the area, date of the drawing, existing zoning of the site, a sheet key, a vicinity map with north arrow (scale of 1" = 2,000' preferred) with an emphasis on the major roadway network within two (2) miles of the proposal, and all applicable County notes, an approval signature block and a block to insert the COGCC Permit number when approved.

(3) **Impact Area Map:** The second sheet shall contain an Impact Area Map that shows the proposed location of the Oil and Gas Facility, locations of all producing oil and gas wells and other oil and gas operations within the one-mile (1) impact area; locations of all abandoned and shut-in wells within one quarter (1/4) mile radius of the projected track of the borehole; locations of all permitted registered water wells within one-half (1/2) mile of the proposed Oil and Gas

Commented [Author3]: What does the county determine as "adequate engagement"?

Commented [Author4]: Will there be any notice when requirements are changed?

Commented [GD1]: Application Form and fees relocated to OGF Development application checklist.

Commented [GD2]: Operations Plan details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Operation, existing improvements within 1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one-mile impact area.

(4) **Drilling Operations Plan:** The third sheet shall provide a site plan of drilling operations with drilling equipment with existing and proposed finished grade topography at two-foot (2') contours or less tied to a datum acceptable to the County. The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

(5) **Production Plan:** The fourth sheet shall provide a site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished grade topography at two-foot (2') contours or less tied to a datum acceptable to the County. The production plan shall also identify tentative drilling and completion schedules. A seed mix shall be provided for reseeding the well pad. Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

(6) **Signage Plan/Sign Detail:** A dimensioned Signage Plan or Sign Detail shall be included on one of the sheets describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs. Directional signs for emergency responders and inspectors shall be included, along with a 24-hour, 7-days per week contact information to deal with all noise complaints. The sign with the 24-hour contact information must be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way.

(7) **Final Plan:** Once the review process is complete and staff has determined that all outstanding issues have been resolved, staff will request a final copy of the Oil

and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the County staff.

b. ~~Emergency Preparedness and Response: In accordance with the Emergency Preparedness and Response requirements in Section 4-10-02-03-03(9).~~

(1) ~~Emergency Service Providers: The applicant must provide a commitment to serve ("will serve") letter from the authority having jurisdiction for providing emergency services (fire protection and emergency medical services) to that facility, or, where no authority has jurisdiction, from an emergency services provider with the ability to provide such emergency services.~~

c. ~~Engineering Documents: The following technical Engineering documents are required by the staff unless otherwise waived:~~

(1) ~~Construction Plans: If applicable, Construction Plans for the proposed Oil and Gas Operations public improvements including road plan and profile sheets, storm drainage improvements plans and other public improvements prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~

(2) ~~Pavement Design Report: If applicable, a Pavement Design Report prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 7).~~

(3) ~~Grading Erosion and Sediment Control: If applicable, a Grading, Erosion, Sediment Control Report and Plan as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~

(4) ~~(1) Transportation, roads, access standards, and fees:~~

(a) The applicant's transportation plan must be designed and implemented to ensure public safety and maintain quality of life for other users of the county transportation system, adjacent residents, and affected property owners.

(b) Where available, existing private roads shall be used to minimize land disturbance unless traffic safety, visual or noise concerns, or other

Commented [GD3]: Emergency Preparedness and Response details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [GD4]: Engineering Documents details relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

adverse surface impacts clearly dictate otherwise.

- (c) Access roads on the site and access points to public roads as identified in the application materials shall be reviewed by the Community and Economic Development Department ~~department~~ and shall be built and maintained in accordance with the engineering specifications and access road standards defined in the Adams County Development Standards and Regulations (Chapter 8).

- (d) ~~All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:~~

- ~~i. Access permit fees~~
- ~~ii. Oversize/overweight permit fees~~
- ~~iii. Right of way construction permit fees;~~
- ~~and~~
- ~~iv. Traffic impact and road maintenance fees.~~

- ~~(e)~~ (d) Oil and gas operations must minimize impacts to the physical infrastructure of the county transportation system. Any costs to improve county transportation system infrastructure necessitated by the proposed oil and gas operation shall be the responsibility of the Applicant. All transportation system infrastructure improvements and associated costs shall be determined by the Community and Economic Development Department ~~department~~. The County shall perform the work or arrange for it to be performed. If the Applicant disagrees with the infrastructure improvements or associated costs as assessed by ~~CED~~ the Community and Economic Development Department, it may request that the department approve a different route for its proposed oil and gas operation that avoids the need for such improvements. Alternatively, the Applicant may engage a licensed civil engineering firm to perform a traffic impact study in accordance with Chapter 8 of the Development Standards and Regulations to

Commented [GD5]: Transportation fees relocated to DSR Chapter 4

Commented [Author5]: As a general comment, with extremely limited oil and gas development since the passage of the Oil & Gas Traffic Impact Study and fee, the impact and maintenance fee already has 4x the balance of the regional development impact fee.

Commented [Author6]: Operator is already required to pay a traffic impact fee for impact to the county's transportation system infrastructure. Would there be additional costs assessed on top of the fee?

Per C.R.S. 29-20-104.5, "No impact fee or other similar development charge shall be imposed except pursuant to a schedule that is...(c) intended to defray the projected impacts on capital facilities caused by proposed development."

Further: "A local government shall quantify the reasonable impacts of proposed development on existing capital facilities and establish the impact fee or development charge at a level no greater than necessary to defray such impacts directly related to proposed development."

independently evaluate county transportation system infrastructure improvements necessitated by the proposed oil and gas operation.

- ~~(5) Drainage study/technical drainage letter/plan: If applicable, a Drainage Study/Technical Drainage Letter/Plan prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~
- ~~(6) Floodplain Use Permit: The applicant must obtain a Floodplain Use Permit, in accordance with the latest version of the Adams County Development Standards and Regulations, if the proposed Oil and Gas construction disturbance or operation encroaches into the 100-year floodplain or the access is crossing a major drainage way, as defined by the latest version of the Adams County Development Standards and Regulations (Chapter 9).~~
- ~~(7) Natural Resource Conservation Overlay (NRCO): If the Oil and Gas Facility is located in the NRCO, a Resource Review may be required.~~
- ~~(8) Water Supply: The applicant must provide proof of adequate water supply. Operator shall identify a water resource lawfully available for industrial use, including oil and gas development, to be utilized by Operator and its suppliers.~~
- ~~(9) Surface Owner Documentation: Documentation as to whether the surface owner and others with interest in the property have authorized the proposed OGF.~~
- ~~(10) Additional Information: Community and Economic Development will develop an application check list that may require additional information to process an OGF Permit application. In addition to the items required on the check list, the Director of Community and Economic Development may require additional information deemed necessary to evaluate particular applications.~~

7-4. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.

8-5. Staff Report: Applicable.

a. Concurrent Referral and Review. County staff may refer the complete application review by the various County Departments and the County Attorney's Office, as deemed

Commented [GD6]: Water Supply requirements relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [GD7]: Surface Owner Documentation relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

Commented [GD8]: Additional Information relocated to Development Application Guide, Appendix A and where applicable into DSR Chapter 4. These changes were made for consistency with other land-use application processes.

appropriate. An application may require review by outside experts or agencies such as the U.S. Army Corps of Engineers, if the project impacts a floodplain, life-safety providers, adjacent jurisdictions, local public health departments, and others as may be deemed appropriate. Operator shall reimburse the County for reasonable costs incurred in connection with the use of third-party expert reviewers.

~~9-6~~ **Notice:** Applicable, except notice shall be sent by the applicant to all property owners and current residents within a half mile at a minimum, or greater, as determined by the Director of Community and Economic Development. The Notice shall meet the format prescribed by the County. The notice shall contain a statement informing the recipients of the notice that they may request written notification by the Applicant of the commencement of construction and commencement of drilling operations. The applicant shall provide written notification by U.S. Mail, which shall include an offer to consult, to any municipality, special district, or County whose boundaries are within one-half (1/2) mile of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County. Posted notice shall be required for all OGF Permits. The signs shall be posted by the County on the subject property in a manner and at a location to afford the best notice to the public. Posting for an OGF Permit shall take place no later than ten days after the Operator selects a site for the facility.

~~10-7~~ **Public Hearing:** Applicable if the OGF Permit requires ~~non-administrative~~ waiver from any approval criteria or performance standards. In cases requiring a waiver, a public hearing shall be held in front of the Board of County Commissioners.

~~11-8~~ **Standards:** Applicable.

~~12-9~~ **Conditions of Approval:** Applicable. The Director of Community and Economic Development in approving a permit for an OGF may attach any conditions necessary to implement the Adams County Comprehensive Plan, and to ensure the compatibility with adjacent uses, and are protective to public health, safety, welfare, the environment, and wildlife resources. Conditions may include a requirement of an Access Permit or Oversize Load Permit prior to development of the Oil and Gas Facility, a Floodplain Use Permit prior to any work within the floodplain, or a building permit prior to construction of certain structures within the Oil and Gas Facility.

a. Term: The approving authority shall specify the term of the OGF Permit as the following: provided that at least one well is drilled and completed during the initial three (3) year period following all required State and local approvals of the OGF,

Commented [Author7]: What would possible triggers be for sending notice out past a half mile?

Commented [Author8]: After the operator selects a site or the Director of CED approves a site?

such action permanently vests the permitted location for the number of wells contained within the initial permit approval. If wells permitted as part of the initial OGF permit are to be drilled at the multi-well pad location following expiration of the initial three (3) year period, those permit(s) for those wells shall be renewed following the OGF permit process as outlined in these regulations.

~~10~~ **10. Amendments.** Applicable. All amendments must be processed in accordance with Section 2-01-10, Amendments. Major Amendments for OGFs include any amendments to a Form 2A with the COGCC. For purposes of an OGF Permit, anything not identified as a major amendment shall be processed as a Minor Amendment.

2-02-14-06 CRITERIA FOR APPROVAL

The Board of County Commissioners or Director of Community and Economic Development, in approving an OGF Permit, shall consider:

1. The OGF is consistent with the purposes of these standards and regulations.
2. The OGF will comply with the requirements of these standards and regulations including, but not limited to, all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
3. The siting of the OGF, after evaluation of alternative sites, is the most compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare, the environment and wildlife of the County.
4. The siting of the OGF does not create any site-specific conditions that present significant or material impacts to nearby land uses.
5. The OGF has addressed off-site impacts and complies with all applicable performance standards, unless specifically waived or modified by the Board of County Commissioners after public hearing.
6. The site is suitable for the use, including adequate usable space, adequate access, and adherence of environmental or wildlife stipulations.
7. The site plan for the proposed use will provide adequate parking, traffic circulation, fencing, screening, and landscaping.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are available and adequate to serve the needs of the OGF as designed and proposed.

9. Cultural and Historical Resources: the OGF does not cause significant degradation of cultural, historic, or archaeological sites eligible for County landmarking, or the National Historic Register.
10. Water Bodies and Water Quality: the OGF does not cause adverse impacts to surface or ground waters within Adams County. The Operator shall comply with all applicable water quality standards.
11. Emergency Preparedness and Response: the OGF does not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
12. Air Quality: The OGF meets all required air quality standards.

2-02-14-07 OIL AND GAS FACILITY PERMIT WAIVER

2-02-14-07-01 PURPOSE

The purpose of this section is to establish criteria and detail the steps whereby the Board of County Commissioners, at public meeting, may grant waivers or modifications from approval criteria or performance standards normally required for OGF Permits, allow the OGF use in an area not zoned for OGFs, or allow applicant to develop an OGF site not selected by Community and Economic Development.

2-02-14-07-02 APPLICABILITY

If the OGF permit application is denied based on noncompliance with the approval criteria or performance standards, if the applicant seeks to develop in an area not zoned for OGF development, or if an applicant seeks to develop on a site not approved by ~~CED staff~~ the Community and Economic Development Department, an applicant may apply for an Oil and Gas Facility Permit Waiver.

2-02-14-07-03 WHO CAN INITIATE A WAIVER

A waiver may be proposed by any applicant that may apply for an OGF. The applicant has the burden of proof to demonstrate that the waiver or proposed site selection meets the criteria for approval.

2-02-14-07-04 WAIVER REVIEW PROCEDURES

Any waiver shall be processed through a public hearing before the Board of County Commissioners (See Steps 1 through 10 below). Waiver applications will be heard by the Board of County Commissioners at a public hearing. At such

public hearing, the Board of County Commissioners may waive or modify specific regulations or standards requested by the applicant and approve the application, may approve with conditions, or may deny the application.

Applicants may only seek a waiver after submitting a complete application for an OGF Permit and participating in a conceptual review meeting with Community and Economic Development staff. If applicant is unable to meet all approval criteria and comply with all performance standards required for an OGF Permit, applicant may choose to seek a waiver from the Board of County Commissioners. The processing of a waiver shall be according to, in compliance with, and subject to the provisions contained in Steps 1 through 10 of the Common Development Review Procedures as follows:

1. Conceptual Review: Must be completed prior to application for waiver as part of OGF Permit process.
2. Neighborhood Meeting: Director of Community and Economic Development will determine whether neighborhood meetings are required after evaluating steps taken as part of OGF process.
3. Development Application Submittal: In addition to all requirements for an OGF Permit, applicant must provide a request for waiver that articulates the specific waivers sought and explains why waivers are necessary.
4. Determination of Sufficiency: Applicable. No application shall be processed if taxes due on the requested property(ies) are not paid, if inspection fees are not paid, or if fines assessed against the applicant have not been paid.
5. Staff Report: Applicable.
6. Notice: Applicable.
7. Public Hearing: Applicable. A public hearing shall be held before the Board of County Commissioners. Any requested waiver shall be reviewed and acted upon by the Board of County Commissioners prior to issuance of an OGF Permit.
8. Standards: Applicable.
9. Conditions of Approval: Applicable. The Board of County Commissioners, in approving a waiver for an OGF Permit, may attach any conditions necessary to implement the Adams County Comprehensive Plan and to ensure the compatibility with adjacent uses.
10. Amendments: Applicable.

2-02-14-07-05

CRITERIA FOR APPROVAL

The Board of County Commissioners, in approving a waiver, shall find:

1. Extraordinary hardships or practical difficulties result from strict compliance with these standards and regulations

2. The purpose of these standards and regulations are served to a greater extent by the alternative proposal.
3. The waiver does not have the effect of nullifying the purpose of these standards and regulations.

2-02-14-07-06 ADDITIONAL CRITERIA FOR A ZONE DISTRICT WAIVER

The Board of County Commissioners, in approving zone district waiver, in addition to the criteria outlined above, shall find:

1. The proposed Oil and Gas Facility is consistent with the Adams County Comprehensive Plan.
2. The proposed Oil and Gas Facility is compatible with the surrounding area, harmonious with the character of the neighborhood, and not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, welfare or the environment of the inhabitants of the area and the County.

2-02-15 AMENDMENT TO TEXT OF THE STANDARDS AND REGULATIONS AND/OR ZONING MAP (REZONING) AND/OR COMPREHENSIVE PLAN

2-02-15-01 PURPOSE

The purpose of this section is to detail the steps to follow for changing the text of these standards and regulations, or the boundaries of the zone districts shown on the Zoning Map (Rezoning), or the Comprehensive Plan.

2-02-15-02 APPLICABILITY

All amendments to the text of these standards and regulations and any changes to the Zoning Map or Comprehensive Plan must be processed in accordance with this section. Only the Board of County Commissioners may, after recommendation of the Planning Commission, adopt a resolution amending the text of these standards and regulations, or the Zoning Map, or the Comprehensive Plan.

CHAPTER 4—DESIGN REQUIREMENTS AND PERFORMANCE STANDARDS

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3. *Pre-Existing Pools:* All pre-existing pools shall be completely enclosed by a fence no later than six (6) months following adoption of these standards and regulations.
4. *Wading Pools:* Wading pools with a maximum possible water depth of twenty (20) inches or less are not required to be fenced.

4-03-04 ACCESSORY USES, COMMERCIAL

4-03-04-01 GENERAL ACCESSORY USES PERMITTED

The following general accessory uses are permitted in Commercial Districts:

1. Communication Tower, Non-Commercial (see Section 4-03-02-02 Accessory Uses, Agricultural for detailed performance standards)
2. Guard Dogs (see Section 4-03-04-02 Accessory Uses, Commercial for detailed performance standards)
3. Marijuana Hospitality Business (see section 4-18-07 for detailed performance standards)
4. Outdoor Storage, Loading and Garbage Areas (see Section 4-03-04-02 ~~02-01~~ Accessory Uses, Commercial for detailed performance standards)
5. Parking (see Section ~~4-13-04-02~~ Parking and Loading for detailed performance standards)
6. Signs (see Section 4-01 Signs and Outdoor Commercial Advertising Devices for detailed performance standards)
7. Solar Energy Systems for use on Property (see Section 4-03-03-11 Accessory Uses, Residential for detailed performance standards)
8. Temporary Use. All temporary uses shall meet the temporary use performance standards contained in Section 4-05 and shall be required to obtain a Special Use Permit unless the temporary use is a permitted principal use within the zone district in which it will be located.
9. Vending and Produce Stands (see Section 04-03-02-05 Accessory Uses, Agricultural for detailed performance standards)
10. Wind Powered Generators (see Section 4-03-02-06 Accessory Uses, Residential for detailed performance standards)
11. Other accessory uses approved by the Director of Community and Economic Development. The Director of Community and Economic Development may require the accessory use meet performance standards for similar uses permitted by these standards and regulations.

closure plan, and to effect remedial measures if environmental damage is found to be taking place.

- d. *Traffic Control Plan*: Provisions of the approved traffic control plan shall be followed.
- e. *Appearance*: All sites shall maintain a clean, neat, and orderly appearance. Litter, dust, and odors may not leave the boundaries of the site.
- f. *Vehicle Parking*: Transfer vehicles may not be parked on public streets.
- g. *Vector Controls*: All sites shall maintain vector controls as prescribed by the approved plan.
- h. *CDPHE Regulations*: Colorado Department of Public Health and Environment Regulations 6CCR 1007-2, Section 14 are hereby incorporated in these Zoning Regulations.
6. *Infectious Waste Disposal Site and/or Processing Facility Standards* (required in addition to General Standards)
 - a. *Radiation Monitoring Program*: The operator shall operate a radiation monitoring program in accordance with an approved plan.
 - b. *General Monitoring Program*: The general monitoring program, approved by the County for each infectious waste disposal and/or processing facility, shall be adhered to.
 - c. *Temperature Operating Charts*: Temperature operating charts from an infectious waste disposal and/or processing facility shall be retained for two (2) years for review by the Director of Community and Economic Development. The County may require additional monitoring if a facility has problems maintaining a temperature or other operational standard.
 - d. *Truck Washing*: All trucks shall be washed at least once a week with a detergent and disinfectant to minimize nuisance conditions, unless spills or leaks are detected which must be disinfected immediately. All wash water shall be properly controlled to prevent runoff.
 - e. *Waste Incineration*: Infectious waste incineration facilities shall be permitted to burn infectious waste only. Incineration of wastepaper, contraband, or other materials is not permitted unless specifically approved as part of the wastestream.
7. *Hazardous Waste Disposal Site and Facility Standards*: All hazardous waste disposal sites and facilities shall meet the standards established by State and Federal regulatory requirements.

4-11-02-03-03 **OIL AND GAS FACILITY**

4-11-02-03-03-01 **Purpose**

This Section is enacted to protect and promote the health, safety, values, convenience, order, prosperity and general welfare of the current and future residents of the County. It is the County's intent by enacting this Section to

facilitate the development of oil and gas resources within the unincorporated area of the County while avoiding or mitigating potential land use conflicts between such development and existing, as well as planned, land uses. It is recognized that under state law the surface and mineral estates are separate and distinct interests in land and that one may be severed from the other. Owners of subsurface mineral interests have certain legal rights and privileges, including the right to use that part of the surface estate reasonably required to extract and develop their subsurface mineral interests from a consenting surface owner, subject to compliance with the provisions of this Section and any other applicable statutory and regulatory requirements. Similarly, owners of the surface estate have certain legal rights and privileges, including the right to have the mineral estate developed in a reasonable manner and to have adverse impacts upon their property, associated with the development of the mineral estate, avoided or mitigated through compliance with this Section.

4-11-02-03-03-02

Definitions

Oil and Gas Facility means an oil and gas facility as defined by the rules and regulations of the Colorado Oil and Gas Conservation Commission ("COGCC").

For any other definition not listed in this section, the definitions listed in Chapter 11 of the Adams County Development Standards and Regulations and the COGCC's regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the COGCC's definitions, the COGCC's definitions shall prevail. If the term is not found in the COGCC's definitions or in Chapter 11, the term shall have its common meaning along with the spirit and intent of the Development Standards and Regulations and may be subject to interpretation by the Director of Community and Economic Development or his or her designee.

4-11-02-03-03-03

General Provisions

1. Access: Oil and gas well installation shall be located to provide convenient access, shall accommodate the traffic and equipment related to the oil and gas operations and emergency vehicles, and shall comply with COGCC rules and Adams County Development Standards and Regulations. Oil and gas operations ~~shall must~~ avoid or minimize impacts to the physical infrastructure of the county transportation system.

4-2. Signage: A sign with the 24-hour, 7-days per week contact information shall be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way. Signage shall follow COGCC Regulations for signage and posting.

2-3. Building Permit Required: For all new or substantially modified wells, a building permit is required for the installation of permanent electrical,

Commented [Author1]: This is an inaccurate statement of the law. While operators strive to obtain surface owner consent for development locations and surface owner consent is commonplace, the law does not require the surface owner to consent to the development. It is exactly for that reason that the doctrine of reasonable accommodation arose and has been statutorily codified at Section 34-60-127, C.R.S. The statute speaks to the operator's and surface owner's respective rights in the absence of a contractual agreement, such as a Surface Use Agreement whereby the surface owner consents to the development. Should the surface owner not consent, the operator may nonetheless develop from the surface, so long as the operator only uses that portion of the surface estate reasonably required to develop the minerals and is otherwise authorized to develop by state and local law.

Please refer to the COGCC's April 14, 2021 presentation entitled, "Staff Informational Presentation on Interaction of Surface Rights & Mineral Development" for more information explaining that surface owner consent is not required for mineral development.

pumps, tank batteries, and all other above-ground structures as well as any other applicable permits including, but not limited to, culvert permits, oversized-load permits, and floodplain use permit.

~~3.4.~~ Setbacks: Oil and Gas Facilities shall be at least ~~2,000~~ ~~1,000~~ feet from the property line of any existing residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, ~~and~~ environmentally sensitive areas, ~~and designated parks and open spaces.~~ Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

a. Administrative Waiver from Setback Requirements: an administrative waiver may be obtained from the setback requirements if the Operator receives a written waiver from each primary resident and property owner located within the setback.

~~a-b. No Administrative Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.~~

~~4.5.~~ Fees and Permits: All applicable County fees adopted by the County, including postage fees and inspection fees, must be paid at time of application and prior to issuance of a building permit, including for all applicable permits required by the Adams County Development Standards and Regulations.

~~5.6.~~ Oil and Gas Road Impact and Maintenance Fees:

a. Operators ~~shall~~ must pay oil and gas road impact and maintenance fees, as approved by the Board of County Commissioners, for all proposed oil and gas wells and pads. ~~This fee shall be paid at the time of issuance of an Oil and Gas Facilities Permit.~~ Any person or entity required to pay the oil and gas road impact fee may elect to submit an independent study and fee calculation to demonstrate that the nature, timing, or location of the proposed oil and gas development is likely to generate impacts costing less to mitigate than the amount of the fee that would be generated by the use of the fee schedule. Any independent fee study for oil and gas development shall generally follow the methodology established in the Adams County Oil & Gas Traffic Impact Study.

- i. The preparation of the independent fee calculation study shall be the sole responsibility of the electing party.
- ii. Any person or entity who requests to perform an independent fee calculation study shall pay an application fee for administrative review. An

Commented [Author2]: The 2,000' setback from the listed receptors and the 1,000' setback from the listed receptors are unconstitutional ultra vires regulations because they exceed the County's authority under the Local Government Land Use Control Enabling Act, to enact land use regulations pertaining to oil and gas that are "necessary and reasonable." § 29-20-104(1)(h), C.R.S. The setback is "hard" with respect to the 2,000' requirement unless there is an administrative waiver available from obtaining the consent of each resident/owner within the setback and no administrative waiver is possible for the 1,000' feet. COGA is unaware of any evidence suggesting that a 2k feet setback from residents and a 1,000' setback from groundwater wells, environmentally sensitive areas or designated parks and open space is necessary and reasonable in light of the fact that operators can and do employ Best Management Practices ("BMPs") that avoid, minimize, and mitigate potential adverse impacts from operations.

At the COGCC "Mission Change" Rulemaking, COGA and other industry parties put on voluminous, un-rebutted ... [1]

Commented [Author3]: COGA suggests that a specific threshold/limit be outlined for the approval of an administrative waiver. E.G. – 45% of landowners and tenants must agree to achieve a written waiver.

Commented [Author4]: To avoid inconsistency between this paragraph 5 and the following paragraph 6, COGA asks that the County specify in paragraph 5 that "All applicable County fees adopted by the County, including postage and inspection fees but excluding oil and gas road impact and maintenance fees, must be paid...." As the below paragraph notes, oil and gas road impact and maintenance fees are to be paid at the time of the issuance of the permit.

Commented [Author5]: COGA asks the County to close this sentence with "at the time of issuance of an Oil and Gas Facilities Permit or as otherwise agreed to by the County and Operator."

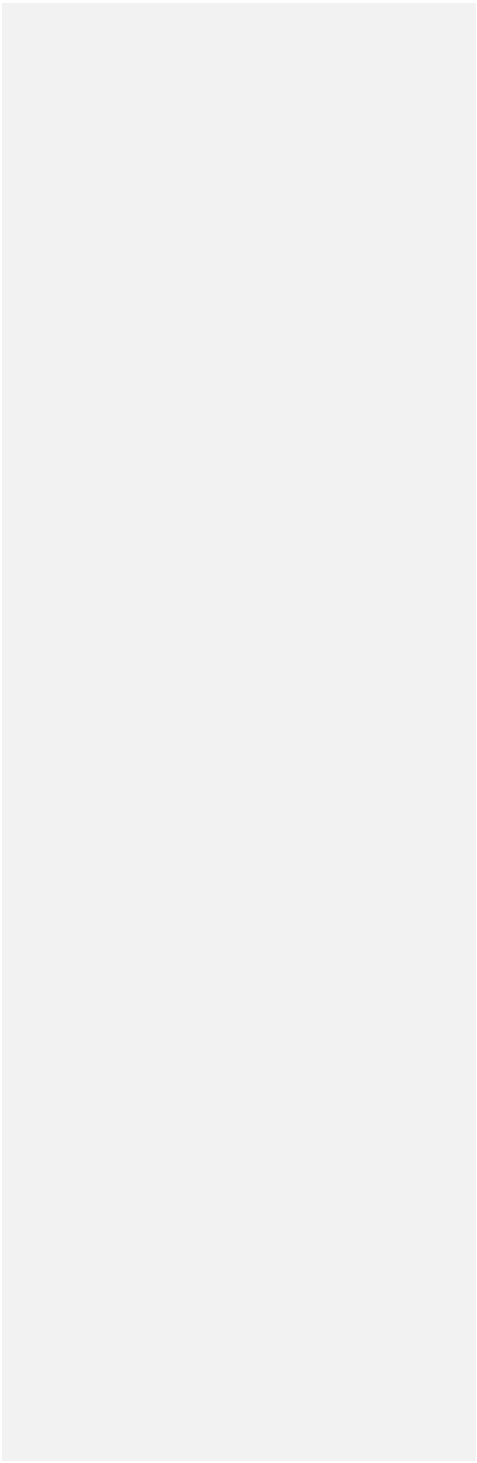
There must be some flexibility here depending upon the amount of the fee. In the past, there have been some discussions about payment of the road impact fee at the time of drilling of the wells or spread out over the course of several years depending on an operator's drilling sche ... [2]

administrative decision related to the independent study may be appealed to the Board of County Commissioners. The appeal shall be filed within 14 days of staff decision and shall follow the appeal process established for OGF Permit Waivers.

6.7. Safety Standards:

- a. Operator shall implement a safety management plan and maintain a safety management system applicable to all covered processes. Upstream facilities consisting of a standard, repeatable design may be covered with a single safety management plan. The safety management system shall provide for employees and systems to oversee implementation and periodic revision of the plan. The plan shall include the following elements and describe the manner in which each of the following elements will be applied to the covered processes:
 - i. Process safety information. Compilation of written process safety information needed to conduct process hazard analysis. Process safety information shall include information pertaining to hazards of substances and chemicals used by the process, information pertaining to the technology of the process, information pertaining to the equipment used in the process, and information pertaining to the hazards of the substances or chemicals in the process. Documentation that equipment used in the process complies with recognized and generally accepted good engineering practices;
 - ii. Operating procedures. Written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information, and at least annual review of operating procedures to ensure they reflect current operating practices;
 - iii. Employee participation. Plan for ensuring employee participation in conduct and development of process hazards analysis and access to process hazards analysis;
 - iv. Training. Written procedures detailing initial and refresher employee training requirements and documentation of employee training;
 - v. Mechanical integrity. Written procedures designed to maintain the on-going integrity of process equipment, ensure employees involved in maintenance are properly trained to ensure the ongoing integrity of process equipment, ensure that process equipment is tested and inspected in accordance with manufacturer specifications, correct deficiencies in equipment in

Commented [Author6]: COGA appreciates the attention to safety that the County has, however, current standards and practices already create a safe work environment for operators, contractors, other employees and the general public. Is there a reason so much process information is being requested?



- a safe and timely manner, and ensure that new equipment is installed or constructed properly;
- vi. Management of change. Written procedures to manage changes to covered processes, technologies, equipment and procedures;
 - vii. Pre-startup reviews. Written procedures regarding pre-startup safety reviews;
 - viii. Compliance audits. Written procedures requiring an audit every five years to verify compliance with the procedures and practices developed under the safety management plan, and procedures requiring correction of any deficiencies identified in audit; operator will make results of audit available to inspector upon request;
 - ix. Incident investigation. Written procedures requiring investigations of all near-misses and incidents, including root cause analysis of all incidents resulting in fatalities or serious environmental harm, establishing a system to promptly address and resolve the incident, and requiring that all employees and contractors whose job tasks are relevant to the investigation of the near miss or incident review the investigation report.
 - x. Hot work. The facility shall ensure that all hot work complies with local and state fire prevention and protection requirements.
 - xi. Contractors. Written procedures describing how operator screens, oversees, shares process safety and emergency response and preparedness information with contractors;
 - xii. Process hazard analysis. Process hazard analysis for each covered process;
 - xiii. Incident history. List of all reportable safety events as defined by the COGCC rules and regulations that have occurred at the operator's facilities within the last five years, along with any investigation reports, root cause analysis and operational or process changes that resulted from the investigation of the accident;
 - xiv. Safety culture assessment. Written procedures requiring operator periodically review safety culture, and at a minimum conduct such review after each major accident; and
 - xv. Inherently safer systems analysis. Require analysis at least every five years, whenever a change is proposed at the facility that could result in an incident, after an incident if recommended by the investigation report or root cause analysis, and during the design of new processes, equipment or facilities.
 - xvi. Operator shall make available the safety management plan to Adams County at the County's request. Adams County may retain

Commented [Author7]: Near-misses and incidents are subjective terms. Please further define or remove from language.

Doesn't the fact that the incident was "missed" mean that the safety processes worked appropriately?

outside consultants to review safety management plan and may request modifications to safety management plan based on its review. Operator ~~shall must~~ reimburse County for any costs associated with retaining outside consultants.

- b. Automatic safety protective systems and surface safety valves. Operator is required to install automated safety system prior to commencement of production. Automated safety system shall include the installation, monitoring and remote control of a surface safety valve or a wellhead master control valve and shall be able to remotely shut in wells on demand. Surface safety valve or a wellhead master control valve shall be equipped to operate remotely via the automated safety protective system. Operator shall test the automated safety system quarterly to quarterly to ensure functionality and provide results of testing to County quarterly within 14 days of such testing.

- c. Incident and accident reporting.

- i. Incidents. ~~As soon as practicable, but no more than within a week or three (3) days~~ of any reportable safety event ~~or emergency situation~~ as defined by the COGCC, Operator shall submit a report to the County including the following, to the extent available:

- (a) Fuel source, location, proximity to residences and other occupied buildings, cause, duration, intensity, volume, specifics and degree of damage to properties, if any beyond the facility, injuries to persons, emergency response, impacts, if any, to public health, safety, welfare, the environment or wildlife resources, and remedial and preventative measures to be taken within a specified amount of time.

- ~~(b)~~ (b) If public health, safety, welfare, the environment or wildlife resources are threatened, the Operator responsible for the operation causing the threat shall immediately notify the County's Local Government Designee ("LGD") electronically and orally.

- ii. County may require operator to conduct root cause analysis of any incidents or Grade 1 gas leaks, as defined by the COGCC.
iii. Operator shall keep a daily incident log that shall be made available to Adams County upon request. Any spill or release that is reportable to the COGCC shall be simultaneously reported to the County's LGD and applicable fire district.
iv. The Operator shall notify Notification to the County's LGD within 24 hours of discovery of all spills of one barrel or more

Commented [Author8]: If the county is unable to digest or understand all of the information it is requesting from operators internally, the county should be responsible for the cost to acquire consultants.

Commented [Author9]: Does quarterly testing create safety issues?

Might there be unintended consequences with turning valves on and off so frequently for testing? This requirement may have an unintended consequence potentially negative to health and safety.

that leaves the facility or released outside of berms or secondary containment, all spills of any material or volume on permeable ground at the facility that has a reportable spill quantity under any law, all spills or releases as required by COGCC Regulations, and copies of any self-reporting submissions that operator provides to the COGCC.

- v. Notification of the surface owner or the surface owner's tenant, and the water rights holder if applicable, of spills and releases in conformance with COGCC Rules.
- d. Worker Training and Records
 - i. Workers at an OGF shall have nationally recognized certifications for the work they are performing. This includes, but is not limited to, Hazard Communications Training, Hazardous Waste Operations Certifications, heavy equipment operator training, and welding certifications per API 1104 and/or ASME Section 9.
 - ii. All workers at an OGF shall have completed a nationally recognized occupational safety and health training program.
 - iii. Upon request from the County, the Operator shall supply the County written procedures detailing employee training requirements and training records.

7-8. Spill Prevention and Containment. Oil and gas operations shall be in compliance with COGCC safety and spill and release requirements.

- a. Requirements to minimize liquid spills and releases include the following:
 - i. Berms or other secondary containment devices around crude oil, condensate, and produced water storage tanks enclosing an area sufficient to contain and provide secondary containment for 110% of the largest single tank.
 - ii. Berms or other secondary containment devices shall be sufficiently impervious to contain any spilled or released material.
 - iii. Inspection of all berms and containment devices at regular intervals, but not less than monthly. Berms shall be inspected within forty-eight (48) hours of a precipitation event of 1.0" or more, and Operator shall make necessary repairs as soon as possible, but not more than seventy-two (72) hours after the event.
 - iv. Maintain all berms and containment devices to ensure they are in good condition.

Commented [Author10]: COGA interprets the intent of this regulation as stating that if a spill or release is reportable by COGCC regulations, it shall be reportable to AdCo. To ensure the clarity of this interpretation, COGA requests the modification of this highlighted phrase to read, "all spills or releases required to be reported by COGCC regulations"

Commented [Author11]: Operators can comply with the 48-hour obligation to inspect following a 1" precipitation event, but having an obligation to then make necessary repairs within 72 hours of the event (which may be only 24 hours after the inspection) is not always feasible and there may be additional impediments due to wet ground. There is no identified need for ensuring that repairs are made within 72 hours of the event. Further, certain weather events may make it impossible to try a repair immediately or the attempt to immediately repair could even cause further damage because the ground is too wet or other circumstances.

- v. A prohibition on the storage or use of ignition sources inside the secondary containment area unless the containment area encloses a fired pressure vessel.
- vi. Construction of containment berms using steel rings, designed and installed to prevent leakage and resist degradation from erosion or routine operation.
- vii. Construction of secondary containment areas with a synthetic or engineered liner that contains all primary containment vessels and flowlines and is mechanically connected to the steel ring to prevent leakage.
- viii. For locations within 500 feet and upgradient of a surface water body or ground water source, tertiary containment, such as an earthen berm, around oil and gas facilities. Alternatively, the County may require Operator to install retention ponds for stormwater management.
- ix. Discharge valves shall be secured, inaccessible to the public and located within the secondary containment area. Open-ended discharge valves shall be placed within the interior of the tank secondary containment.
- b. Anchoring. Anchoring is required within floodplain or geological hazard areas, as needed to resist flotation, collapse, lateral movement, sinking, or subsidence, and in compliance with Federal Emergency Management Agency (FEMA). All guy line anchors left buried for future use shall be identified by a marker of bright color not less than four feet in height and not greater than one (1) foot east of the guy line anchor.

8.9. Chemical Handling and Requirements

- a. The owner or operator of any installation that is required to prepare or have available a safety data sheet for a hazardous chemical under the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 et seq., and regulations promulgated under that Act, shall submit both a safety data sheet (SDS) for each such chemical and an annual emergency and hazardous chemical inventory form to the Local Emergency Planning Commission (LEPC) and the local fire district. A comprehensive and universal listing of all hazardous chemicals stored, handled, and/or used on site must be maintained in an inventory list and must be made available to the County upon request.
- b. Drilling and completion chemicals shall be removed at most sixty days after completion.
- c. Operator shall provide to the County a copy of the chemical disclosure registry form provided to the COGCC pursuant to the

COGCC's "Hydraulic Fracturing Chemical Disclosure" rule prior to conducting hydraulic fracturing.

- d. The following toxic, including orally toxic chemicals shall not be added to the hydraulic fracturing fluid:

1. Benzene
2. Lead
3. Mercury
4. Arsenic
5. Cadmium
6. Chromium
7. Ethylbenzene
8. Xylene
9. 1,3,5-trimethylbenzene
10. 1,4-dioxane
11. 1-butanol
12. 2-butoxyethanol
13. N,N-dimethylformamide
14. 2-ethylhexanol
15. 2-mercaptoethanol
16. Benzene, 1,1'-oxybis-, tetrapropylene derivatives, sulfonated, sodium salts
17. Butyl glycidyl ether
18. Polysorbate 80
19. Quaternary ammonium compounds, dicoco alkyl/dimethyl, chlorides
20. Bis hexamethylene triamine penta methylene phosphonic acid
21. Diethylenetriamine penta
22. FD&C blue no 1.
23. Tetrakis (triethanolaminate) zirconium (IV) (TTZ)

9-10. Emergency Preparedness and Response

- a. In General. Oil and gas operations shall not cause unreasonable risks of emergency situations such as explosions, fires, gas, oil or water pipeline leaks, ruptures, hydrogen sulfide or other toxic gas or fluid emissions, and hazardous material vehicle accidents or spills.
- b. Emergency Preparedness Plan. Each Applicant with an operation in the County is required to implement an emergency preparedness plan for each specific oil and gas facility. The plan shall be referred to the Office of Emergency Management (OEM), and the applicable fire district, filed with the County and updated on an annual basis or as conditions change (responsible field personnel change, ownership changes, etc.). The emergency preparedness plan shall consist of at least the following information:

- i. Name, address and phone number, including 24-hour emergency numbers for at least two persons located in or near Adams County who are responsible for emergency field operations.
- ii. An as-built facilities map in a format suitable for input into the County's GIS system depicting the locations and type of above and below ground facilities including sizes, and depths below grade of all oil and gas gathering and transmission lines and associated equipment, isolation valves, surface operations and their functions, as well as transportation routes to and from exploration and development sites, for emergency response and management purposes. The information concerning pipelines and isolation valves shall be held confidentially by the County's OEM, and shall only be disclosed in the event of an emergency. The County shall deny the right of inspection of the as-built facilities maps to the public pursuant to C.R.S. §24-72-204.
- iii. Detailed information addressing each potential emergency that may be associated with the operation. This may include any or all of the following: explosions, fires, gas, oil or water pipeline leaks or ruptures, hydrogen sulfide or other toxic gas emissions, or hazardous material vehicle accidents or spills. For each potential emergency, threshold / trigger levels shall be pre-identified that govern when an emergency state is declared by the Applicant.
- iv. The plan shall include a provision that any spill outside of the containment area or which has the potential to leave the facility or to threaten a water body shall be reported to the emergency dispatch and the Director immediately.
- v. Detailed information identifying site access, evacuation routes as determined by first responders, impact zones for each emergency scenario identifying impacted facilities, and buildings and health care facilities anticipated to be used.
- vi. Project specific emergency preparedness plans are required for any project that involves drilling or penetrating through known zones of hydrogen sulfide gas.
- vii. The plan shall include a provision that obligates the Applicant to reimburse the appropriate emergency response service providers for costs incurred in connection with any emergency.
- viii. Detailed information that the Applicant has adequate personnel, supplies, and funding to implement the emergency

response plan immediately at all times during construction and operations. Supplies can include adsorption boom, granulated materials, and coordination of foam supplies with the local first responders.

- ix. The plan shall include provisions that obligate the Applicant to keep onsite and make immediately available to any emergency responders the identification and corresponding Safety Data Sheets (SDS) of all products used, stored or transported to the site. The SDS sheets shall be provided immediately upon request to the Director, a public safety officer, or a health professional. In cases of spills or other emergency events, the plan shall include provisions establishing a notification process to emergency responders of potential products they may encounter, including the products used in the hydraulic fracturing fluids.
- x. The plan shall establish a process for informing surrounding neighbors and schools identified as being within the emergency impact zone of applicable emergency response plan and procedures.

10-11. Recycle, Reuse and Disposal of Fluids:

- a. Operator shall recycle drilling, completion, flowback and produced fluids unless technically infeasible.
- b. Exploration & Production (E&P) Waste may be temporarily stored in tanks while awaiting transportation to licensed disposal or recycling sites.
- c. Produced Water must be transported by pipelines unless economically or technically infeasible.

10-12. Stormwater Controls:

- a. Oil and gas operations shall be in compliance with COGCC rules related to stormwater management regulations and Adams County Stormwater Quality Regulations as contained in the Adams County Development Standards and Regulations / Ordinances and other applicable federal, state, and county requirements.
- b. The Owner or Operator must provide a stormwater management plan that identifies possible pollutant sources that may contribute pollutants to stormwater, best management practices, sampling procedures (if required), and inspections that, when implemented, will reduce or eliminate any possible water quality impacts.

12. Water Bodies and Water Quality:

- a. General: Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Rules, specifically with respect to spills and releases in floodplains and/or water bodies, and

Commented [Author12]: Operators frequently have agreements in place with surface owners to purchase fresh water from landowners for oil and gas drilling. Requiring recycling could result in a breach of these agreements and/or result in substantial loss of income to surface owner.

Commented [GD1]: Water Bodies and Water Quality relocated to a new section in DSR Chapter 4.

applicable water quality standards set by the Colorado Department of Public Health and Environment.

- b. ~~Water quality plan. Operators shall implement a water quality plan and make available to Adams County upon request. Such plan shall include details such as operator's plans for water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies. The owner or operator shall provide the County with the information it provides to the COGCC, ensuring compliance with the water quality protection standards contained in COGCC Rules. The owner or operator shall provide all water source test results to the county and maintain records of such results. The owner or operator shall make available to the County upon approval by the COGCC, its plans concerning downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.~~

- c. ~~Wastewater injection. Wells used for produced water disposal are prohibited in Adams County.~~

- d. ~~Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering regulations. A "100-year floodplain" shall be, for purposes of this section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.~~

13. Well Plugging and Abandonment:

- a. An ~~O~~perator shall comply with all COGCC rules regarding well abandonment and reclamation, including, but not limited to, removal of all equipment from the location and restoring the surface of the land to its original state. Notice of well plugging and abandonment shall be submitted by the ~~O~~perator to the Community and Economic Development Department within forty-eight (48) hours. Notice shall include surveyed coordinates of the decommissioned well ~~or facility~~.

- ~~a-b. The Operator shall submit the COGCC required Notice of Intent to Abandon report to the County concurrently with the COGCC.~~

- ~~b-c. Decommissioned oil and gas well assessment. Prior to any hydraulic fracturing, and at periods following hydraulic fracturing, the ~~O~~perator shall must perform assessment and monitoring of plugged and decommissioned or removed from use, and dry and removed from use oil and gas wells (abandoned wells) within one-quarter mile~~

Commented [GD2]: Water Quality Plan details relocated to the Development Application Guide, Appendix A.

Commented [Author13]: COGA believes this provision is unreasonable and unnecessary in light of the fact that that the COGCC, the technical expert in this area and the sole entity with jurisdiction over downhole issues, already requires an offset well evaluation in COGCC Rule 308.b.7. That rule requires all Form 2s (Applications for Permits to Drill) to include an offset well evaluation in which the Operator must evaluate the construction and integrity of all offset wells within 1,500 feet (a little greater than ¼ of a mile) of the proposed wellbore and provide a plan to address offset wells within 1,500' feet that do not meet isolation requirements. Given this state requirement, there is no need for this regulation because the County's concerns will be addressed by the offset well plan required by the expert in well-integrity, the COGCC.

of the projected track of the borehole of a proposed well. The assessment and monitoring includes:

- i. Identification of all abandoned wells located within one-quarter mile of the projected track of the borehole of a proposed well based upon examination of COGCC and other publicly available records,
- ii. A Risk assessment of leaking gas or water to the ground surface or into subsurface water resources, taking into account plugging and cementing procedures described in any recompletion or plugged and abandoned (P&A) report filed with the COGCC.
- iii. Notification to the County and COGCC of the results of the risk assessment of the plugging and cementing procedures.
- iv. Permission from each surface owner who has an abandoned well on the surface owner's property to access the property in order to test the abandoned well. If a surface owner has not provided permission to access after thirty days from receiving notice, the applicant shall not be required to test the abandoned well.
- v. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well prior to hydraulic fracturing
- vi. Soil gas surveys from various depths and at various distances, depending on results of risk assessment, of the abandoned well within ninety (90) days after completion, and then every year after production has commenced if initial survey results suggest increased risk of leaking gas or water from the abandoned well.
- vii. Notification of the results of the soil gas survey to the County and the COGCC within three weeks of conducting the survey or advising the County that access to the abandoned wells could not be obtained from the surface owner.
- viii. In the event that contamination is detected during any soils testing, no further operations may continue until the cause of the contamination is detected and resolved and the County has given its approval for additional operations to continue.

~~c-d~~ Marking of plugged and abandoned wells. The ~~O~~perator shall permanently mark by a brass plaque set in concrete, similar to a permanent bench mark to monument the plugged and abandoned well's existence and location. Such plaque shall contain all information required by the COGCC and the County.

14. Noise. The Operator shall control noise levels as follows:

- a. Prior to operations ~~Operator will shall~~ obtain a baseline noise study that encompasses at least ~~five (5) to three~~ days, one of those days being a weekend. ~~The Operator may use the baseline noise study submitted with the Development Application to fulfill this requirement, if that noise study is completed within twelve (12) months of any ground disturbing activities.~~
- b. Beginning with construction and up to production, the County ~~will may~~ require continuous noise monitoring ~~for all oil and gas facilities located within one-half mile (1/2), or greater depending on the location, nature, and size of the facility, of the property line of any existing residences, schools, state licensed daycares or high occupancy buildings, and may require that this~~ ~~The County may require continuous noise monitoring~~ be conducted by an approved third-party consultant based on the location, nature, and size of the facility.
- c. The Operator ~~must shall~~ follow COGCC Regulations for noise level.
- d. The Operator shall post 24-hour, 7 days per week contact information to deal with all noise complaints arising from Operator's oil and gas facility. Such posting shall be visible from the public rights-of-way.
~~For oil and gas facilities located within 2,000 feet of a land use or zoning designation boundary the Operator shall be required to comply with the lower maximum permissible noise level as defined in COGCC Regulations for noise of that corresponding land use or zone district.~~
- e. To ensure the Operator controls noise to the allowable levels set forth above, one or more of the following may be required based on the location, nature, and size of the facility:
 - i. Acoustically insulated housing or cover enclosing the motor or engine;
 - ii. Noise management plan identifying hours of maximum noise emissions, type, frequency, and level of noise to be emitted, and proposed mitigation measures;
 - iii. Obtain all power from utility line power or renewable sources;
 - iv. Utilize the most current equipment to minimize noise impact during drilling, completions, and all phases of operation including the use of "Quiet Fleet" noise mitigation measures for completions;
 - v. Sound walls around well drilling and completion activities to mitigate noise impacts;
 - vi. Restrictions on the unloading of pipe or other tubular goods between 6:00 p.m. and 8:00 a.m.;
 - vii. Any abatement measures required by COGCC for high-density areas, if applicable.

Commented [Author14]: COGA submits this requirement is unreasonable because it treats oil and gas operations disparately from other industrial activities. It is unreasonable to subject oil and gas operations to a more stringent noise limit than other activities within the same zone. The source of the noise is irrelevant; it is the decibel level that matters. Under this regulation, a use could be noisier than an oil and gas facility and yet perfectly legal. There is no justification for treating noise from oil and gas operations differently from noise from other uses. It is qualitatively identical.

Further, at what distance will the sound be measured for compliance?

- viii. The use of electric drill rigs.
- ix. Tier 4 or better diesel engines, diesel and natural gas co-fired Tier 2 or Tier 3 engines, natural gas fired spark ignition engines, or electric line power for hydraulic fracturing pumps.
- x. Use of quiet design mufflers (also referred to as hospital grade or dual dissipative) or equivalent.
- xi. The use of liquefied natural gas dual fuel hydraulic fracturing pumps.

f.g. All noise studies and assessments required by the County shall be completed by a qualified sound professional.

15. Air Emissions: Air contaminant emission sources shall comply with the permit and control provisions of the state air quality control program (C.R.S. § 25-7-101 et seq.) and the rules and regulations promulgated by the State Air Quality Control Commission. The Operator shall employ the following control measures and operating procedures to avoid or minimize all emissions into the atmosphere.

- a. Air quality action days. Operator shall respond to air quality action day advisories posted by the CDPHE for the front range area by implementing suggested air emission reduction measures as feasible. Emissions reduction measures shall be implemented for the duration of an air quality action day advisory and may include measures such as:
 - i. Minimize vehicle and engine idling;
 - ii. Reduce truck traffic and worker traffic;
 - iii. Delay vehicle refueling;
 - iv. Suspend or delay use of fossil fuel powered ancillary equipment; and
 - v. Postpone construction or maintenance activities, if feasible.
 - vi. Postpone well maintenance and liquids unloading activities that would result in emission to the atmosphere.
- b. Leak Detection and Repair (LDAR). Operator shall develop and maintain an LDAR program using modern leak detection technologies for equipment used at the facility that complies with the following requirements:
 - i. Inspections must occur at least semi-annually; more frequent inspections may be required based on the nature, location and size of the facility.
 - ii. Any leaks discovered by operator, including any verified leaks that are reported to operator by a member of the public, shall be reported to the County no later than twenty-four hours after discovery. The operator shall maintain a weekly log of all reported leaks and shall make that log available upon request from the County.

Commented [Author15]: Please explain what is required by reference to a "qualified sound professional."

- iii. Operator shall repair leaks as soon as possible, but at least within seventy-two hours, unless technically or operationally infeasible. If the leak presents an imminent hazard to persons or property, the operator may not operate the affected component, equipment or pipeline segment until the operator has corrected the problem and notified the County of the successful repair. In the event of leaks that do not pose an imminent hazard to persons or property, if more than 48 hours repair time is needed after a leak is discovered, operator shall contact the County and provide an explanation of why more time is required.
- iv. Plan shall include detailed record keeping of the inspections for leaking components.
- v. At least once per year, the operator shall notify the County five business days prior to an LDAR inspection of its facilities to provide the County the opportunity to observe the inspection.
- c. **Well Completions and Emissions Control**
 - i. Operators shall utilize EPA Reduced Emission Completions for oil wells and gas wells.
 - ii. Operators ~~shall not~~ utilize closed loop, pitless drilling, completions systems without permanent on-site storage tanks for containment and/or recycling of all drilling, completion, and flowback fluids. Any emissions must be routed to and controlled by a flare or combustor operated with at least a 98% destruction removal efficiency.
- d. **Combustion Devices**
 - i. For any flares or combustion devices used, manufacturer test or other data must be maintained and demonstrate that the device has a destruction removal efficiency of 98% for hydrocarbons.
 - ii. To the extent used, all flares, thermal oxidizers, or combustion devices shall be designed and operated as follows:
 - (a) The flare and or combustor shall be fired with natural gas.
 - (b) The flare and or combustor shall be designed and operated in a manner that will ensure no visible emissions during normal operation. Visible emissions is defined as the observation of smoke for any period or periods of duration greater than or equal to one minute in any fifteen minute period during normal operation, pursuant to EPA Method 22. Visible

Commented [Author16]: With respect to utilizing completions and production systems without permanent on-site storage tanks for containment, COGA has strong objections to this requirement as it relates to both completion and production. First, while a significant portion of the completions activities utilize skid-mounted temporary frac tanks, operators do, depending on circumstances, seek to employ permanent equipment on-site during the completion process in order to reduce emissions. These permanent storage tanks (which are controlled by combustion devices) would be prohibited by this provision. Such prohibition could result in an increase in emissions during the completions process.

The requirement to use production systems without permanent on-site storage tanks appears to be an attempt to mandate tankless operations. Such a requirement is technologically and economically infeasible and could result in operators being unable to develop their mineral resources. While operators continue to look for opportunities to utilize tankless operations, there are significant impediments to doing so including the availability of oil pipelines that are capable of and willing to transport liquids with a high Reid vapor pressure and in the amount needed to remove tanks from the facility. Further, companies that cannot transport their own liquids face more significant costs in operating tankless facilities.

emissions do not include radiant energy or water vapor.

- (c) The flare and or combustor shall always be operated with a flame present when emissions may be vented to it.
- (d) All combustion devices shall be equipped with an operating auto-igniter.
- (e) If using a pilot flame ignition system, the presence of a pilot flame shall be monitored using a thermocouple or other equivalent device to detect the presence of a flame. A pilot flame shall be maintained at all times in the flare's pilot light burner. A telemetry system shall be in place to monitor pilot flame and shall activate a visible and audible alarm in the case that the pilot goes out.
- (f) If using an electric arc ignition system, the arcing of the electric arc ignition system shall pulse continually, and a device shall be installed and used to continuously monitor the electric arc ignition system.
- e. Well Liquids Unloading
 - i. Best management practices during liquids unloading activities are required including the installation of artificial lift, automated plunger lifts and at least 90% emissions reductions when utilizing combustion to control any venting.
 - ii. If manual unloading is permitted, **Operator** shall remain onsite.
- f. General air quality protection measures.
 - i. Operators should work to limit truck traffic to and from the site.
 - ii. Hydrocarbon emissions control of at least 98% or better for crude oil, condensate, and produced water tanks with uncontrolled actual emissions of Volatile Organic Compounds (VOCs) greater than two tons per year (TPY) VOCs.
 - iii. **No venting other than if necessary for safety or during an emergency.**
 - iv. Operators should consolidate product treatment and storage facilities within a facility.
 - v. Operators should centralize compression equipment within a facility.
- g. Site-specific air quality protection measures. To eliminate or minimize air emissions, the County may require any or all of the following depending on the size, location and nature of the facility:

Commented [Author17]: COGA agrees that venting as a matter of course should be prohibited but maintains venting should be allowed where it is reasonably required for maintenance, gauging, or safety of personnel and equipment.

COGA notes that CDPHE's Air Quality Control Commission (AQCC) has some of the most extensive and comprehensive regulations against venting in the country. However, the AQCC recognizes that venting can be required during maintenance, gauging, and in circumstances for safety of personnel and equipment. These same circumstances for venting must be allowed here.

- i. Ambient Air Monitoring. An air monitoring plan that describes how the operator will conduct baseline monitoring within 500 feet of a proposed facility prior to construction and conduct monitoring during the drilling, completion and production phases of development. The plan may include monitoring for all potential emissions, including but not limited to, methane, VOCs, Hazardous Air Pollutants (HAPs), Oxides of Nitrogen (NOx), Particulate Matter (PM), and Fine Particulate Matter (PM 2.5). Operator shall pay for the baseline and ongoing monitoring. Baseline and continuous monitoring shall be done by a consultant approved of by the County. Any continuous monitoring system shall be able to alert the operator of increases in monitored air pollutant concentrations.
- ii. Implementation of tankless production techniques.
- iii. The use of zero emission dehydrators.
- iv. Use of a pressure-suitable separator and vapor recovery unit (VRU) where applicable.
- v. Pipeline infrastructure for produced water, natural gas, crude oil and condensate constructed and placed into service prior to the start of any fluid flow from any wellbore.
- vi. The use of no-bleed continuous and intermittent pneumatic devices. This requirement can be met by replacing natural gas with electricity or instrument air, or routing the discharge emissions to a closed loop-system or process.
- vii. Automated tank gauging.
- viii. Flaring shall be eliminated other than during emergencies or upset conditions; all flaring shall be reported to the county

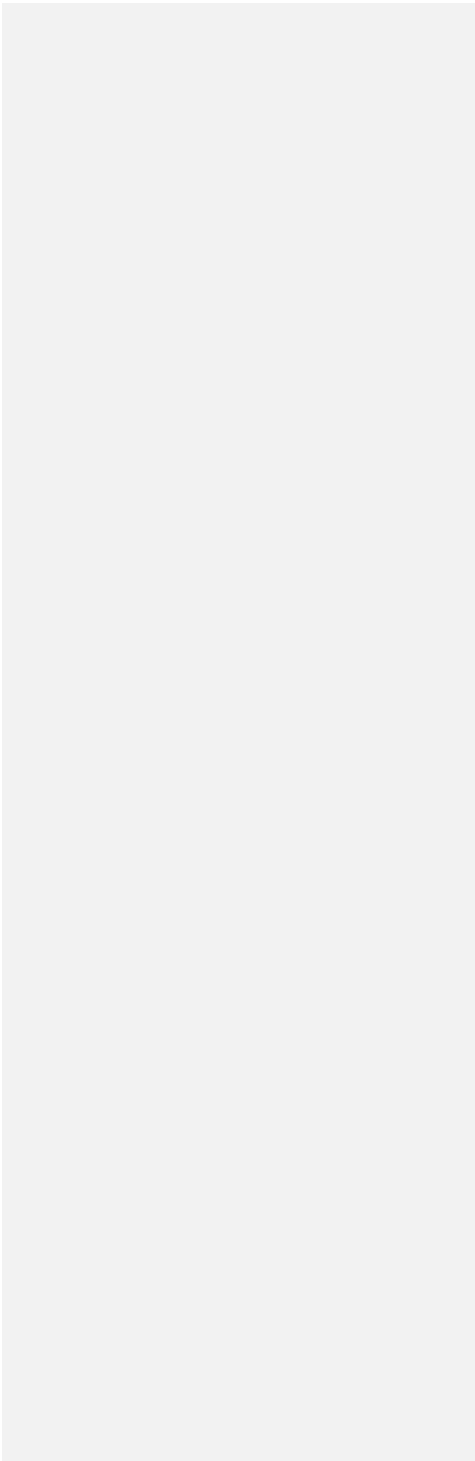
16.

Odors:

- a. Operator ~~must shall~~ implement and maintain ~~and make available to the County upon request~~, an odor mitigation plan that demonstrates how ~~the O~~operator will minimize odors from its operations and comply with Colorado Department of Public Health and Environment, Air Quality Control Commission, Regulation No. 2 Odor Emissions, 5 CCR 1001-4, Regulation No. 3, 5 CCR 1001-5, and Regulation No. 7, 5 CCR 1001-9 sections VII and VIII. The plan shall also provide a plan for timely responding to odor complaints from the community, and for identifying and implementing additional odor control measures to control odors emanating from the ~~O~~oil and ~~G~~as ~~F~~facility.
- b. Operator ~~must shall~~ notify the County's LGD no later than 24 hours after receiving odor complaint.
- c. Operator ~~shall must~~ prevent odors from oil and gas facilities from affecting the health and welfare of the public by proactively addressing and, to the fullest extent, resolving complaints filed by

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members of the community, in coordination with County and Tri-County Health Department staff.

~~d. In response to an odor-related complaint, the Operator shall provide a complete description of all activities occurring at the oil and facility and measures or actions taken to reduce odors to the County's LGD within 24 hours.~~

~~e.e. The Director of Community and Economic Development may require an Operator to collect and analyze a speciated air sample to measure for volatile organic compounds or hazardous air pollutants in response to an odor-related complaint. Speciated air sample collection shall be done utilizing a third-party vendor approved by the County.~~

~~d.f.~~ To ensure compliance with the odor mitigation plan, the County may require the Operator to implement any of the following measures depending on the size, location and nature of the facility:

- i. Adding an odorant which is not a masking agent or adding chillers to the mud systems.
- ii. Using filtration systems or additives to minimize odors from drilling and fracturing fluids except that operator shall not mask odors by using masking fragrances.
- iii. Enclose shale shaker to contain fumes from exposed mud, where safe and feasible.
- iv. Wipe down drill pipe each time drilling operation "trips" out of hole.
- v. Increasing additive concentration during peak hours provided additive does not create a separate odor. Additive must be used per manufacturer's recommended level.
- ~~vi. Requiring the use of, at a minimum, low odor Category III drilling fluid.~~

~~17. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant will be required to identify and offer to sample all available water sources located within one-half mile of the proposed well or facility. All sampling must be conducted by third-party consultant approved by the County. Sampling requirements include:~~

- ~~i. Initial baseline samples and subsequent monitoring samples.~~
- ~~ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.~~

Commented [Author18]: Any complaint filed should be verified by the LGD as justifiable (within a certain distance to the pad, etc.). Otherwise, complaints could be filed by any resident in any proximity to the oil and gas location at any time, causing undue burden and expense on the operator.

Commented [Author19]: Operators have advised that the use of enclosed shale shakers is virtually never safe or feasible. COGA requests deletion of this provision.

Commented [GD3]: Water source sampling and testing relocated to a new section in DSR Chapter 4.

iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:

i. ~~One sample within six months after completion;~~

ii. ~~One sample between twelve and eighteen months after completion; and~~

iii. ~~One sample between sixty and seventy-two months after completion;~~

iv. ~~For multi-well pads, collection shall occur annually during active drilling and completion.~~

iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator ~~shall~~ collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.

v. An operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided that data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 1, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.

vi. The operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the CED Director that the applicant could not obtain access to the water source from the surface owner.

vii. Testing for the analytes listed in Table 1, and subsequent testing as necessary or appropriate.

viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.

ix. Reporting the location of the water source using a GPS with sub-meter resolution.

x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.

- xii. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.
- xiii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:
 - i. If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).
 - ii. If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.
 - iii. Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than one mg/l.
 - iv. Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detection may result in required subsequent sampling for additional analysis.
 - v. Further water source sampling in response to complaints from water source owners.

Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the CED Director, the COGCC and the water source owners.

~~18-17.~~ Dust:

- a. Operator shall minimize dust pollution associated with onsite activities and traffic.
- b. No untreated produced water or other process fluids shall be used for dust suppression.
- c. The ~~Operator will~~shall avoid creating dust or dust suppression

Table 4-11-A: Water Quality Analytes

GENERAL WATER QUALITY	Alkalinity Conductivity & TDS pH Dissolved Organic Carbon (or Total Organic Carbon) Bacteria Hydrogen Sulfide
MAJOR IONS	Ammonide Chloride Fluoride Magnesium Potassium Sodium Sulfate Nitrate + Nitrite as N (total)
METALS	Arsenic Barium Boron Chromium Copper Iron Lead Manganese Selenium Strontium
DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS	Methane Ethane Propane BTEX-as Benzene, Toluene, Ethylbenzene, Xylenes Total Petroleum Hydrocarbons (TPH)
OTHER	Water Level Stable isotopes of water (Oxygen, Hydrogen, Carbon) Phosphorus

activities
within 300 feet of the ordinary high-water mark of any water body,
unless the dust suppressant is water.

Commented [GD4]: Table 4-11A: Water Quality Analytes
relocated to new section in DSR Chapter 4.

Commented [Author20]: Avoiding dust completely as this provision mandates is unreasonable as all activities can create some de minimis amount of dust.

COGA proposes rewording as follows: **"The operator will minimize creating dust and avoid dust suppression activities within 300 feet of the ordinary high-water mark of any water body, unless the dust suppressant is water."**

COGA's proposed minor revisions protect public health, safety, welfare, and then environment by reflecting a duty to minimize dust creation and avoid any dust suppression activities other than water within 300 feet of the high-water mark.

- i. Safety Data Sheets (SDS) for any chemical-based dust suppressant shall be submitted to the County prior to use.
- d. To ensure the Operator controls dust, one or more of the following may be required based on the location, nature, and size of the facility:
 - i. Ceasing all earthwork activities when wind speeds equal or exceed 30 MPH at any time measured by onsite anemometer.
 - ii. The use of reduced speed restrictions.
 - iii. Approved dust suppression activities.
 - iv. Ceasing ongoing truck traffic causing fugitive dust, until Operator has minimized dust to acceptable levels.

49-18. Visual Aesthetics.

- a. Operator shall submit a visual mitigation plan in compliance with COGCC Rules, including but not limited to, a list of the proposed colors for the facilities, regardless of construction date, which are observable from any public roadway. All permanent equipment on an oil and gas facility regardless of construction date, which are observable from any public highway, road, or publicly maintained trail will be painted, providing for paint that is uniform, non-contrasting, nonreflective color tones (similar to the Munsell Soil Color Coding System), and with colors matched to but slightly darker than the surrounding landscape, a listing of the operations' equipment, proposed fencing, and screening. Plan shall indicate the location of all outdoor lighting at the site and any structures and include cut sheets of all proposed fixtures. Fencing shall be required around all well site equipment, including, but not limited to, storage tanks, well heads, and meters if the well site is visible from a subdivision west of Imboden Road. Such fencing shall screen equipment, provide safety precautions, and be compatible with the surrounding environment. Should fencing apply to a well site, the design and construction of such fencing shall be approved by the Community and Economic Development Department prior to the construction of any site. If a chain link fence is required to achieve safety requirements set by the COGCC, then landscaping and other screening mechanisms shall be required that comply with the County's Development Standards and Regulations and the Operator's safety requirements. Operator shall be responsible for obtaining consent by surface owner allowing any required fencing.

- i. Required sound walls shall comply with a color scheme approved by the County, blending with natural background.

- a-b. Operator shall submit landscaping and berming plan that includes maintenance and irrigation requirements for planted vegetation

Commented [GD5]: Visual Mitigation plan details relocated to the Development Application Guide, Appendix A.

Commented [Author21]: This could be unreasonable because it will extend the overall construction period or otherwise extend whatever phase the operation is in. Contractors/drill schedule, etc. and other operational concerns may make a pause in operations due to wind difficult and increase impacts over the long term because needing more trips to the location to execute the various phases of development.

Commented [Author22]: COGA asks that the county not retroactively apply equipment color standards.

Commented [Author23]: Given the nature of drilling and completion activities, fencing may not be appropriate until moving into the production phase. Additionally, because sound walls are used during drilling and completion, fencing is generally not feasible at these stages.

COGA believes it appropriate to use all good and reasonable efforts to obtain authorization to install a fence; however, if an operator cannot do so or the surface owner demands unacceptable fees for erecting the fence as required by the County, then operators must have relief from this provision.

Commented [Author24]: Are there different colors of sound walls?

Commented [GD6]: Landscaping and berming Plan details relocated to the Development Application Guide, Appendix A.

~~throughout the duration of operations, including production.~~ Operator shall be required to provide maintenance funding through bonding to ensure funds are available for upkeep of any planted vegetation throughout the duration of operations, including production. Weed control is required at the facility and along access roads until final reclamation and abandonment. ~~Required sound walls shall be included in the visual mitigation plan and shall comply with the color scheme approved by the County, blending with natural background.~~ All landscaping shall be in compliance with County requirements and in compliance with the safety requirements of the Operator. Existing vegetation shall be minimally impacted. Motorized equipment shall be restricted to the well sites and access roads to the well sites. Operator is responsible for obtaining consent by surface owner allowing landscaping as well as automatic irrigation for landscaping in urban mitigation areas and/or parks/recreation areas. All plant materials shall be kept in a healthy growing condition at all times.

- ~~b. Operator shall submit lighting mitigation plan for all phases of development and operation, which adheres to best management practices to minimize light escaping the facility including making all lighting downward facing and fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture. Operator shall conduct a photometric study prior to start of construction to indicate impact on surrounding properties and measure the lumens emitted from the facility outside of the walls.~~
- ~~c. Site access and security. Site shall be properly secured during all phases of operations, including, but not limited to, security fencing or barriers to prevent unauthorized access to site. Site shall be properly secured prior to the start of drilling. Proposed fencing, barriers, and screening shall be included in the visual mitigation plan.~~

19. Lighting. The Operator shall minimize light escaping the facility as follows:
- All lighting shall be directed downward and inward and use fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture.
 - Operator shall follow COGCC Regulations for lighting standards.
 - Operator shall provide sufficient on-site lighting to ensure the safety of personnel on or near the site.
 - If the facility has a noise barrier (sound walls, etc.), the Operator shall install facility lighting beneath the noise barrier, except for drilling rig lights.
 - To ensure the Operator controls light escaping from the facility, one or more of the following may be required based on the location, nature, and size of the facility:

Commented [GD7]: Lighting moved to a new section within DSR Chapter 4

Commented [Author25]: COGA requests the County delete the requirement that "Operator is responsible for obtaining consent by surface owner allowing landscaping as well as automatic irrigation..." as well as the requirement that "All plant materials shall be kept in a healthy growing condition at all times." With respect to the first request and as noted elsewhere, the County must provide relief if, after good faith negotiations and reasonable attempts, operators are unable to obtain land owner approval. By both mandating certain requirements and requiring surface owner approval for many of those requirements, the County is placing the surface owner in the position of potentially being able to withhold approval unless operators pay unreasonable amounts. The County's regulations should not be encouraging or mandating that outcome. Thus, there should be an alternate path where the surface owner does not consent to landscaping/irrigation and the surface owner's wishes should be respected.

As for the second request, COGA notes that operators cannot ensure that no plants will die. Natural occurrences such as hailstorms, sun exposure, and natural plant death make this requirement infeasible. While operators will maintain their landscaping and may be required to replant or weed out dead plants or things like that, the requirement as written is unreasonable.

Finally, please provide guidance as to what qualifies as a "recreation area"

- i. The use of timers or motion sensor lighting.
- ii. The use of full cut-off lighting.
- iii. The use of reduced light intensity colors and low-glare or no-glare lighting.

20. Community Outreach:

- a. The Operator shall hold quarterly neighborhood meetings from initial permit approval by the County through the completion of the first wellbore, or longer as determined by the Director of Community and Economic Development for oil and gas facilities located within one-half mile (1/2) of any existing residences, platted residential development, high occupancy building units, school facilities, or state licensed child care centers. Notice for quarterly neighborhood meetings shall be sent by the Operator to all property owners, current residents, or school facility or childcare center administrators within one-half mile (1/2) at a minimum, or greater, as determined by the Director of Community and Economic Development, of the facility. Notice for the quarterly neighborhood meetings shall occur at least 14 days prior to the meeting.
- b. At the quarterly neighborhood meetings, the Operator will provide an update on the status of any pending permits with the County, state or federal agencies associated with facility, an overview of all planned or ongoing operations at the oil and gas facility and allow those in attendance to ask questions and provide input related to the facility.
- c. The location, timing, and format of the quarterly neighborhood meetings shall be approved by the County.
- d. The County may require one or more of the following based on the location, nature, and size of the facility:
 - i. The Operator to provide written and digital materials in languages other than English
 - ii. The Operator to provide interpretation services at neighborhood meetings
 - iii. The Operator to hold additional neighborhood meetings to accommodate resident or property owner input.

21. Cumulative Impacts: Operators shall evaluate and address the potential cumulative impacts from the Oil and Gas Facility, and all reasonably foreseeable development associated with other oil and gas activity and heavy industrial operations within one mile (1), at a minimum, of the oil and gas facility. Operators shall minimize, avoid, mitigate, and offset cumulative impacts from oil and gas operations to the extent technically feasible. This may be achieved through a suite of best management practices, engineering or operations controls, and/or compensatory measures.

Commented [GD8]: Disproportionally impacted community identification is located in Development Application Guide, Appendix A.

Commented [Author26]: COGA notes that a quarter of a year or even longer may pass from the date the permit is approved by the County until the date there is any activity on the well pad. Where there are no operations to report on and there is no change of plans to notify the community of, COGA believes that this requirement should not apply. There is no need to have a meeting to say, "nothing is happening and we are still on the schedule we provided earlier; we still anticipate starting construction on xxx date."

Commented [Author27]: Will the cumulative impact plan required by the COGCC be sufficient for the county?

- a. The evaluation and review of cumulative impacts may require the submission of quantitative and/or qualitative analysis and data for the following impact areas, at a minimum:
- Air Quality,
 - Public Health and welfare,
 - Traffic,
 - Water resources,
 - Wildlife, Ecosystems, and Soil
- b. The Operator shall follow all CDECC Regulations and standards that address cumulative impacts related to noise, odor, dust, and light.
22. Transportation and Traffic
- a. General: Oil and gas operations shall minimize impacts to the physical infrastructure of the County transportation system.
- b. Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two hours.
- c. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department) with a Class 6 road base, or as approved by the local fire district, at least nine inches (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and reseeded with an appropriate native seed mixture within sixty days of discontinued use. Erosion shall be

Commented [Author28]: COGA asks that the "not to exceed two hours" requirement be deleted as unreasonable. Such timing may be impossible, particularly during an ongoing storm events or for other reasons.

Commented [Author29]: There should be flexibility for the operator to repair roads within 10 days in case there are issues outside of operators' control (such as obtaining the appropriate materials) that prevent repair within that timeframe. The County would not want an operator to use sub-standard materials in the repair to meet the aggressive timeline. COGA recommends adding "unless otherwise agreed to by the county and operator" to this 10-day provision.

controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.

- d. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department.

i. Requirements for the access permit may include the following:

1. A location that provides a safe entrance and exit that accommodates the type and volume of traffic using the access and reduces impact to residents on local roadways;
2. Haul route and traffic data;
3. Pre and post inspection of roadways used by the Operator;
4. Collateral or bond to ensure that road damage caused by the Operator is repaired;
5. Dust control (material used for dust control must be pre-approved by the County);
6. Road maintenance agreement during drilling phase; and
7. Payment of all applicable fees.

ii. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m.

iii. Operator shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school buses when schools are in session.

iv. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.

- e. All applicable transportation fees shall be paid prior to issuance of a notice to proceed, including without limitation:

- i. Access permit fees
- ii. Oversize/overweight permit fees
- iii. Right of way construction permit fees; and
- iv. Traffic impact and road maintenance fees.

23. Water and Wildlife Protection.

- a. Water Bodies and Water Quality:

Commented [Author30]: Operator already pays traffic impact fee for impact to roads.

Commented [Author31]: Operator already pays traffic impact fee for impact to roads.

- i. General. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Regulations, and applicable water quality standards set by the Colorado Department of Public Health and Environment and Colorado Water Quality Control Commission.
- ii. The owner or Operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Regulations.
- iii. The owner or Operator shall provide all water source test results to the County and maintain records of such results.
- iv. The owner or Operator shall make available to the County upon approval by the COGCC, its plans concerning downhole construction details and installation practices, including casing and cementing design selected to protect surface waters and source water aquifers from contamination.
- v. Wastewater Injection Wells used for produced water disposal are prohibited in Adams County.
- vi. Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering regulations. A "100-year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.
- b. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant shall be required to identify and offer to sample all available water sources located within one-half mile of the proposed facility. All sampling must be conducted by third-party consultant approved of by the County. Sampling requirements include:
- i. Initial baseline samples and subsequent monitoring samples.
- ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.

Commented [GD9]: Water Quality Plan details relocated to the Development Application Guide, Appendix A.

Commented [Author32]: Adams County has no authority over downhole.

Commented [Author33]: This prohibition must be deleted. The Commission maintains exclusive authority over one form of subsurface Class II underground injection control ("UIC") wells. C.R.S. § 34-60-106(9). That authority is delegated exclusively to the Commission from the U.S. Environmental Protection Agency. 42 U.S.C. § 300h-4; 40 C.F.R. § 147.300. This provision remains operationally preempted, even after SB 19-181.

- iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:
 - (1) One sample within six months after completion;
 - (2) One sample between twelve and eighteen months after completion; and
 - (3) One sample between sixty and seventy-two months after completion.
 - (4) For multi-well wells, collection shall occur annually during active drilling and completion.
- iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down-gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.
- v. An operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 4-11-A, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.
- vi. The operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the Director of Community and Economic Development that the applicant could not obtain access to the water source from the surface owner.
- vii. Testing for the analytes listed in Table 4-11-A, and subsequent testing as necessary or appropriate.
- viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.
- ix. Reporting the location of the water source using a GPS with sub-meter resolution.
- x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.

- xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.
- xii. Subsequent sampling. If sampling shows water contamination, additional measures may be required including the following:
 - (1) If free gas or a dissolved methane concentration level greater than one milligram per liter (mg/l) is detected in a water source, determination of the gas type using gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen).
 - (2) If the test results indicate thermogenic or a mixture of thermogenic and biogenic gas, an action plan to determine the source of the gas.
 - (3) Immediate notification to the County, the COGCC, and the owner of the water source if the methane concentration increases by more than five mg/l between sampling periods, or increases to more than ten mg/l.
 - (4) Immediate notification to the County, the COGCC and the owner of the water source if BTEX and/or TPH are detected as a result of testing. Such detections may result in required subsequent sampling for additional analytes.
 - (5) Further water source sampling in response to complaints from water source owners.
 - (6) Timely production and distribution of test results, well location, and analytical data in electronic deliverable format to the Director of Community and Economic Development, the COGCC, and the water source owners.
- c. Wildlife. Operators shall avoid, minimize, and mitigate adverse impacts to wildlife resources.
 - i. Operators shall comply with all COGCC Regulations for wildlife impacts.
 - ii. Operators shall actively engage Colorado Parks and Wildlife, where applicable, for the sake of avoiding, minimizing, and mitigating wildlife impacts.
 - iii. Operators shall share all findings, recommendations, and reports resulting from any consultation with Colorado Parks and Wildlife with the County within seven (7) days.

Commented [Author34]: What would be considered a credible complaint to require further testing?

Commented [Author35]: This requirement should be limited to FINAL findings.

24. Flammable material. The area twenty-five feet around anything flammable shall be kept free of dry grass or weeds, conform to COGCC safety standards and applicable fire code. The operator's conceptual review application and application shall be reviewed by the serving fire district.

Table 4-11-A: Water Quality Analytes	
GENERAL WATER QUALITY	Alkalinity Conductivity & TDS pH Dissolved Organic Carbon (or Total Organic Carbon) Bacteria Hydrogen Sulfide
MAJOR IONS	Ammonide Chloride Fluoride Magnesium Potassium Sodium Sulfate Nitrate + Nitrite as N (total)
METALS	Arsenic Barium Boron Chromium Copper Iron Lead Manganese Selenium Strontium
DISSOLVED GASES AND VOLATILE ORGANIC COMPOUNDS	Methane Ethane Propane BTEX as Benzene, Toluene, Ethylbenzene, Xylenes Total Petroleum Hydrocarbons (TPH)
OTHER	Water Level Stable isotopes of water (Oxygen, Hydrogen, Carbon) Phosphorus

e. ~~Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed two hours.~~

Commented [GD10]: Transportation and traffic related topics combined into another section in DSR Chapter 4

- ~~f. Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards and support an imposed load of 75,000 pounds that will accommodate emergency response vehicles such as, but not limited to, law enforcement, emergency command vehicles (cars/SUVs), ambulances, hazardous materials response vehicles, water tenders, and fire apparatus during construction and operation of new tank batteries, new drilling activity and reworks or recompletions of existing wells, unless a local fire department or fire district agrees to a different or lesser standard or waived by the County. With respect to new roads to new tank batteries, the Operator agrees to construct access roads at least twenty (20') feet wide (unless waived by the local fire district and the County's Public Works Department with a Class 6 road base, or as approved by the local fire district, at least nine (9") thick. Best efforts will be made to improve inadequate access to existing tank battery sites identified by the fire district or County, based on service calls and demonstrated problems of accessing the site. Operator and County agree that spot inspections of access roads may be done by the County and/or appropriate emergency response agency, at such County or agency's sole risk and expense, to ensure that emergency access in accordance with this section is maintained. Operator is required to maintain and repair any damaged roads within ten (10) days of County notice. Operator will assure that temporary access roads are reclaimed and revegetated within sixty days of discontinued use. Erosion shall be controlled in accordance with the Erosion and Sediment Control Plan while the roads are in use.~~
- ~~g. Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department. Requirements for the access permit may include the following: a) access location providing for a safe entrance/exit and utilization of main roadways to minimize impact/conflict with residents on local roadways; b) haul route and traffic data; c) pre/post inspection of roadways used by the Operator; d) collateral or bond to insure that road damage caused by the Operator is repaired; e) dust control (material used for dust control must be pre-approved by the County); f) road maintenance agreement during drilling phase; and g) payment of all applicable fees. Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m., and shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school.~~

~~buses when schools are in session. Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and Regulations.~~

~~20-25.~~ Removal of debris. All excess debris shall be removed during construction activities. Site shall remain free of debris and excess materials at all times during operations. Burning of debris and other materials is strictly prohibited at all times.

~~21-26.~~ Removal of equipment. No permanent storage of equipment. When no longer used, equipment shall be removed within thirty days unless a Temporary Use Permit for said storage is obtained from the County.

~~22-27.~~ Maintenance of machinery. Routine field maintenance of equipment involving hazardous materials within 300 feet of any water body is prohibited. All fueling shall occur over impervious material and shall not be done during storm events. Operator shall operate and maintain all equipment in accordance with manufacturer specifications. Regular maintenance checks are required for all equipment.

~~23-28.~~ Burning. No open burning of trash, debris or other flammable materials.

~~24-29.~~ Chains. Traction chains shall be removed from heavy equipment on public streets.

~~25-30.~~ Off-location flow lines and crude oil transfer lines

- a. Off-location flow lines and crude oil transfer lines regulated by the COGCC shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. ~~Without compromising pipeline integrity and safety, applicant shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.~~
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must conduct leak detection inspections or pressure testing in order to identify flowline leaks or integrity issues in accordance with COGCC Regulations.
- e. Operator must make available to County upon request all records required to be kept by COGCC
- f. Buried pipelines shall have a minimum of four feet cover.

~~26-31.~~ Gathering Lines

Commented [Author36]: COGA firmly believes that this requirement should be "to the extent practicable." COGA believes this language is necessary to promote surface owners' desires and because operators may have the ability in some instances to consolidate off-location flowlines or crude oil transfer lines or their rights-of-way, which should be encouraged, as recognized by the County immediately below. Existing rights-of-way may well be in areas containing existing or proposed buildings, etc.

Commented [Author37]: COGA is concerned with this suite of provisions to the extent they suggest the county is purporting to regulate gathering lines as OGF facilities. Upstream operators typically do not operator gathering lines and gathering lines are not regulated by the COGCC.

- a. Gathering lines shall be sited to avoid areas containing existing or proposed residential, commercial, and industrial buildings; places of public assembly; surface water bodies; and designated open space.
- b. Without compromising pipeline integrity and safety, Operator shall share existing pipeline rights-of-way and consolidate new corridors for pipeline rights-of-way to minimize impact.
- c. Setbacks from residential, commercial, or industrial buildings, places of public assembly, the high-water mark of any surface water body and sensitive environmental features will be determined on a case-by-case basis in consideration of the size and type of pipeline proposed and features of the proposed site.
- d. Operator must make available to County upon request all records submitted to the Pipeline and Hazardous Materials Safety Administration (PHMSA) or the Public Utilities Commission (PUC) including those related to inspections, pressure testing, pipeline accidents and other safety incidents.
- e. ~~Well Connects. Well connects do not require a separate permit as long as the well connect was permitted under the original permit for the Oil and Gas Facility. Well connects are defined as a pipeline, 10" or less inside diameter and 2 miles or less in length, laid running from the custody transfer point or production facility for a new well(s) to an existing gathering line connection point.~~

~~27-32.~~ Temporary surface water lines

- a. Operator shall use temporary surface water lines, unless infeasible.
- b. Operator may use County Road Right-of-Way, and County drainage culverts for the laying and operation of temporary water lines on the surface and in accordance with Adams County Standards and Regulations, unless infeasible.
- c. Operator will bury temporary water lines at existing driveway and gravel road crossings, or utilize existing culverts, if available, with County approval.

~~28-33.~~ Financial Assurance.

- a. ~~Operators shall be required to maintain environmental liability insurance to cover gradual pollution events.~~
- b. Operator shall be required to file and maintain financial assurance as determined on a site-specific basis prior to commencing operations, and thereafter during the active life of the facility, the operator shall post and maintain a performance bond or other approved financial instrument with Adams County. Should any corrective actions be required by the County in order to protect the health, safety, welfare, and the environment which result from failure of the operator to follow any regulations, standards, or conditions of approval, the

Commented [Author38]: This type of insurance can be very difficult or impossible for operators to obtain. To be sure, financial assurance is of utmost importance but flexibility in how it is demonstrated is needed.

Commented [Author39]: COGA requests that the County add after the word failure "not involving a force majeure event." Without this change, this provision is unreasonable.

performance bond shall be forfeited in an amount sufficient to defray the expense of said actions, including staff time expended by Adams County involved in such corrective actions.

~~29-34.~~ Mapping Information. Operator shall agree to provide coordinates and/or exact location of well sites to the County's GIS Department within forty-eight (48) hours of final completion of a well site in a format acceptable to the County. Any subsequent changes to a well site location shall also be provided to the County within forty-eight (48) hours of such changes.

4-11-02-03-04

INSPECTION AND ENFORCEMENT

1. Inspection: In recognition of the potential impacts associated with oil and gas facilities, all wells and accessory equipment and structures may be examined by the inspectors of the County at reasonable times to determine compliance with applicable provisions of this chapter, the International Fire Code, the International Building Code, and all other applicable standards in these Regulations.. The County reserves the right in its discretion to make spot inspections or to inspect without notice in the event of an issue potentially involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another. For the purpose of implementing and enforcing the provisions of this chapter, the inspector and other authorized personnel have the right to enter upon private property. The County may use the information collected on the inspections to enforce the requirements of this chapter. The County may also report this information to appropriate state and federal officials, including but not limited to information regarding alleged violations of state and federal rules. Operator shall make available to County, upon request, all records required to be maintained by these regulations or to show compliance with these regulations, and the rules and regulations promulgated by the COGCC and the CDPHE, including permits, Air Pollutant Emission Notices (APENs) and other documents required to be maintained by the COGCC, CDPHE and these regulations. The County ~~will~~ ~~shall~~ charge a yearly inspection fee for all Oil and Gas Facilities in the County. Fees for Oil and Gas Facility inspections shall be assessed according to the County's adopted fee schedule.
2. State Notification of Violations: Adams County will cooperate fully with the State of Colorado by notifying the Oil and Gas Conservation Commission of any and all violations of the Colorado Laws and Regulations.
3. Delinquent Taxes: One condition of any oil and gas well building permit is that all taxes as provided by statute, shall be paid.

Commented [Author40]: This provision is overly broad and could have safety consequences. COGA asks that the County delete "upon private property" and replace it with "the oil and Gas Facility provided that they have provided twenty-four (24) hours' notice to operator (except in the case of an emergency situation involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another), received the appropriate safety training from the operator, are outfitted in the appropriate personal protective equipment, and comply with all applicable federal, state, and local occupational safety laws while on the oil and Gas Facility."

Commented [Author41]: COGA requests that the County here add, "Any information collected from the inspection shall be provided to the operator and list the contact information of the inspecting party." The operator has a right to know what is alleged and to have a point of contact to discuss the inspector's observations. This will also facilitate a quicker return to compliance, should a legitimate issue be identified.

Commented [Author42]: Would the County please provide a fee schedule? All fees must be reasonable, necessary, and adopted in accordance with applicable Colorado law.

4. Penalties and Fines: The County has authority under C.R.S. § 29-20-104, as amended, to impose fines for leaks, spills, and emissions.¹ The following table summarizes the fine schedule for violations of these Development Standards and Regulations:

Degree of threatened or actual impact to public health, safety, welfare, the environment, or wildlife	Rule Classification			
	Class 1: Paperwork other ministerial regulations, a violation of which presents no direct risk of harm to public health, safety, welfare, and the environment.	Class 2: Regulations related at least indirectly to promoting the public health, safety, welfare, and the environment and wildlife resources; a violation of which presents a possibility of distinct, identifiable actual or threatened adverse impacts to those interests	Class 3: Regulations directly related to protecting public health, safety, welfare, the environment, and wildlife resources, a violation of which presents a significant probability of actual or threatened adverse impacts to those interests.	
	Major: Actual significant adverse impacts	\$5,000	\$10,000	\$15,000
	Moderate: Threat of significant adverse impacts, or moderate actual adverse impacts	\$1,500	\$5,000	\$10,000
	Minor: No actual adverse impact and little or no threat of adverse impacts	\$200	\$2,500	\$5,000

TABLE 4-11-B: Fine Structure

6. County Violations: In addition to the fines outlined above, the County has authority to cite violations under its control pursuant to Section 1-05-06 Criminal Remedies and Enforcement.
7. Legal Non-conforming: Adams County recognizes that there are oil and gas operations that were legally established prior to the effective date of these regulations that may or may not conform to these regulations. These operations may continue, provided the facility is not substantially modified.
8. Hearing, Enforcement and Appeal Procedures for Air Quality Violations

¹ Violations of Section 4-10-02-03-03(15) are capped at \$300/day per violation in accordance with the State Air Pollution Control Act, C.R.S. § 25-7-128.

Commented [Author43]: COGA is concerned that the County may seek to duplicate fines that the COGCC may also assess.

Specifically, in many instances, operators anticipate conditions of approval or best management practices required on its County OGF Permit to mirror requirements included on a COGCC Form 2A or Form 2. This could lead to an operator being assessed the same fine twice, once by the County and once by the state, for the exact same violation. This would lead to fines disproportionate to the conduct and raises concerns similar to double jeopardy where the State and County disagree about whether a violation did in fact occur and how the penalty policy should be assessed. COGA's members would appreciate more guidance on the County's proposed penalty schedule as well as how it will be implemented. The COGCC's penalty policy, for example, allows fines to be reduced where there are mitigating factors.

COGA also notes that this provision appears to be in conflict with Adams County's existing code. Specifically, Section 1-05-06 provides that any entity violating the Development Standards Regulations, of which these oil and gas regulations are a part, will be "punished by a fine in an amount not to exceed one hundred dollars (\$100) for each day of violation...." That section further provides for civil penalties in the range of \$500-\$1,000 dollars. This section does not contemplate the high figures quoted below. Thus, this section is in conflict with Adams County's own code.

- a. Hearings:
- i. Operators of OGFs may request a hearing in front of the BOCC to contest any alleged violations of the provisions contained in the Air Quality section of these Development Standards and Regulations or to contest permitting decisions involving the provisions contained in the Air Quality section of these Development Standards and Regulations. The BOCC shall grant request for a hearing within 15 days of receipt of such request.
 - ii. Hearing date ~~must will~~ be set within 90 days
 - iii. Notice ~~must will~~ be printed in a newspaper of general circulation in the area where the OGF is located.
 - iv. Director of ~~CEP Community and Economic Development~~ shall appear as a party in all hearings adjudicating decisions of the ~~CEP Community and Economic Development Department~~.
 - v. The Director of ~~CEP Community and Economic Development~~ shall have the same right to judicial review as other parties.
 - vi. All testimony ~~shall must~~ be under oath or affirmation.
 - vii. A full and complete record of proceedings and testimony presented shall be taken and filed.
 - viii. Information related to secret processes or methods of manufacture or production must be kept confidential. The person seeking to keep information confidential has the burden of proof. Except as provided in the Clean Air Act, information claimed to be related to secret processes or methods of manufacture or production which is emissions data may not be withheld as confidential; except such information may be submitted under a claim of confidentiality and the County shall not disclose such information unless required under the Clean Air Act
 - ix. ~~Any person who is affected and not adequately represented shall have an opportunity to be a party upon prior application to and approval by the BOCC in its discretion; such party shall have the right to be heard and cross-examine witnesses~~
 - x. BOCC shall make a decision within 30 days of completion of the hearing
 - xi. Burden of proof is on Director of ~~CEP Community and Economic Development~~ with respect to any hearings involving alleged violations.
 - xii. Where the Operator requests a hearing before the BOCC on a Permit involving provisions contained in the Air Quality section of these Development Standards and Regulations, the permit applicant bears burden of proof with respect to justification therefor and information, data, and analysis supportive thereof or required with respect to the application
- b. **Judicial Review:**
- i. Final orders or determinations of the Community and Economic Development Director or the BOCC are subject to judicial review

Commented [Author44]: Please explain the process for contesting non air quality alleged violations.

Commented [Author45]: How will "affected" status be determined?

- ii. Any party may move the court to remand the case to the ~~CEP~~ Director of Community and Economic Development or the BOCC in the interests of justice for purpose of adducing additional evidence and findings; such party shall show reasonable grounds for failure to adduce such evidence previously.
- iii. Any proceeding for judicial review shall be filed in the district court in which the OGF is located
- c. **Injunctions:**
 - i. If any person fails to comply with a final order of the ~~CEP~~ Director of Community and Economic Development or the BOCC that is not subject to a pending administrative or judicial review, or in the event of a violation of an emission control regulation, or term or condition of a permit, the ~~CEP~~ Director of Community and Economic Development or the BOCC may request the District Attorney for the district court in which the air pollution source is located to bring suit for an injunction
 - ii. In proceedings brought to enforce an order of the of the ~~CEP~~ Director of Community and Economic Development or BOCC, a temporary restraining order or preliminary injunction, if sought, shall not issue if there is probable cause to believe granting such order or injunction will cause serious harm to the affected person or any other person and; (1) that the alleged violation or activity will not continue or be repeated; or (2) the granting of such temporary restraining order or preliminary injunction would be without sufficient corresponding public benefit.
- d. **Coordination with the Air Quality Control Commission**
 - i. Pursuant to section 25-7-128(4), C.R.S., upon the issuance of any enforcement order or granting of any permit, the County shall transmit to the AQCC a copy of the order or permit. Pursuant to section 25-7-128(6), C.R.S., the County shall confer and coordinate its activities regarding efforts to control or abate air pollution consistent with that provision.

Commented [Author46]: A party may protest this motion, however. This potential should be codified in the Code for clarity.

4-11-02-03-03-05

RESIDENTIAL CONSTRUCTION STANDARDS

- 1. **Residential Construction Standards:** The Director of Community and Economic Development may impose any one (1) or more of the following standards on a specific site basis as a condition of subdivision approval and/or building permits on platted or unplatted land:
 - a. The oil and gas well location shall include a two-hundred-fifty (250) foot buffer in the form of an easement on the Final Plat. No structures may be constructed within the buffer area.
 - b. Access to the oil and gas well location shall be provided by a public street or recorded easement for private access.
 - c. The Final Plat shall include notice to prospective buyers of the location of the oil and gas well and associated easements.

- d. All oil and gas well flow lines and/or easements shall be graphically depicted on the Final Plat.
 - e. All surface and subsurface agreements shall be noted on the Final Plat by the recorded book and page number.
 - f. Pursuant to Section 4-06-01-02-01-12, where a new home and/or other permanent structure with plumbing is constructed within three hundred (300) feet of an existing oil and gas well, the property owner shall submit a signed waiver acknowledging the existence of the facility.
2. **Plugged and Abandoned, and Former Oil and Gas Production Sites:** This Section is enacted to protect and promote the health, safety, morals, convenience, order, prosperity, or general welfare of the present and future residents of the County. These regulations are based upon the land use authority of the County.
- a. Prior to submittal of a final plat or site-specific development plan, each plugged and abandoned well shall be located and surveyed. The plugged and abandoned well shall be permanently marked by a brass plaque set in concrete similar to a permanent benchmark to monument its existence and location. Such plaque shall contain all information required on a dry hole marker by the Colorado Oil and Gas Conservation Commission and the County.
 - b. As a condition of review of any final plat or site specific development plan which contains a plugged and abandoned well or former oil and gas production site or is within 200 feet of such well or site, the owner shall submit a location diagram of the location of the well.
 - c. On every final plat or site-specific development plan which contains a plugged and abandoned well, there shall be dedicated a well maintenance and workover setback depicted on the plat, the dimensions of which shall be not less than fifty feet in width and 100 feet in length. No structures shall be located within this setback. The plugged and abandoned well shall be located in the center of the setback. There shall be public access for ingress and egress to the setback of a width of not less than twenty feet.
 - d. Every final plat and site specific development plan which contains a plugged and abandoned well or a site specific development that includes a property that is less than 200 feet from a plugged and abandon well, shall include the following notation: "The owner shall disclose to prospective purchasers of lots within a radius of 200 feet of the plugged and abandoned well of (1) the location of the plugged and abandoned well, (2) the location of the maintenance and workover setback, and (3) the purpose for the well maintenance and workover setback."

- e. As a condition of building permit review, no dwelling shall be constructed within fifty (50) feet of a plugged and abandoned well.
- f. Prior to issuance of a grading permit within a development containing a known reserve pit site, the reserve pit site shall be tested for expansive soils. Reserve pits containing expansive soils in locations proposed for buildings shall be subject to the provisions of the International Building Code.
- g. No utility lines shall be installed within ten feet of any plugged and abandoned well.

4-11-02-03-06

COGCC AND COUNTY APPROVALS REQUIRED

Development of the OGF shall not commence unless and until applicant receives an approved OGF Permit, including any approved waiver(s), and receives all required approvals and permits from COGCC.

4-11-02-04 HEAVY INDUSTRY

4-11-02-04-01

GENERAL

1. *Outdoor Storage:* Materials may be stored outdoors, provided the storage area is consistent with the zone district allowances. All outdoor storage shall be screened in accordance with the Fencing, Walls and Screening section (See Section 4-11-01-03) of these standards and regulations.
2. *Garbage Storage:* Garbage area screening shall consist of a six (6) foot high minimum screen fence made of wood or masonry material. Fencing materials should be cleaned and maintained must be clean and maintained at all times to present an orderly appearance. No garbage storage area shall be located within twenty (20) feet of a public sidewalk
3. *Smoke and Odor Control:* Smoke and odor shall be controlled by filter, scrubbers, fans, or other means.
4. *Hours of Operation:* The hours of operation shall be from 7:00 a.m. to 7:00 p.m. for this use category when within two-hundred feet of a residentially used dwelling.

4-11-02-04-02

AUCTION YARDS, WITH LIVESTOCK

1. *Minimum Parcel Area:* one (1) acre
2. *Location:* All auction yards shall be located at least fifty (50) feet away from any on-property residence, fifty (50) feet from any right-of-way and five hundred (500) feet from any off-property residence.
3. *Operation in Accordance with County Tax Regulations:* The yard shall operate in accordance with the County Sales and Tax Department Regulations.

Commented [Author47]: This provision must be deleted as unreasonable and unnecessary. Under the COGCC Rules as modified by the "Mission Change Rulemaking," the local permit will often be approved before or concurrently with the state permit.

4-13 PARKING, LOADING, AND CURB CUT REQUIREMENTS

- 4-13-01

APPLICABILITY

Off-road parking and loading requirements in all new developments shall comply with the general access, circulation, and parking standards set forth in this Section.
- 4-13-02

GENERAL STANDARDS

4-13-02-01

SAFETY BARRICADES

A curb, rail, fence, guard, or other continuous safety barricade of a height or design sufficient to retain vehicles within the parking area shall be provided except for single-family residences and duplexes.

4-13-02-02

COMMERCIAL AND INDUSTRIAL PARKING LOT SCREENING/FENCING REQUIRED

For each boundary line of a commercial or industrial parking area abutting directly on a residential lot a wall, fence, or screen planting of a year-round nature shall be installed at least forty-eight (48) inches high to serve as a barrier for passage of persons and waste material, to conceal glare from headlights, and to reduce noise, fumes, and pavement heat.

4-13-02-03

PLANTINGS PROTECTED

Wheel or bumper guards shall be located so no part of any vehicle extends beyond the boundary lines of the parking area or comes in contact with walls, fences, plantings, or any other structures.

4-13-02-04

PARKING AREA LANDSCAPING REQUIREMENTS

Parking areas are required to meet standards for landscaping within the parking area and around the perimeter of the parking area. Landscaping requirements are found in Section [4-17](#) **Error! Reference source not found.** of these standards and regulations.

4-13-02-05

SURFACE OF PARKING AREA

Except for agricultural areas, off-road parking areas shall be surfaced and maintained with a portland or asphalt concrete surface, or other suitable surface as determined by the Director of Community and Economic Development. Drainage shall be subject to the approval of the Director of Community and Economic Development.
The surface of the parking area shall be maintained with the following minimum requirements:
 1. Potholes shall not exceed six (6) inches deep or six (6) inches wide.
 2. Cracks shall not exceed three (3) inches in width.

4-16 OFF-PREMISE ADVERTISING DEVICES (BILLBOARD)**4-16-01 PURPOSE**

The Purpose of this section is to advance the County's legitimate and substantial interest in limiting the number and area of off-premise advertising devices permitted to maintain the visual appearance of scenic corridors, avoid clutter, and protect the health, safety, and welfare of the citizens of Adams County by mitigating traffic distractions.

4-16-02 APPLICABILITY

Off-premise advertising devices are permitted with an approved Conditional Use Permit in the C-5 and industrial zone districts. All off-premise advertising devices shall meet the standards contained in this Section 4-16-02.

A Conditional Use Permit or a Major Amendment to an existing Conditional Use Permit or Planned Unit Development shall be required to display, erect, relocate, or alter any off-premise advertising device excluding indirect lighting traditionally used and attached to a sign, but not internally located.

Provided any Off-Premise Advertising Device complies with all standards in this Section and allows off-premise commercial messages, the Off-Premise Advertising Device shall also be permitted to allow non-commercial messages to the same extent.

In conjunction with these Development Standards and Regulations, the Colorado Outdoor Advertising Act, C.R.S. 43-1-401 et. seq, and the Colorado Rules and Regulations promulgated thereunder by the Colorado Department of Transportation shall be adhered to. Nothing in these Standards and Regulations shall be construed to allow advertising devices which are prohibited, or otherwise non-conforming with the Colorado Outdoor Advertising Act.

4-16-03 MAXIMUM NUMBER OF SIGNS

Only one (1) two-faced off-premise advertising device shall be permitted per lot.

4-16-04 MAXIMUM SIZE

No off-premise advertising device shall exceed three hundred (300) square feet per face.

4-16-05 MAXIMUM HEIGHT AND MINIMUM CLEARANCE

No off-premise advertising device shall exceed forty (40) feet in height. Height shall be determined as the distance from the grade of the right-of-way on which the sign fronts to the top of the sign including all projections. If located within one thousand

3. *Required Trees and Shrubs:* A minimum of one (1) large tree and two (2) shrubs, or two (2) ornamental trees and two (2) shrubs, shall be required for each increment of fifteen hundred (1,500) square feet in western Adams County and three thousand (3,000) square feet in eastern Adams County.
4. *Parking Lot Landscaping:* All parking lots which consist of thirty (30) spaces or more must be designed to include landscaped islands between rows. This landscaping shall be credited toward the total landscaped area required.
5. *Required Tree Mix:* The selection of trees shall be a mix of large deciduous (10% - 50%) and ornamental (10% - 50%). Evergreens shall be considered ornamental.
6. Minimum size requirements for trees and shrubs shall be:

<i>Plant Type</i>	<i>Maturity Height</i>	<i>Minimum Plant Size at Planting</i>
Ornamentals	Less than 20'	1" to 1-1/2"
Large Deciduous	Over 20'	2" to 2-1/2"
Evergreens (Sm.)	Less than 20'	5' tall
Evergreens (Lg.)	Over 20'	6' tall
Low Shrubs	1' to 3'	5 gallon
Upright Shrubs	3' to 10'	5 gallon

7. *Irrigation System Required:* A fully automatic irrigation system is required.

4-17-09-01-05 **DWELLING, MANUFACTURED HOME PARK**

A twenty (20) foot strip around the boundary must be landscaped to provide a visual screen. All open spaces and other unimproved areas must be suitably landscaped. All landscaping must be maintained and furnished with an automatic sprinkler system.

4-17-09-01-06 **DWELLING, MOBILE HOME PARK**

A landscaping plan shall be submitted for review and approval. The setbacks of the development and any other area not covered by mobile homes, driveways, ingress and egress, or other structures, shall be landscaped.

4-17-09-02 **COMMERCIAL USES**

4-17-09-02-01 **AUTOMOBILE SERVICE STATIONS**

1. *Screening:* Service stations shall be separated from abutting residential properties by a six (6) foot high masonry wall and a Bufferyard as required in Section 4-~~17~~46-06.

4-17-13 DEVELOPMENT ABUTTING ADAMS COUNTY TRAIL SYSTEM

Any new development abutting any portion of the designated Adams County Trail System, a public park, or limited access highway, shall be buffered from the trail, or park, using a Special Bufferyard (Type C), unless increased or decreased by the Director of Community and Economic Development.

4-17-14 REQUIRED LOT LANDSCAPING

In addition to the required bufferyards and bufferyard landscaping, the following site landscaping shall also be required:

4-17-15 ADMINISTRATIVE RELIEF

Administrative relief is provided to add flexibility in the application of the landscaping regulations in this Section 4-17-15 when a standard is inapplicable or inappropriate to a specific use or design proposal. However, the granting of administrative relief should not always mean a requirement is reduced without mitigation – be it landscaping combined with urban design elements (i.e. architectural elements within a parking lot that screen parking to provide shade pavement, sidewalk/tree lawn area, gathering space or plaza, or natural areas), concentrated/denser plant material within a reduced buffer yard width, or demonstrations of concepts that are equal to or superior in fulfilling the purpose of the landscaping requirements).

A written request for administrative relief shall be submitted to the Director of Community and Economic Development either before or in conjunction with the building permit review process. The written request shall:

Include a justification in terms of the findings necessary to grant administrative relief; and the written request shall close with a section for the Director of Community and Economic Development's use, which will include a block for the decision of approval/denial, the Director of Community and Economic Development's signature, and decision date.

The written request with decision shall be attached to the plan or retained in the applicable file, as appropriate. An example of this written request shall be available from the Director of Community and Economic Development.

The Director of Community and Economic Development must make all of the following findings in order to grant administrative relief:

The strict application of the regulations in question is unreasonable given the development proposal or the measures proposed by the applicant or the property has extraordinary or exceptional physical conditions or unique circumstances which

The 2,000' setback from the listed receptors and the 1,000' setback from the listed receptors are unconstitutional ultra vires regulations because they exceed the County's authority under the Local Government Land Use Control Enabling Act, to enact land use regulations pertaining to oil and gas that are "necessary and reasonable." § 29-20-104(1)(h), C.R.S. The setback is "hard" with respect to the 2,000' requirement unless there is an administrative waiver available from obtaining the consent of each resident/owner within the setback and no administrative waiver is possible for the 1,000' feet. COGA is unaware of any evidence suggesting that a 2k feet setback from residents and a 1,000' setback from groundwater wells, environmentally sensitive areas or designated parks and open space is necessary and reasonable in light of the fact that operators can and do employ Best Management Practices ("BMPs") that avoid, minimize, and mitigate potential adverse impacts from operations.

At the COGCC "Mission Change" Rulemaking, COGA and other industry parties put on voluminous, un-rebutted testimony and other evidence based on real, not-modeled, state and third-party gathered air quality data to show that benzene, for example, was benign at distances past 500 feet COGA encourages Adams County to look at the real data. **See Appendix A for list of studies.**

COGA notes that while it opposes the COGCC's "soft" setback of 2,000' feet from residences because of the lack of scientific basis for the threshold, it appreciates the COGCC's approach under COGCC Rule 604.b.(4) that allows the Commission to approve oil and gas locations within 2k feet even if there is no consent from the residents/property owners.

The COGCC also allows locations to be within 1,000 feet of GUDI and Type III Aquifer wells where the operator has secured a waiver from the water well operator. See COGCC Rule 411.a.(2)A.iii.

As such, Adams County has gone far beyond what the state has done.

While COGA acknowledges that Adams County can enact regulations more protective or stricter than the state's, those regulations still must be "reasonable and necessary." COGA submits that these setbacks with extremely limited or no waiver options are unnecessary and unreasonable because development can, has and does occur in a manner that protects public health, safety, welfare, and the environment, including wildlife resources.

As drafted--and particularly because the setback is measured from the property line or even merely the platted residential lot instead of the building unit--this setback may well present a de facto ban for most operators. As such, not only is this regulation unnecessary and unreasonable, it may also be unlawful on the additional bases that (1) the regulation acts as a ban and is therefore operationally preempted by state law, rendering it unconstitutional; and (2) the ban operates as a regulatory "taking" and is therefore unconstitutional.

Finally, COGA also reminds the County that given the way the setbacks are measured (that is, from the property line, not a residential building, and to the oil and gas facility, not a well head or production facility), the as-drafted setback will be as large or larger than the one Colorado voters, including 59% of Adams County residents, soundly defeated when they rejected Proposition 112 in 2018.

For the above and other reasons, COGA urges the County to reconsider these provisions and to include alternate paths to development within the setbacks as drafted.

COGA asks the County to close this sentence with "at the time of issuance of an Oil and Gas Facilities Permit or as otherwise agreed to by the County and Operator."

There must be some flexibility here depending upon the amount of the fee. In the past, there have been some discussions about payment of the road impact fee at the time of drilling of the wells or spread out over the course of several years depending on an operator's drilling schedule. Additionally, what is the Operator's recourse if it

pays the fee at the time of the permit issuance, but the development does not move forward for whatever reason? Local governments can only enact impact fees that recoup the cost of actual impacts. In the scenario where the permitted operations do not take place, there are no impacts and therefore no need for the fee.

Main document changes and comments

Page 145: Commented [Author1]

Author

4/26/2021 7:25:00 PM

This is an inaccurate statement of the law. While operators strive to obtain surface owner consent for development locations and surface owner consent is commonplace, the law does not require the surface owner to consent to the development. It is exactly for that reason that the doctrine of reasonable accommodation arose and has been statutorily codified at Section 34-60-127, C.R.S. The statute speaks to the operator's and surface owner's respective rights in the absence of a contractual agreement, such as a Surface Use Agreement whereby the surface owner consents to the development. Should the surface owner not consent, the operator may nonetheless develop from the surface, so long as the operator only uses that portion of the surface estate reasonably required to develop the minerals and is otherwise authorized to develop by state and local law.

Please refer to the COGCC's April 14, 2021 presentation entitled, "Staff Informational Presentation on Interaction of Surface Rights & Mineral Development" for more information explaining that surface owner consent is not required for mineral development.

Page 146: Commented [Author2]

Author

4/13/2021 11:59:00 AM

The 2,000' setback from the listed receptors and the 1,000' setback from the listed receptors are unconstitutional ultra vires regulations because they exceed the County's authority under the Local Government Land Use Control Enabling Act, to enact land use regulations pertaining to oil and gas that are "necessary and reasonable." § 29-20-104(1)(h), C.R.S. The setback is "hard" with respect to the 2,000' requirement unless there is an administrative waiver available from obtaining the consent of each resident/owner within the setback and no administrative waiver is possible for the 1,000' feet. COGA is unaware of any evidence suggesting that a 2k feet setback from residents and a 1,000' setback from groundwater wells, environmentally sensitive areas or designated parks and open space is necessary and reasonable in light of the fact that operators can and do employ Best Management Practices ("BMPs") that avoid, minimize, and mitigate potential adverse impacts from operations.

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unconstitutional; and (2) the ban operates as a regulatory "taking" and is therefore unconstitutional.

Finally, COGA also reminds the County that given the way the setbacks are measured (that is, from the property line, not a residential building, and to the oil and gas facility, not a well head or production facility), the as-drafted setback will be as large or larger than the one Colorado voters, including 59% of Adams County residents, soundly defeated when they rejected Proposition 112 in 2018.

For the above and other reasons, COGA urges the County to reconsider these provisions and to include alternate paths to development within the setbacks as drafted.

Page 146: Commented [Author3] Author 4/13/2021 12:00:00 PM

COGA suggests that a specific threshold/limit be outlined for the approval of an administrative waiver. E.G. – 45% of landowners and tenants must agree to achieve a written waiver.

Page 146: Commented [Author4] Author 4/26/2021 7:32:00 PM

To avoid inconsistency between this paragraph 5 and the following paragraph 6, COGA asks that the County specify in paragraph 5 that "All applicable County fees adopted by the County, including postage and inspection fees but excluding oil and gas road impact and maintenance fees, must be paid...." As the below paragraph notes, oil and gas road impact and maintenance fees are to be paid at the time of the issuance of the permit.

Page 146: Commented [Author5] Author 4/26/2021 7:33:00 PM

COGA asks the County to close this sentence with "at the time of issuance of an Oil and Gas Facilities Permit or as otherwise agreed to by the County and Operator."

There must be some flexibility here depending upon the amount of the fee. In the past, there have been some discussions about payment of the road impact fee at the time of drilling of the wells or spread out over the course of several years depending on an operator's drilling schedule. Additionally, what is the Operator's recourse if it pays the fee at the time of the permit issuance, but the development does not move forward for whatever reason? Local governments can only enact impact fees that recoup the cost of actual impacts. In the scenario where the permitted operations do not take place, there are no impacts and therefore no need for the fee.

Page 147: Commented [Author6] Author 4/14/2021 8:21:00 AM

COGA appreciates the attention to safety that the County has, however, current standards and practices already create a safe work environment for operators, contractors, other employees and the general public. Is there a reason so much process information is being requested?

Page 149: Commented [Author7] Author 4/14/2021 8:20:00 AM

Near-misses and incidents are subjective terms. Please further define or remove from language.

Doesn't the fact that the incident was "missed" mean that the safety processes worked appropriately?

Page 150: Commented [Author8] Author 4/14/2021 8:35:00 AM

If the county is unable to digest or understand all of the information it is requesting from operators internally, the county should be responsible for the cost to acquire consultants.

Page 150: Commented [Author9] Author 4/14/2021 8:36:00 AM

Does quarterly testing create safety issues?

Might there be unintended consequences with turning valves on and off so frequently for testing? This requirement may have an unintended consequence potentially negative to health and safety.

Page 151: Commented [Author10] Author 4/26/2021 7:39:00 PM

COGA interprets the intent of this regulation as stating that if a spill or release is reportable by COGCC regulations, it shall be reportable to AdCo. To ensure the clarity of this interpretation, COGA requests the modification of this highlighted phrase to read, "all spills or releases required to be reported by COGCC regulations"

Page 151: Commented [Author11] **Author** **4/26/2021 7:44:00 PM**

Operators can comply with the 48-hour obligation to inspect following a 1" precipitation event, but having an obligation to then make necessary repairs within 72 hours of the event (which may be only 24 hours after the inspection) is not always feasible and there may be additional impediments due to wet ground. There is no identified need for ensuring that repairs are made within 72 hours of the event. Further, certain weather events may make it impossible to try a repair immediately or the attempt to immediately repair could even cause further damage because the ground is too wet or other circumstances.

Page 155: Commented [Author12] **Author** **4/26/2021 7:47:00 PM**

Operators frequently have agreements in place with surface owners to purchase fresh water from landowners for oil and gas drilling. Requiring recycling could result in a breach of these agreements and/or result in substantial loss of income to surface owner.

Page 156: Commented [Author13] **Author** **4/26/2021 7:50:00 PM**

COGA believes this provision is unreasonable and unnecessary in light of the fact that the COGCC, the technical expert in this area and the sole entity with jurisdiction over downhole issues, already requires an offset well evaluation in COGCC Rule 308.b.7. That rule requires all Form 2s (Applications for Permits to Drill) to include an offset well evaluation in which the Operator must evaluate the construction and integrity of all offset wells within 1,500 feet (a little greater than ¼ of a mile) of the proposed wellbore and provide a plan to address offset wells within 1,500' feet that do not meet isolation requirements. Given this state requirement, there is no need for this regulation because the County's concerns will be addressed by the offset well plan required by the expert in well-integrity, the COGCC.

Page 158: Commented [Author14] **Author** **4/16/2021 12:17:00 PM**

COGA submits this requirement is unreasonable because it treats oil and gas operations disparately from other industrial activities. It is unreasonable to subject oil and gas operations to a more stringent noise limit than other activities within the same zone. The source of the noise is irrelevant; it is the decibel level that matters. Under this regulation, a use could be noisier than an oil and gas facility and yet perfectly legal. There is no justification for treating noise from oil and gas operations differently from noise from other uses. It is qualitatively identical.

Further, at what distance will the sound be measured for compliance?

Page 159: Commented [Author15] **Author** **4/26/2021 7:53:00 PM**

Please explain what is required by reference to a "qualified sound professional."

Page 160: Commented [Author16] **Author** **4/26/2021 7:54:00 PM**

With respect to utilizing completions and production systems without permanent on-site storage tanks for containment, COGA has strong objections to this requirement as it relates to both completion and production. First, while a significant portion of the completions activities utilize skid-mounted temporary frac tanks, operators do, depending on circumstances, seek to employ permanent equipment on-site during the completion process in order to reduce emissions. These permanent storage tanks (which are controlled by combustion devices) would be prohibited by this provision. Such prohibition could result in an increase in emissions during the completions process.

The requirement to use production systems without permanent on-site storage tanks appears to be an attempt to mandate tankless operations. Such a requirement is technologically and economically infeasible and could result in operators being unable to develop their mineral resources. While operators continue to look for opportunities to utilize tankless operations, there are significant impediments to doing so including the availability of oil pipelines that are capable of and willing to transport liquids with a high Reid vapor pressure and in the amount needed to remove tanks from the facility. Further, companies that cannot transport their own liquids face more significant costs in operating tankless facilities.

Page 161: Commented [Author17] **Author** **4/26/2021 7:54:00 PM**

COGA agrees that venting as a matter of course should be prohibited but maintains venting should be allowed where it is reasonably required for maintenance, gauging, or safety of personnel and equipment.

COGA notes that CDPHE's Air Quality Control Commission (AQCC) has some of the most extensive and comprehensive regulations against venting in the country. However, the AQCC recognizes that venting can be required during maintenance, gauging, and in circumstances for safety of personnel and equipment. These same circumstances for venting must be allowed here.

Page 164: Commented [Author18]	Author	4/16/2021 12:28:00 PM
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Any complaint filed should be verified by the LGD as justifiable (within a certain distance to the pad, etc.). Otherwise, complaints could be filed by any resident in any proximity to the oil and gas location at any time, causing undue burden and expense on the operator.

Page 164: Commented [Author19]	Author	4/26/2021 7:55:00 PM
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Operators have advised that the use of enclosed shale shakers is virtually never safe or feasible. COGA requests deletion of this provision.

Page 167: Commented [Author20]	Author	4/26/2021 7:56:00 PM
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Avoiding dust completely as this provision mandates is unreasonable as all activities can create some de minimis amount of dust.

COGA proposes rewording as follows: **"The operator will minimize creating dust and avoid dust suppression activities within 300 feet of the ordinary high-water mark of any water body, unless the dust suppressant is water."**

COGA's proposed minor revisions protect public health, safety, welfare, and then environment by reflecting a duty to minimize dust creation and avoid any dust suppression activities other than water within 300 feet of the high-water mark.

Page 168: Commented [Author21]	Author	4/16/2021 2:53:00 PM
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This could be unreasonable because it will extend the overall construction period or otherwise extend whatever phase the operation is in. Contractors/drill schedule, etc. and other operational concerns may make a pause in operations due to wind difficult and increase impacts over the long term because needing more trips to the location to execute the various phases of development.

Page 168: Commented [Author22]	Author	4/16/2021 12:33:00 PM
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COGA asks that the county not retroactively apply equipment color standards.

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Given the nature of drilling and completion activities, fencing may not be appropriate until moving into the production phase. Additionally, because sound walls are used during drilling and completion, fencing is generally not feasible at these stages.

COGA believes it appropriate to use all good and reasonable efforts to obtain authorization to install a fence; however, if an operator cannot do so or the surface owner demands unacceptable fees for erecting the fence as required by the County, then operators must have relief from this provision.

Page 168: Commented [Author24]	Author	4/16/2021 12:35:00 PM
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Are there different colors of sound walls?

Page 169: Commented [Author25]	Author	4/26/2021 8:00:00 PM
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COGA requests the County delete the requirement that "Operator is responsible for obtaining consent by surface owner allowing landscaping as well as automatic irrigation..." as well as the requirement that "All plant materials shall be kept in a healthy growing condition at all times." With respect to the first request and as noted elsewhere,

the County must provide relief if, after good faith negotiations and reasonable attempts, operators are unable to obtain land owner approval. By both mandating certain requirements and requiring surface owner approval for many of those requirements, the County is placing the surface owner in the position of potentially being able to withhold approval unless operators pay unreasonable amounts. The County's regulations should not be encouraging or mandating that outcome. Thus, there should be an alternate path where the surface owner does not consent to landscaping/irrigation and the surface owner's wishes should be respected.

As for the second request, COGA notes that operators cannot ensure that no plants will die. Natural occurrences such as hailstorms, sun exposure, and natural plant death make this requirement infeasible. While operators will maintain their landscaping and may be required to replant or weed out dead plants or things like that, the requirement as written is unreasonable.

Finally, please provide guidance as to what qualifies as a "recreation area"

Page 170: Commented [Author26]	Author	4/26/2021 8:01:00 PM
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COGA notes that a quarter of a year or even longer may pass from the date the permit is approved by the County until the date there is any activity on the well pad. Where there are no operations to report on and there is no change of plans to notify the community of, COGA believes that this requirement should not apply. There is no need to have a meeting to say, "nothing is happening and we are still on the schedule we provided earlier; we still anticipate starting construction on xxx date."

Page 170: Commented [Author27]	Author	4/16/2021 2:25:00 PM
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Will the cumulative impact plan required by the COGCC be sufficient for the county?

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COGA asks that the "not to exceed two hours" requirement be deleted as unreasonable. Such timing may be impossible, particularly during an ongoing storm events or for other reasons.

Page 171: Commented [Author29]	Author	4/26/2021 8:04:00 PM
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There should be flexibility for the operator to repair roads within 10 days in case there are issues outside of operators' control (such as obtaining the appropriate materials) that prevent repair within that timeframe. The County would not want an operator to use sub-standard materials in the repair to meet the aggressive timeline. COGA recommends adding "unless otherwise agreed to by the county and operator" to this 10-day provision.

Page 172: Commented [Author30]	Author	4/16/2021 2:31:00 PM
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Operator already pays traffic impact fee for impact to roads.

Page 172: Commented [Author31]	Author	4/16/2021 2:32:00 PM
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Operator already pays traffic impact fee for impact to roads.

Page 173: Commented [Author32]	Author	4/16/2021 2:34:00 PM
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Adams County has no authority over downhole.

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This prohibition must be deleted. The Commission maintains exclusive authority over one form of subsurface Class II underground injection control ("UIC") wells. C.R.S. § 34-60-106(9). That authority is delegated exclusively to the Commission from the U.S. Environmental Protection Agency. 42 U.S.C. § 300h-4; 40 C.F.R. § 147.300. This provision remains operationally preempted, even after SB 19-181.

Page 175: Commented [Author34]	Author	4/16/2021 2:41:00 PM
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What would be considered a credible complaint to require further testing?

Page 175: Commented [Author35]	Author	4/26/2021 8:09:00 PM
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This requirement should be limited to FINAL findings.

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COGA firmly believes that this requirement should be "to the extent practicable." COGA believes this language is necessary to promote surface owners' desires and because operators may have the ability in some instances to consolidate off-location flowlines or crude oil transfer lines or their rights-of-way, which should be encouraged, as recognized by the County immediately below. Existing rights-of-way may well be in areas containing existing or proposed buildings, etc.

Page 178: Commented [Author37]	Author	4/26/2021 8:13:00 PM
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COGA is concerned with this suite of provisions to the extent they suggest the county is purporting to regulate gathering lines as OGF facilities. Upstream operators typically do not operator gathering lines and gathering lines are not regulated by the COGCC.

Page 179: Commented [Author38]	Author	4/26/2021 8:14:00 PM
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This type of insurance can be very difficult or impossible for operators to obtain. To be sure, financial assurance is of utmost importance but flexibility in how it is demonstrated is needed.

Page 179: Commented [Author39]	Author	4/27/2021 4:48:00 PM
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COGA requests that the County add after the word failure "**not involving a force majeure event.**" Without this change, this provision is unreasonable.

Page 180: Commented [Author40]	Author	4/26/2021 8:15:00 PM
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This provision is overly broad and could have safety consequences. COGA asks that the County delete "upon private property" and replace it with "**the oil and Gas Facility provided that they have provided twenty-four (24) hours' notice to operator (except in the case of an emergency situation involving an immediate risk to public health, safety, welfare, the environment, or wildlife, or damage to the property of another), received the appropriate safety training from the operator, are outfitted in the appropriate personal protective equipment, and comply with all applicable federal, state, and local occupational safety laws while on the oil and Gas Facility.**"

Page 180: Commented [Author41]	Author	4/26/2021 8:16:00 PM
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COGA requests that the County here add, "**Any information collected from the inspection shall be provided to the operator and list the contact information of the inspecting party.**" The operator has a right to know what is alleged and to have a point of contact to discuss the inspector's observations. This will also facilitate a quicker return to compliance, should a legitimate issue be identified.

Page 180: Commented [Author42]	Author	4/26/2021 8:16:00 PM
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Would the County please provide a fee schedule? All fees must be reasonable, necessary, and adopted in accordance with applicable Colorado law.

Page 181: Commented [Author43]	Author	4/26/2021 8:17:00 PM
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COGA is concerned that the County may seek to duplicate fines that the COGCC may also assess.

Specifically, in many instances, operators anticipate conditions of approval or best management practices required on its County OGF Permit to mirror requirements included on a COGCC Form 2A or Form 2. This could lead to an operator being assessed the same fine twice, once by the County and once by the state, for the exact same violation. This would lead to fines disproportionate to the conduct and raises concerns similar to double jeopardy where the State and County disagree about whether a violation did in fact occur and how the penalty policy should be assessed. COGA's members would appreciate more guidance on the County's proposed penalty schedule as well as how it will be implemented. The COGCC's penalty policy, for example, allows fines to be reduced where there are mitigating factors.

COGA also notes that this provision appears to be in conflict with Adams County's existing code. Specifically, Section 1-05-06 provides that any entity violating the Development Standards Regulations, of which these oil and

gas regulations are a part, will be "punished by a fine in an amount not to exceed one hundred dollars (\$100) for each day of violation...." That section further provides for civil penalties in the range of \$500-\$1,000 dollars. This section does not contemplate the high figures quoted below. Thus, this section is in conflict with Adams County's own code.

Page 182: Commented [Author44]	Author	4/26/2021 8:18:00 PM
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Please explain the process for contesting non air quality alleged violations.

Page 182: Commented [Author45]	Author	4/26/2021 8:18:00 PM
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How will "affected" status be determined?

Page 183: Commented [Author46]	Author	4/26/2021 8:19:00 PM
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A party may protest this motion, however. This potential should be codified in the Code for clarity.

Page 185: Commented [Author47]	Author	4/26/2021 8:20:00 PM
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This provision must be deleted as unreasonable and unnecessary. Under the COGCC Rules as modified by the "Mission Change Rulemaking," the local permit will often be approved before or concurrently with the state permit.

Header and footer changes

Text Box changes

Header and footer text box changes

Footnote changes

Endnote changes

Oil and Gas Facility Permit (OGF) - Application Checklist

Application submittals must include all documents on this checklist. Please use the reference guide included in this packet for more information on each submittal item.

All applications shall be submitted electronically to epermitcenter@adcogov.org. If a submittal is too larger to email as an attachment, the application may be sent as an unlocked OneDrive link. Alternatively, the application may be delivered on a flash drive to the One-Stop Customer Service Center. Once a complete application has been received, fees will be invoiced and payable online at: <https://permits.adcogov.org/CitizenAccess/>.

- ☐ 1. Conceptual Review Summary and Alternative Site Analysis
- ☐ 2. Neighborhood meeting summary
- ☐ 3. Development Application
 - ☐ Operations Plan
 - ☐ Emergency Preparedness and Response Plan
 - ☐ Transportation Plan
 - ☐ Noise Mitigation Plan
 - ☐ Lighting Mitigation Plan
 - ☐ Odor Mitigation Plan
 - ☐ Dust Mitigation Plan
 - ☐ Visual Aesthetics Plan
 - ☐ Community Outreach Plan



- ☐ Cumulative Impacts Plan
 - ☐ Water and Wildlife Protection Plan
 - ☐ Engineering Documents
 - ☐ Surface Owner Documentation
 - ☐ Other Documentation as determined by the Director of Community and Economic Development Department
 - ☐ Signed Oil and Gas Worker Safety Compliance Statement
- ☐ 4. Application fees (see table below)

Application Fees	Amount	Due
Oil and Gas Facility Permit	\$2,600	After complete application
Tri-County Health	\$245	After complete application

Appendix A:

Oil and Gas Facility Permit (OGF) – Guide to Development Application Submittal

All development application submittals shall comprise of one (1) electronic copy (emailed or delivered on a USB). **Application submittals that do not conform to these guidelines will not be accepted.**

General Format:

- All applications shall be submitted electronically or delivered to the One-Stop Customer Service Center on a flash drive.
- No plans or information within shall contain copyright restrictions or public use restrictions.



Operations Plan:

Cover Sheet:

- Title block with the reference to an Oil and Gas Facility Permit, project name, and location by section, township, and range.
- Legal description of the area, date of the drawing, existing zoning of the site, a sheet key, a vicinity map with north arrow (scale of 1" = 2,000' preferred) with an emphasis on the major roadway network within two (2) miles of the proposal.
- All applicable County notes, an approval signature block and a block to insert the COGCC Permit number when approved.

Impact Area Map:

- Map that shows the proposed location of the Oil and Gas Facility, locations of all producing oil and gas wells and other oil and gas operations within the one-mile (1) impact area; locations of all abandoned and shut-in wells within one quarter mile (1/4) radius of the projected track of the borehole; locations of all permitted registered water wells within one-mile (1) of the proposed Oil and Gas Operation; existing improvements within 1,500 feet of the location on which the operation is proposed, and all existing and proposed roads within the one-mile impact area.

GIS Information:

- The applicant shall submit all geographic information systems (GIS) data for the proposed facility in a format and scale acceptable to the County.
- The GIS data shall include, at a minimum, the outline of the edge of maximum disturbance for the proposed site, the access road, and the location of any proposed sound walls, if applicable.

Drilling Operations Plan:

- Site plan of drilling operations with drilling equipment with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum acceptable to the County.
- The applicant shall verify current information regarding what datum is acceptable to the County, prior to submitting the application for the Oil and Gas Facility Permit. The layout of the drilling equipment may be shown as a typical plan, if the County deems it appropriate for the extent of development of the proposed Oil and Gas Facility.

Production Plan:

- Site plan of production operations with production equipment such as tanks and compressor stations with existing and proposed finished-grade topography at two-foot (2') contours or less tied to a datum acceptable to the County.
- Identify tentative drilling and completion schedules. A seed mix must be provided for reseeded the well pad. Equipment layout may be a typical plan appropriate to the degree of development for the Oil and Gas Facility; if the County deems it appropriate for the extent of

development of the proposed Oil and Gas Facility.

Signage Plan/Sign Detail:

- A dimensioned Signage Plan or Sign Detail shall be included describing and illustrating the appearance, size, location, type, color, material, and illumination of all signs.
- Directional signs for emergency responders and inspectors, along with a 24-hour, 7-days per week contact information to deal with all complaints.

Final Plan:

- Once the review process is complete and staff has determined that all outstanding issues have been resolved, staff will request a final copy of the Oil and Gas Operations Plan. The final Oil and Gas Operations Plan shall contain the information listed above unless otherwise specified by the Community and Economic Development Department.

Emergency Preparedness and Response Plan:

- In accordance with the Emergency Preparedness and Response requirements in Section 4-11-02-03-03(9).
- Emergency Service Providers: The applicant must provide a commitment to serve (“will serve”) letter from the authority having jurisdiction for providing emergency services (fire protection and emergency medical services) for that facility, or, where no authority has jurisdiction, from an emergency services provider with the ability to provide such emergency services.

Transportation Plan:

- Plan must be designed and implemented to ensure public safety and maintain quality of life for other users of the County transportation system, adjacent residents, and affected property owners.
- Traffic Impact Study must satisfy the requirements of Adams County Development Standards and Regulations, Chapter 8, and provide:

- Project lifetime truck trip estimates during each phase of operations, both cumulatively and along each proposed access route.
- Map(s) and discussion of each proposed access route, any road weight restrictions, local government jurisdiction(s), access and egress of location, necessary turning radii for equipment, trucks or emergency vehicles, and plans for staging and waiting of vehicles during operations.
- Plan for use of temporary and permanent pipelines, if applicable, for transporting products on or off location (oil, natural gas, produced water, etc.).

Noise Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Ambient Baseline Noise Study:

- Encompass at least five days, one of those days being a weekend.
- Shall measure noise for A-weighted and C-weighted sound pressure levels.

Noise modeling study/noise impact assessment:

- Shall estimate and predict environmental noise levels and impacts during each phase of operations.
- Shall present noise estimates for A-weighted and C-weighted sound pressure levels.
- Shall present noise estimates at the proposed facility and cumulatively with ambient background noise levels.
- Shall include a low frequency (C-weighted) noise impact analysis and identification of available control measures for low frequency sound.
- Topographic considerations of noise and noise propagation at the proposed site.
- Plan for continuous noise monitoring and measurements at the proposed facility, if applicable, including the placement of equipment and data sharing and reporting.



- Any applicant-proposed mitigation measures to reduce impacts associated with noise.

Lighting Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Methods to ensure adequate lighting for onsite safety
- Facility lighting type, anticipated location, mounting, height, and orientation during each phase of operations.
- Photometric study indicating impact on surrounding properties and measure of lumens and lumens per square foot of the facility emitted during each phase of operations.
- Cut sheets for all proposed fixtures.
- Any applicant-proposed mitigation measures to reduce impacts associated with light.

Odor Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Type(s) of fluid to be utilized during each phase of drilling.
- All potential odor sources during each phase of operations.
- Planned methods for responding to odor-related complaints.
- Any applicant-proposed mitigation measures to reduce impacts associated with odor.

Dust Mitigation Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- The amount of total area disturbed for construction, proposed access road coverage type (dirt, gravel, pavement, etc.), and soil type.
- Predominant wind patterns including wind speeds and direction for each scheduled phase of earthmoving operations.

- Any applicant-proposed mitigation measures to reduce impacts associated with dust.

Visual Aesthetics Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Visual Mitigation Plan:

- Listing of all operations' equipment, including required sound walls, equipment heights, proposed colors for all equipment, and whether equipment is observable from any public highway, roadway, or trail.
- Renderings of the proposed facility and the surrounding areas during drilling and production operations.
- Methods for site access and security including proposed fencing, barriers, and screening during each phase of operations.

Landscaping and Berming Plan:

- Proposed landscaping and berming type, height of mature landscaping, location of berming placement, and maintenance and irrigation requirements for planted vegetation throughout the duration of operations, including production.
- Any applicant-proposed mitigation measures to reduce impacts associated with visual aesthetics.

Community Outreach Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Identification of any Disproportionately Impacted Communities within one-half mile (1/2), or greater as determined by the Director of Community and Economic Development, of the proposed site with plans for engagement and a description of measures taken to directly mitigate impacts to those communities.
- Plans for regularly updating residents within one-half mile (1/2), or greater of the proposed site (public meetings, access to information, website creating, meeting notifications, etc.).

- Plans for providing written or digital materials to residents with one-half mile (1/2), or greater including materials in languages other than English.

Cumulative Impacts Plan:


Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

- Evaluation and discussion of the cumulative impacts from all reasonably foreseeable development associated with oil and gas activity and other heavy industrial operations within one mile (1) of the proposed site and all incremental increases to the following impacts, at a minimum:
 - **Air Quality:** a qualitative and quantitative evaluation, discussion, and emission estimate for air pollutants during all pre-production operations and for the first year of production from the proposed site.
 - **Public health and welfare:** a qualitative or quantitative evaluation of short-term and long-term cumulative impacts to noise, light, odor, and dust.

Quantitative evaluation of total hazardous air pollutant emissions estimated during pre-production operations and for the first year of production from the proposed site.
 - **Traffic:** a quantitative and qualitative evaluation and discussion of short-term and long-term cumulative impacts associated with traffic to and from the proposed site.
 - **Water resources:** an identification of all potential contaminant migration pathways including distances from the proposed site to the nearest downstream riparian corridors, wetlands, surface waters, and environmentally sensitive areas.

Qualitative evaluation of potential impacts to public water systems and intakes.

Qualitative evaluation of anticipated volume of surface and groundwater to be

used and plans for the reduction, reuse, and recycling of water for all operations. 

- **Wildlife, Ecosystems, and Soil:** the identification and listing of all high priority habitats and total acreage of surface disturbance within those habitats.

A quantitative evaluation and measurement of total topsoil disturbance necessary for the proposed site and qualitative evaluation of impacts on ecosystems and vegetative communities as a result of surface disturbance from the proposed site.


Plans for short-term and long-term revegetation of disturbed areas. Plans and volume estimates for bringing in inert fill from offsite.

- Plans for addressing, mitigating, and offsetting cumulative impacts, including specific measures proposed by the applicant.

Water and Wildlife Protection Plan:

Demonstrate compliance with Adams County Development Standards and Regulations Chapter 4 and include, at a minimum:

Water Supply:

- Proof of adequate water supply. Operator shall identify a water resource lawfully available for industrial use, including oil and gas development, to be utilized by Operator and its suppliers. 

Water Quality Plan:

- Details on water quality testing, prevention of illicit or inadvertent discharges, stormwater discharge management, containment of pollutants, and spill notification and response as required by the County and federal and state agencies.

Natural Resources Evaluation:

- Identification of the location, size, and status of any wetlands, Colorado Parks and Wildlife classified high priority habitats, other wildlife habitats (non-eagle habitats/nests, prairie dog burrows, etc.), floodplains, surface waters, tributaries, intermittent and ephemeral

streams, drainage canals, and groundwater wells.

- Plans for consultation and engagement with Colorado Parks and Wildlife.
- Any applicant-proposed mitigation measures to reduce impacts to water resources and wildlife.

Engineering Documents:

The following technical engineering documents are required by the Community and Economic Development unless otherwise waived:

Construction Plans:

- If applicable, plans for the proposed Oil and Gas Operation's public improvements including road plan and profile sheets, storm drainage improvement plans and other public improvements, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Pavement Design Report:

- If applicable, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 7).

Grading Erosion and Sediment Control:

- If applicable, as defined in the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Drainage study/technical drainage letter/plan:

- If applicable, prepared in accordance with the latest version of the Adams County Development Standards and Regulations (Chapter 9).

Floodplain Use Permit:

- The applicant must obtain a Floodplain Use Permit, in accordance with the latest version of the Adams County Development Standards and Regulations, if the proposed Oil and Gas construction disturbance or operation encroaches into the 100-year floodplain, or the access is crossing a major drainage way, as defined by the latest version of the Adams

County Development Standards and Regulations (Chapter 9).

Natural Resource Conservation Overlay (NRCO):

- If the Oil and Gas Facility is located in the NRCO, a Resource Review will be required.

Surface Owner Documentation:

- Documentation as to whether the surface owner and others with interest in the property have authorized the proposed OGF.

Additional documentation as determined by the Director of Community and Economic Development Department:

- Community and Economic Development may require additional information to process an OGF Permit application. In addition to the items required on the check list, the Director of Community and Economic Development may require additional information deemed necessary to evaluate particular applications.



June 9, 2021

VIA EMAIL – gdean@adcogov.org

Adams County Government Center – Community & Economic Development Department,
ATTN: Gregory Dean
4430 S. Adams County Pkwy.
Brighton, CO 80601

*RE: Great Western Operating Company, LLC
Comments to Adams County May 2021 Proposed Oil & Gas Facility Regulations*

Dear Mr. Dean,

Great Western Operating Company, LLC (“Great Western”) appreciates the opportunity to provide comments to the Adams County May 2021 Proposed Oil & Gas Facility Regulations (“Propose Regulations”) and hereby submits this letter and the corresponding attachment for the County’s consideration.

Great Western is dedicated to providing responsibly-produced oil and natural gas to the citizens of Adams County, the State of Colorado and our Nation. We are passionately committed to the environment, our community, our employees, our service providers, and our shareholders. Our core values of stewardship, teamwork, excellence, people, growth and resilience help us uphold these commitments and stay on course toward meeting our community and development goals. Great Western has dedicated itself to serving the community of Adams County by coordinating over 400 hours annually in volunteer projects in addition to our financial support of the communities where we live and operate.

With over 70,000 acres of leasehold interests in Colorado and 138 drilling permits in Adams County, Great Western is the primary drilling operator in Adams County and we are committed to partnering with the County to ensure that the changes made to the County’s oil and gas regulations are meaningful. We have worked hard to separate ourselves from other operators when developing our leasehold assets in Adams County, and it is our hope that the County Staff and Commissioners can view Great Western as a partner in this process, instead of a foe. Great Western’s partnership and collaboration with the County on oil and gas development can be illustrated by tangible, positively focused actions that specifically proactively address topics raised in the proposed rule revisions – voluntarily providing aggregate air emission data from the Ivey to the County for review, providing continuous air monitoring on its sites long before the new Colorado Oil and Gas Conservation Commission rules were adopted, developing a microsite on Great Western’s homepage to transparently illustrate each phase in the development process for the Ivey Pad; and, with all new Adams County development where technically feasible, Great Western is significantly redesigning our production facilities to substantially reduce the emissions and footprint by eliminating the single largest source of emissions for the life of the

facility, the atmospheric condensate storage tanks. Great Western has demonstrated our commitment to finding noise mitigation solutions and implemented a number of sound mitigation best management practices and design enhancements at the Ivey production facility that included higher attenuating engine exhaust silencers, equipment electrification including compressors, and tank lite facility design which meaningfully reduces the total equipment count from the facility. Great Western employs innovative solutions to reduce our impact on communities during drilling through the use of twin rigs to substantially shorten the time on location during drilling for the benefit of the nearby residence. In addition, Great Western routinely invites over 200 residents and citizens to open houses and town halls to learn more about Great Western's development.

Since the beginning of the County's regulatory review process, Great Western has listened intently to the Adams County Staff and Commissioners as they have engaged in numerous hours of study sessions, presentations and discussions regarding what the Proposed Regulations should include and how and when such regulations should be applied to oil and gas operators. Our team has absorbed the points made and has taken to heart the concerns of the Commissioners as well as the citizen commentors. What Great Western has come to realize is this: there are extraordinary people working to modify Proposed Regulations in a manner that is most protective of public health, safety, welfare and environment, and wildlife resources, and Great Western supports this effort, yet in addition to the hard work and effort happening to protect building unit and surface owners, the County is missing an opportunity to fulfill its obligation of ensuring that the real property rights' of its citizen and voting constituent mineral and leasehold interest owners are not detrimentally impacted by the Proposed Regulations.

How can the County fulfill its obligation to protect *all* real property right owners within Adams County? This is simple – enact regulations that are reasonable and necessary as required by Senate Bill 19-181 and C.R.S. § 29-20-104(1)(h). The County's regulations cannot continue to be based by the mandate of only a handful of building unit owner citizens that do not live near oil and gas development and that do not speak for the larger community. The County must ensure that it is reviewing, crafting and adopting regulations, in a reasonable and necessary manner, that regulate the surface impacts only. C.R.S. § 29-20-104(1)(h). The County has no authority to regulate oil and gas operations in such a manner that interferes, inhibits or otherwise affects subsurface oil and gas activities, or to adopt regulations which ultimately prohibit development of County constituents' real property mineral interests. Specifically, the following sections of the Proposed Regulations will have an immediate and detrimental impact on the mineral rights owners in the County:

- 4-11-02-03-03(4): Setbacks
 - Oil and Gas Facilities shall be at least 2,000 feet from the *property line* of any existing residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, and environmentally sensitive areas, and designated parks and open spaces
 - Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as

- defined by Colorado Water Quality Control Commission and COGCC rules with no waiver allowance.
- An administrative waiver, may be obtained from the setback requirements if the Operator receives a written waiver from each primary resident and property owner located within the setback; however, there is no guarantee of approval of the Oil and Gas Facility. If one renter decides that they will not provide a waiver, then there is no permit for development which immediately impacts and prohibits the development of the County's mineral right owners.
 - A waiver may be granted by the Board of County Commissioners after a public hearing if the Oil and Gas Facility is deemed to provide substantially equivalent protections to public health, safety, welfare, the environment, and wildlife resources that are equal to or more effective to satisfy the criteria of approval; however, there is no guarantee of approval of the Oil and Gas Facility. If the BOCC decides that they will not grant a waiver, then there is no permit for development which immediately impacts and prohibits the development of the County's mineral right owners.
 - 02-02-14-05(1)(a): Alternative Site Analysis
 - Requires justification for at least three potential sites and a description of whether "mineral extraction is possible and reasonable from those sites", yet the criteria for reviewing the three sites does not include any review of loss or prohibition of mineral interest development
 - 02-02-14-05(2): Neighborhood Meetings
 - Does not include invitations to mineral interest owners potentially impacted by the surface development
 - 02-02-14-05(7): Notice
 - Does not require notice to mineral interest owners potentially impacted by the surface development
 - 02-02-14-05(10)(a): Term
 - Limits Oil and Gas Facility permit to three years, but prohibits extension of term if well is not completed or has not commenced production operations and new permit is required; provides additional, unnecessary delays on development of mineral interests
 - 4-11-02-03-03-03(14): Noise "Pseudo-Setbacks"
 - For Oil and Gas Facilities located within 2,000 feet of a land use or zoning designation boundary the Operator shall be required to comply with the lower maximum permissible noise level as defined in COGCC regulations for noise of that corresponding land use or zone district
 - For locations within 2,000 feet of a land use or zoning designation boundary, noise must be attenuated to the maximum permissible noise levels for the corresponding land use or zone district, as specified in COGCC rules, at the land use designation boundary as determined by the Director of Community and Economic Development
 - There is no off-ramp or express waiver allowance for the noise requirements in the Proposed Regulations. An operator is required to meet the noise levels or it



cannot obtain its Oil and Gas Facility Permit. This discriminatory prohibition on the oil and gas operators due to the adjacent zoning designations also adds another layer of immediate prohibition on the development of the underlying real property mineral interests.

As drafted, there are several ill-fated provisions of the Proposed Regulations that have an immediate impact on the County's mineral and leasehold interest constituents and Great Western would implore the County to look beyond the curtain of the naysayers who are trying to stop oil and gas development as a whole, and include these leasehold and mineral interest owner voices in your consideration of the Proposed Regulations. If the County fails to listen to their mineral owner constituents in this process, then the process has failed. The public process is to not just provide a platform for the handful of activists who have made it their life's work to stop oil and gas development in this State, but to provide an avenue for *all* voting citizens and constituents to have their voices heard by the very Commissioners who secured their vote to protect their rights in the first place.

In addition to Great Western's concerns about the County's lack of consideration of the real property mineral interest owner rights, we have additional concerns with the Proposed Regulations as they relate to our ability to operate in the County and how the Proposed Regulations interfere with our own obligations to our lessors. Great Western's development plan for the County includes obtaining a handful of new Oil and Gas Facility permits, but more predominantly, returning to existing, developed locations to continue its development with less impact. As drafted, many of the provisions could serve to ultimately prohibit Great Western from returning to those existing, developed locations which, in our view, undermines the very purpose of Senate Bill 19-181 and the County's own mandate to enact reasonable and necessary regulations. Also, as drafted, the County's Proposed Regulations have completely ignored the possibility of an operator utilizing the highly beneficial COGCC Rule 314 Comprehensive Area Plan that would otherwise allow for the engagement of the County early on the development process on a holistic and comprehensive basis, and ultimately provide the County with what it seems to actually want – thoughtful planning, with phased development, utilizing best management practices and mitigation measures that it has derived through a cumulative evaluation process. This is the purpose of the Rule 314 Comprehensive Area Plan and, yet the County is missing an opportunity to encourage such comprehensive development by including severely limiting factors on oil and gas development in the Proposed Regulations.

In an effort to provide as much clarity as possible to the County, we have created the attached spreadsheet that addresses each Proposed Regulation, notes the corresponding COGCC regulation, and then describes Great Western's concerns and proposed changes to the draft regulations. While a redline of the Proposed Regulations may be helpful in some instances, we have found this format of comment and explanation is more helpful to the members of the public reviewing our concerns, as well as the County Staff.

Upon review of this letter and attached spreadsheet, Great Western would welcome a conversation with Staff to address our specific concerns and to continue the open dialogue that

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720.595.2095
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we have with the County. As stated above, Great Western views itself as a partner with the County as well as a contributing member to the County's success, and encourages the Staff and the Commissioners to continue looking to Great Western as a resourceful partner in this process. Thank you.

Sincerely,

A handwritten signature in blue ink, which appears to read "S Fakharzadeh". The signature is fluid and cursive.

Susan Fakharzadeh
Senior Vice President, Sustainability & Government
Affairs

Enclosure: GWOC Comment Proposed Regulation Spreadsheet

Proposed Amended Adams County Regulation

2-02-14-05.1 Conceptual Review. Description of potential sites. Applicant must submit descriptions of at least three (3) potential sites for the OGF that were considered by applicant. All potential site descriptions shall include Geographic Information System (GIS) data. The GIS data shall include, at a minimum, the outline edge of maximum disturbance and the access road for each proposed site. The description shall include an explanation of site locations considered, whether mineral extraction is possible and reasonable from those sites, the off-site impacts associated with those sites, and why a particular site is proposed, if any.

2-02-14-05.1 Conceptual Review. Potential sites shall be: (1) a minimum of 500 feet away from each other but can be located on the same parcel; and (2). uniquely different from one another as determined by the Director of Community and Economic Development.

2-02-14-05.2 Neighborhood Meeting. Where Disproportionately Impacted Communities are located within **one mile** of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns based on primary and secondary languages, culturally sensitive methods of communication. and other socio-economic factors that impact public availability and participation in neighborhood meetings. If any additional neighborhood meetings are required, those meetings shall comply with the requirements of Section 4-11-02-03-03-03.

2-02-14-05.7 Notice 9.7. Notice: Applicable, except notice shall be sent by the applicant to all property owners and current residents within **one (1) mile** of the proposed parcel where an application for an Oil and Gas Facility has been filed with the County, at a minimum, or greater, as determined by the Director of Community and Economic Development.

2-02-14-05.10.a. Term: The approving authority shall specify the term of the OGF Permit as three (3) years. If, at the expiration of the three (3) year period, a well is not completed or has not commenced production operations as defined by the COGCC Rules and Regulations, the approval of that well shall lapse. For any wells for which approval has lapsed, the applicant shall be required to apply for a new OGF Permit in accordance with these regulations.

4-11-02-03-03-03. 2. A sign with the 24-hour, 7-days per week contact information shall be placed close to the intersection of the access road and the right of way so that it is legible from the public right of way. Signage shall conform to COGCC Regulations for signage and posting.

4-11-02-03-03. 4. Setbacks: Oil and Gas Facilities shall be at least 2,000 feet from the property line of any existing residences or platted residential lots, schools or future school facilities, state licensed daycares, high occupancy building units, and environmentally sensitive areas, and designated parks and open spaces.

4-11-02-03-03. 4. Setbacks: Oil and Gas Facilities shall be at least 1,000 feet from groundwater under the direct influence of surface water (GUDI) wells and Type III Aquifer wells as defined by Colorado Water Quality Control Commission and COGCC rules.

4-11-02-03-03. 4. Setbacks will be measured from the edge of maximum disturbance which includes the rough grading footprint of the Oil and Gas Facility, including the final landscaping boundary. The measurement of setbacks will not include

4-11-02-03-03. 4. Setbacks: an administrative waiver may be obtained from the setback requirements if the Operator receives a written waiver from each primary resident and property owner located within the setback. Staff will evaluate the granting of an Administrative Waiver from setback requirements based on criteria including, but not limited to: the number of receptors, location, nature, and size of the facility. No Administrative Waivers will be issued from setback requirements for school facilities, future school facilities, state licensed daycares, groundwater wells, environmentally sensitive areas or designated parks and open spaces.

Oil and Gas Facilities that do not meet the above setback requirements: A waiver may be granted by the Board of County Commissioners after a public hearing if the Oil and Gas Facility is deemed to provide substantially equivalent protections to public health, safety, welfare, the environment, and wildlife resources that are equal to or more effective to satisfy the criteria of approval. The criteria for determining substantially equivalent protections may include, but are not limited to:

- i. The location of receptors and proximity of those receptors;
- ii. The location, nature, and size of the facility;
- iii. The duration and intensity of all phases of operation at the Oil and Gas Facility;
- iv. The extent to which the Oil and Gas Facility design, any planned best management practices, best available control measures and technologies, and conditions of approval avoid, minimize, and mitigate adverse impacts;

4-11-02-03-03. 7.c.i. Incidents. As soon as practicable, but no more than three (3) days of any reportable safety event or emergency situation as defined by the COGCC, Operator shall submit a report to the County including the following, to the extent available: impacts, if any, to public health, safety, welfare, the environment or wildlife resources.

If public health, safety, welfare, the environment or wildlife resources are threatened, the Operator responsible for the operation causing the threat shall immediately notify the County's Local Government Designee ("LGD") electronically and orally.

4-11-02-03-03. 7.c.iv. The Operator shall notify Notification to the County's LGD within 24 hours of discovery of all spills of one barrel or more that leaves the facility or released outside of berms or secondary containment, all spills of any material or volume on permeable ground at the facility that has a reportable spill quantity under any law, all spills or releases as required by COGCC Regulations, and copies of any self-reporting submissions that operator provides to the COGCC.

4-11-02-03-03. 7.c.vi The Operator may be required to obtain additional permits from the County, such as an inert fill or access permits, for site remediation as defined in Chapter 4 of the Adams County Development Standards and Regulations

4-11-02-03-03. 8 Berms or other secondary containment devices around crude oil, condensate, and produced water storage tanks enclosing an area sufficient to contain and provide secondary containment for **150%** of the largest single tank

4-11-02-03-03. 13 Notice of well plugging and abandonment shall be submitted by the Operator to the Community and Economic Development Department within seven (7) days. Notice shall include, at a minimum, the surveyed coordinates of the decommissioned well or facility, planned or proposed access route(s), planned duration of activities, planned hours of operation, and a list of equipment to be utilized at the site. The Operator shall submit the COGCC required Notice of Intent to Abandon report to the County concurrently with the COGCC. Notice shall be sent by the Operator or contractor to all property

4-11-02-03-03-03. 14 Noise. Prior to operations Operator shall obtain a baseline noise study that encompasses at least five (5) days, one of those days being a weekend. The Operator may use the baseline noise study submitted with the Development Application to fulfill this requirement, if that noise study is completed within twelve (12) months of any ground disturbing activities.

4-11-02-03-03-03. 14 Noise. Beginning with construction and up to production, the County will may require continuous noise monitoring for all oil and gas facilities located with one-half mile (1/2), or greater depending on the location, nature, and size of the facility, of the property line of any existing residences, schools, state licensed daycares or high occupancy building units. The County may require continuous noise monitoring be conducted by an approved third-party consultant based on the

4-11-02-03-03-03. 14 Noise. For oil and gas facilities located within 2,000 feet of a land use or zoning designation boundary the Operator shall be required to comply with the lower maximum permissible noise level as defined in COGCC Regulations for noise of that corresponding land use or zone district. For locations within 2,000 feet of a land use or zoning designation boundary, noise must be attenuated to the maximum permissible noise levels for the corresponding land use or zone district, as specified in COGCC rules, at the land use designation boundary as determined by the Director of Community and Economic Development. Operator shall update the noise modeling study or noise impact analysis if the planned or actual equipment at the Oil and Gas Facility is expected to produce noise levels that will exceed those previously presented to the County or if the noise modeling study or noise impact analysis was completed more than twelve (12) months prior to any ground disturbing

4-11-02-03-03-03. 14 Noise. Professional Consultant(s) Required: The baseline noise study and noise modeling shall be prepared by one (1) or more professionals deemed professionally qualified by the Community and Economic Development Department. Each professional shall be deemed qualified by the Department of Community and Economic Development based on education, professional certifications, experience in the field, and their understanding of the Adams County oil and gas regulations and COGCC rules pertaining to noise. The County shall maintain a list of qualified professional consultants. The applicant for an Oil and Gas Facility shall select one (1) or more individuals from the County's list of qualified consultants to

4-11-02-03-03-03. 16 Odors. In response to an odor-related complaint, the Operator shall provide a complete description of all activities occurring at the oil and facility and measures or actions taken to reduce odors to the County's LGD within 24 hours.

4-11-02-03-03-03. 16 Odors. The Director of Community and Economic Development may require an Operator to collect and analyze a speciated air sample to measure for volatile organic compounds or hazardous air pollutants in response to an odor-related complaint. Speciated air sample collection shall be done utilizing a third-party vendor approved by the County.

4-11-02-03-03-03. 17 Dust. To ensure the Operator controls dust, one or more of the following may be required based on the location, nature, and size of the facility: i. Ceasing all earthwork activities when wind speeds equal or exceed 30 MPH at any time measured by onsite anemometer, ii. The use of reduced speed restrictions, iii. Approved dust suppression activities, iv. Ceasing ongoing truck traffic causing fugitive dust, until Operator has minimized dust to acceptable levels.

4-11-02-03-03-03. 18 Visual. All permanent equipment on an oil and gas facility, regardless of construction date, which are observable from any public highway, road, or publicly maintained trail will be painted in uniform, non-contrasting, nonreflective color tones (similar to the Munsell Soil Color Coding System), and with colors matched to but slightly darker

4-11-02-03-03-03. 18 Visual. Required sound walls shall comply with a color scheme approved by the County, blending with natural background.

4-11-02-03-03-03. 18 Visual. Operator shall be required to provide maintenance funding through bonding to ensure funds are available for upkeep of any planted vegetation throughout the duration of operations, including production.

4-11-02-03-03-03. 18 Visual. Site access and security. Site shall be properly secured during all phases of operations

4-11-02-03-03-03. 19 Lighting. The Operator shall minimize light escaping the facility as follows: a. All lighting shall be directed downward and inward and use fully shielding bulbs to prevent light emissions above a horizontal plane drawn from the bottom of the fixture. b. Operator shall follow COGCC Regulations for lighting standards. c. Operator shall provide sufficient on-site lighting to ensure the safety of personnel on or near the site. d. If the facility has a noise barrier (sound walls, etc.), the Operator shall install facility lighting beneath the noise barrier, except for drilling rig lights. e. To ensure the Operator controls light escaping from the facility, one or more of the following may be required based on the location, nature, and size of the facility: The use of timers or motion sensor lighting,
The use of full cut-off lighting,
The use of reduced light intensity colors and low-glare or no-glare lighting

4-11-02-03-03-03. 20 Community Outreach. The Operator shall hold quarterly neighborhood meetings from initial permit approval by the County, through the completion of the first wellbore, or longer as determined by the Director of Community and Economic Development for all oil and gas facilities located within one mile of any existing residences, platted residential development, high occupancy building units, school facilities, or state licensed child care centers. Operator shall hold additional quarterly neighborhood meetings for each subsequent return to the Oil and Gas Facility for any drilling or completion operations if there have been no neighborhood meetings held for a period of six (6) consecutive months or more. Notice for quarterly neighborhood meetings shall be sent by the Operator to all property owners, current residents, or school facility or childcare center administrators within one mile at a minimum, or greater, as determined by the Director of Community and Economic Development, of the facility. Notice for the quarterly neighborhood meetings shall occur at least 14

4-11-02-03-03-03. 21 Cumulative Impacts. Operators shall evaluate and address the potential cumulative impacts from the Oil and Gas Facility, and all reasonably foreseeable development associated with other oil and gas activity and heavy industrial operations within one mile (1), at a minimum, of the oil and gas facility. Operators shall minimize, avoid, mitigate, and offset cumulative impacts from oil and gas operations to the extent technically feasible. This may be achieved through a suite of best

4-11-02-03-03-03. 21 Cumulative Impacts. The evaluation and review of cumulative impacts may require the submission of quantitative and/or qualitative analysis and data for the following impact areas, at a minimum: i. Air Quality, ii. Public Health and welfare, including nuisance-type impacts, iii. Traffic, iv. Water resources, v. Wildlife, Ecosystems, and Soil. An Operator

4-11-02-03-03-03. 22 Transportation and Traffic a. General: Oil and gas operations shall minimize impacts to the physical infrastructure of the County transportation system. b. Mud tracking. Operator shall take all practical measures to prevent mud and dirt tracking onto public right of ways and shall remove tracked mud and dirt within a reasonable time not to exceed four

4-11-02-03-03-03. 22 Private Roads. The Operator shall construct (unless already constructed) and maintain an access road designed to meet County and fire district standards (see Rule for detail).

4-11-02-03-03-03. 22 Public Roads. Operator shall utilize existing roads and access points where practical and apply for and obtain access permits for its oil and gas facilities from the County's Public Works Department (see Rule for detail).

4-11-02-03-03-03. 22 Transportation and Traffic: Operator shall exercise reasonable efforts to minimize heavy truck traffic on local roads within residential neighborhoods between the hours of 9 p.m. and 6 a.m. Operator shall work with and show written evidence that the applicable school district(s) has been consulted to minimize traffic conflicts with school buses when schools

4-11-02-03-03-03. 22 Transportation and Traffic: Operator shall obtain any legally valid and applicable oversize and/or overweight moving permit from the County's Public Works Department for all vehicles that exceed legal vehicle dimensions or weights as specified by the Colorado Department of Transportation and the County's Development Standards and

4-11-02-03-03-03. 22 Transportation and Traffic: All applicable transportation fees shall be paid prior to issuance of a notice to proceed.

4-11-02-03-03-03. 23 Water and Wildlife Protection. Oil and gas operations shall not cause adverse impacts to surface or ground waters within Adams County. Operators shall comply with all Adams County rules, COGCC Regulations, and applicable water quality standards set by the Colorado Department of Public Health and Environment and Colorado Water

4-11-02-03-03-03. 23 Water and Wildlife Protection. The owner or Operator shall provide the County with the information it provides to the COGCC ensuring compliance with the water quality protection standards contained in COGCC Regulations. iii. The owner or Operator shall provide all water source test results to the County and maintain records of such results. iv. The owner or Operator shall make available to the County upon approval by the COGCC, its plans concerning downhole

4-11-02-03-03-03. 23 Water and Wildlife Protection. Wastewater Injection Wells used for produced water disposal are prohibited in Adams County.

4-11-02-03-03. 23 Water and Wildlife Protection. Floodplain. Any disturbance within a 100-year floodplain will be allowed if the Operator has obtained a Floodplain Use Permit from the County and has complied with all of the County's legally adopted floodplain and engineering regulations. A "100-year floodplain" shall be, for purposes of this Section, a "Special Flood Hazard Area" as identified and mapped by the Federal Emergency Management Agency's National Flood Insurance Program and adopted by the County.

4-11-02-03-03. 23 Water and Wildlife Protection. Water source sampling and testing: Using records of the Colorado Division of Water Resources, the applicant shall be required to identify and offer to sample all available water sources located within one-half mile of the proposed facility. All sampling must be conducted by third-party consultant approved of by the County. Sampling requirements include:

- i. Initial baseline samples and subsequent monitoring samples.
- ii. Initial collection and testing of baseline samples from available water sources shall occur within twelve months prior to the commencement of drilling a well, or within twelve months prior to the re-stimulation of an existing well for which no samples were collected and tested during the previous twelve months.
- iii. Post-stimulation samples of available water sources shall be collected and tested pursuant to the following time frame:
 - (1) One sample within six months after completion;
 - (2) One sample between twelve and eighteen months after completion; and
 - (3) One sample between sixty and seventy-two months after completion.
 - (4) For multi-well pads, collection shall occur annually during active drilling and completion.
- iv. Operator shall collect a sample from at least one up-gradient and two down-gradient water sources within a one-half mile radius of the facility. If no such water sources are available, operator shall collect samples from additional water sources within a radius of up to one mile from the facility until samples from a total of at least one up-gradient and two down- gradient water sources are collected. Operators should give priority to the selection of water sources closest to the facility.
- v. An Operator may rely on existing groundwater sampling data collected from any water source within the radii described above, provided the data was collected within the twelve months preceding the commencement of drilling the well, the data includes measurement of all of the constituents measured in Table 4-11-A, and there has been no significant oil and gas activity within a one-mile radius in the time period between the original sampling and the commencement of drilling the well.
- vi. The Operator shall make reasonable efforts to obtain the consent of the owner of the water source. If the operator is unable to locate and obtain permission from the surface owner of the water source, the operator shall advise the Director of Community and Economic Development that the applicant could not obtain access to the water source from the surface owner.
- vii. Testing for the analytes listed in Table 4-11-A, and subsequent testing as necessary or appropriate.
- viii. Standard industry procedures in collecting samples, consistent with the COGCC model Sampling and Analysis Plan, shall be followed.
- ix. Reporting the location of the water source using a GPS with sub-meter resolution.
- x. Field observations. Reporting on damaged or unsanitary well conditions, adjacent potential pollution sources, odor, water color, sediment, bubbles, and effervescence.
- xi. Test results. Provide copies of all test results described above to the County, the COGCC, and the water source owners within three months after collecting the samples.

4-11-02-03-03. 23 Wildlife. Operators shall avoid, minimize, and mitigate adverse impacts to wildlife resources.

- i. Operators shall comply with all COGCC Regulations for wildlife impacts.
- ii. Operators shall actively engage Colorado Parks and Wildlife, where applicable, for the sake of avoiding, minimizing, and mitigating wildlife impacts.

11-02-183 Environmentally sensitive areas include, but are not limited to, wetlands, biological resources, habitats, **Waters of the State**, national parks, archaeological/historic sites, natural heritage areas, tribal lands, drinking water sources, intakes, marinas/boat ramps, and wildlife areas.

Appendix A: OGF Application Added various noise requirements
Appendix A: OGF Application Added Substantially Equivalent Protection Plan details

Corresponding COGCC Rule

304.b.(2) ALA applies to any proposed Oil and Gas Location: 304.b.(2)

ALA applies to any proposed Oil and Gas Location:

(1) that meets any of the criteria listed in Rule 304.b.(2).B, unless the Director determines in the completeness determination that an alternative location analysis is not necessary to protect and minimize adverse impacts to public health, safety, welfare, the environment, or wildlife resources. The Director may not waive the alternative location analysis requirement for any Oil and Gas Location that meets the criteria listed in Rule 304.b.(2).B.i–iii.

(2) which the Director or Commission determines that an alternative location analysis is necessary to evaluate whether the proposed Oil and Gas Location reasonably protects and minimizes adverse impacts to public health, safety, welfare, the

304.b.(2) If an alternative location analysis is required, the Operator will prepare a narrative analysis that identifies all potential alternate locations from which the targeted minerals can be accessed that may be considered for siting of the Oil and Gas Location.

304.b.(2) ALA for proposed Oil and Gas Locations within or within 2,000 feet of a Disproportionately Impacted Community must include community outreach efforts conducted by the Operator prior to preparing the alternative location analysis, including whether the Operator made information available in languages other than English based on the linguistic needs of the community, questions and Operator responses to questions from residents of the Disproportionately Impacted Community, and any public meetings conducted (including location, time of day, and whether interpreters were requested and provided) with residents of the Disproportionately Impacted Community.

304.c.(20)

~~For Oil and Gas Locations proposed within 2,000 feet of a Residential Building Unit, High Occupancy Building Unit, or~~

303.e. The Operator will provide notice of the completeness determination within 7 days to:

All Owners of minerals to be developed by the Oil and Gas Development Plan except that no notice is required for minerals already subject to a federal Unit Agreement pursuant to 43 C.F.R. § 3180.

All Surface Owners, Building Unit owners, and residents, including tenants of both residential and commercial properties, within 2,000 feet of any Working Pad Surface included in the Oil and Gas Development Plan. Notice to tenants may be accomplished by sending the notice to the residences addressed to “Current Resident.”

The Colorado State Land Board (if a mineral owner).

The U.S. Bureau of Land Management (if any federal entity is mineral owner).

The Southern Ute Indian Tribe (for applications involving minerals within the exterior boundary of the Tribe’s reservation that are subject to the Commission’s jurisdiction pursuant to Rule 201.d.(2)).

All Schools, Child Care Centers, and School Governing Bodies pursuant to Rule 309.d.

Police, fire departments, emergency service agencies, and first responder agencies responsible for ensuring public safety in all areas within 2,000 feet of any Working Pad Surface included in the Oil and Gas Development Plan.

311. Except as otherwise specified by Rule 314.b.(2), Oil and Gas Development Plans are valid for 3 years. The following expirations will occur 3 years from the approval date of the Oil and Gas Development Plan:

(1) If drilling operations have not commenced for a permitted Well, the Form 2 for the undrilled Well will be null and void.

(2) If drilling operations have not commenced at any Wells on an Oil and Gas Location, the Form 2A(s) for that Oil and Gas Location, any associated Production Facilities designed to serve only that Location, and the associated Form 2s will be null and void;

(3) If drilling operations have not commenced for any permitted Well in a Drilling and Spacing Unit, the Drilling and Spacing Unit order will be vacated, and any associated Form 2As and Form 2s will become null and void; or

(4) If drilling operations have not commenced for any permitted Well subject to an Oil and Gas Development Plan, the Oil and Gas Development Plan will expire, the Drilling and Spacing Unit orders will be vacated, and the associated Form 2As and Form 2s will be null and void.

314.c. Approved CAPs will expire 6 years after the date the Commission approves the CAP, unless the Commission issues an

406.d. Location Signage. The Operator will, concurrent with the Rule 412 Surface Owner notice, post a sign not less than 2 feet by 2 feet at the intersection of the lease road and the public road providing access to the Oil and Gas Location, with the name of the proposed Well or Oil and Gas Location, the legal location thereof, and the estimated date of commencement of

604.b. No Working Pad Surface will be located more than 500 feet and less than 2,000 feet from 1 or more Residential Building Units or High Occupancy Building Units unless one or more of the following conditions are satisfied

411.b.(1)B After January 15, 2021, Operators will not conduct any new surface disturbance within the internal buffer zone of a GUDI Well or Type III Well identified in Rule 411.b.(2).A. (internal buffer zone = 1,000')

604. Setbacks are measured from the Working Pad Surface to the Residential Building Unit, School Facility or Childcare Center.

604.a.(3) No Working Pad Surface will be located 2,000 feet or less from a School Facility or Child Care Center;

411.a.(2)A.iii Only the Commission may grant a variance to Rules 411.a.(2).A.i & ii.

213.b If notice or information is provided orally in the event of an Emergency Situation, Operators will provide to the Director the same information in writing at the earliest possible time but no later than 3 days following the Emergency Situation, unless a Commission Rule establishes a different timeframe. If public health, safety, welfare, the environment, or wildlife resources are threatened, the Operator responsible for the operation causing such threat will immediately notify the Director, Relevant and Proximate Local Governments, and Surface Owner electronically and orally

602.g

Operators will notify the Director and the Local Government of the applicable jurisdiction of reportable safety events at an Oil and Gas Facility.

602.h

912.b. Report to the Director. Operators will submit an initial report ("24 Hour Notification") of a Spill or Release of E&P Waste, natural gas, or produced Fluids that meet any of the following criteria to the Director verbally, via electronic mail, or on a Form 19, Spill/Release Report – Initial within 24 hours of discovery, unless otherwise specified in the Rule. (7) At the same time the Operator makes the 24 Hour Notification, the Operator will provide verbal or written notification to the entity with jurisdiction over emergency response within the local municipality if the Spill or Release occurred within a municipality or the

603.o. Operators will design secondary containment structures to be sufficiently sized to contain at least 150% of the volume of the largest single Tank within the containment.

435.a. Prior to the abandonment of a Well, a Form 6, Well Abandonment Report – Notice of Intent to Abandon will be submitted to, and approved by, the Director.

423.b. The Director may require as a condition of approval on the Form 2A that the Operator conduct the background ambient noise survey between 30 and 90 days prior to start of construction and update the plan accordingly based on the results.

Operators will conduct baseline noise surveys at the noise points of compliance identified pursuant to Rule 423.a.(5). When an Operator conducts a background ambient survey the Operator will follow the same approach as outlined in Rule 423.c.(7) and over a 72-hour period, including at least 24 hours between 10:00 p.m. on a Friday and 4:00 a.m. on a Monday. Operators will record any significant weather events and take those events into account when establishing the baseline. A single cumulative

423.c.(1) During pre-production activities and ongoing operations lasting longer than 24 consecutive hours such as drilling, completion, recompletion, Stimulation, and Well maintenance, in areas zoned residential or within 2,000 feet of a Building Unit, Operators will take continuous sound measurements from each noise point of compliance designated pursuant to Rule 423.a.(5)

423.a.(5) For proposed Oil and Gas Locations with a Working Pad Surface within 2,000 feet of one or more Residential Building Units, at least one, and no more than six noise points of compliance where monitors will be located. **423.b.(3)A** To protect public health, safety, and welfare, the Director may require Operators to comply with a lower maximum permissible noise level in areas zoned industrial, light industrial, or commercial, if the Oil and Gas Facility will be within 2,000 feet of a Residential Building Unit or High Occupancy Building Unit.

423.b.(3)B

In a noise mitigation plan submitted pursuant to Rule 423.a, an Operator may request a higher maximum permissible noise level than would otherwise be allowed by Table 423-1 if the Operator demonstrates that both the Relevant and any Proximate
No Corresponding COGCC Rule

426.d. Upon Director request, the Operator(s) of the Oil and Gas Facility or Facilities subject to the complaint will provide within 24 hours the Director, the Relevant or Proximate Local Government, and the complainant (should the complainant request notification) with a complete description of all activities occurring at the facility during the timeframe specified in the complaint. The Director may require the Operator(s) of the Oil and Gas Facility or Facilities subject to the complaint to take necessary and reasonable actions to reduce odors, including, but not limited to, conducting air sampling to measure volatile organic compounds.

No Corresponding COGCC Rule

427.a Requires Dust Mitigation Plan.

427.b.

Operators will minimize fugitive dust caused by their operations, or dust originating from areas disturbed by their Oil and Gas Operations that becomes windborne.

427.c. Dust suppressant requirements.

427.d.

Within 2,000 feet of Building Units, or High Priority Habitat, the Commission may require additional dust control measures as a condition of approval.

427.e

425.a. Unless the Commission approves an alternate method of visual impact mitigation, all permanent equipment at new and existing Oil and Gas Facilities, regardless of construction date, which are observable from any public highway, road, or publicly- maintained trail, will be painted with uniform, non-contrasting, non-reflective color tones (similar to the Munsell Soil

425.b. If requested to do so during consultation with the Relevant Local Government, the Surface Owner, or a Building Unit owner pursuant to Rules 302.g, 309.b, or 309.c, an Operator will orient new Oil and Gas Facilities in a direction to reduce the contrast between the Oil and Gas Facilities and the surrounding landscape. If multiple receptors to visual impacts may be

No Corresponding COGCC Rule

No Corresponding COGCC Rule

424.b. Operators will direct site lighting downward and inward, such that no light shines above a horizontal plane passing through the center point light source.

424.c.

At all Oil and Gas Facilities with active operations involving personnel, Operators will provide sufficient on-site lighting to ensure the safety of all persons on or near the site.

If the facility has a noise barrier, Operators will locate the facility lighting beneath the noise barrier, except for drilling rig lights, which will be shielded and pursuant to Federal Aviation Administration permit requirements if applicable. Operators will take precautions to ensure that lights do not shine out of openings in the noise barrier.

424.b.

~~Operators will use Best Management Practices to minimize light pollution and obtrusive lighting, which may include, but are~~

309.c. An Operator will be available to meet for a Formal Consultation Process with residents (including owners and tenants) of Building Units located within 2,000 feet of the proposed Working Pad Surface. Building Unit Owners, their agents, their tenants, or a Relevant or Proximate Local Government may request such a meeting. **309.d.** The Operator must provide 30-day pre-notice that a School Governing Body for the School Facility or Child Care Center (within 2,000' of the WPS) may request a consultation to discuss the proposed operations by contacting the Operator, and that the Director may be invited to any meeting. A School Governing Body or Child Care Center may delegate the consultation process to the principal or senior administrator of a School or Child Care Center in proximity to the proposed Oil and Gas Location

303.a.(5) The Operator will submit a Form 2B, Cumulative Impacts Data Identification that provides quantitative and qualitative data to evaluate incremental adverse and beneficial contributions to cumulative impacts caused by Oil and Gas Operations associated with the proposed Oil and Gas Development Plan, including any measures the Operator will take to avoid, minimize, or mitigate any adverse impacts

303.a.(5) Form 2B includes Air Resources, Public Health, Water Resources, Wildlife, Soil and Public Welfare

304.c.(6) If the Relevant Local Government requires a transportation plan or an equivalent traffic planning document, the transportation plan submitted to the Relevant Local Government. If the Relevant Local Government does not require a transportation plan, the Director may request information regarding haul routes, traffic volumes, and Best Management

No Corresponding COGCC Rule

No Corresponding COGCC Rule

No Corresponding COGCC Rule

No Corresponding COGCC Rule

No Corresponding COGCC Rule

902.d. No Operator, in the conduct of any Oil or Gas Operation, may violate numeric or narrative water quality standards or classifications established by the WQCC for Waters of the State, or any Point of Compliance established by the Director pursuant to Rule 914. The Director may require the Operator to establish one or more Points of Compliance for any event of

915.c. Operators will adhere to the concentrations for Groundwater in Table 915-1. The Groundwater standards and analytical methods are derived from the Groundwater standards and classifications established by WQCC Regulation 41 numeric and narrative Groundwater quality standards and classifications, as incorporated by reference in Rule 901.b. **308.b.(6)** A Form 2 to drill a Well will include a casing and cementing plan that addresses anticipated Groundwater by demonstrating how it will be
COGCC 800-Series Rules regulate allowed UIC Wells, including produced water injection disposal wells and enhanced recovery.

304.b.(2)B An Operator will perform an alternative location analysis if the proposed Working Pad Surface is within a Floodplain.

304.c.(9)

If located in a Floodplain, a shut-in plan consistent with the requirements of Rule 421.b.(1).

421

When operating within a defined Floodplain, the requirements of Rule 421 apply to new Oil and Gas Locations and Wells. **304.b.(2)B**

An Operator will perform an alternative location analysis if the proposed Working Pad Surface is within a Floodplain.

304.c.(9)

If located in a Floodplain, a shut-in plan consistent with the requirements of Rule 421.b.(1).

421

When operating within a defined Floodplain, the requirements of Rule 421 apply to new Oil and Gas Locations and Wells.

615.b. Initial baseline samples and subsequent monitoring samples will be collected from all Available Water Sources, up to a maximum of 4, within a 1/2 mile radius of a proposed Oil and Gas Well, Multi-Well Site, or Class II UIC Well. If more than 4 Available Water Sources are present within a 1/2 mile radius of a proposed Oil and Gas Well, Multi-Well Site, or Class II UIC Well, the Operator will select the 4 sampling locations based on the criteria in the Rule.

615.d.

Initial sampling will be conducted within 12 months prior to setting conductor pipe in a Well or if no conductor is present prior to spudding the first Well on a Multi-Well Site, or commencement of drilling a Class II UIC Well.

One subsequent sampling event will be conducted at the initial sample locations between 6 and 12 months, and a second subsequent sampling event will be conducted between 60 and 72 months following completion of the Well or Class II UIC Well, or the last Well on a Multi-Well Site. Additional subsequent samples will be collected every 5 years (57 to 63 month interval) for the life of the Well. A post abandonment sample will be collected 6 to 12 months after the Oil and Gas Well has been Plugged and Abandoned. Wells that are drilled and abandoned without ever producing hydrocarbons are exempt from subsequent monitoring sampling under this Rule 615.d.(2). 615. b.

To the extent Groundwater flow direction is known or reasonably can be inferred, sample locations from both down-gradient and up-gradient are preferred over cross-gradient locations. Where Groundwater flow direction is uncertain, sample locations should be chosen in a radial pattern from a proposed Oil and Gas Well, Multi-Well Site, or Class II UIC Well.

615.d.

An Operator may rely on water sampling analytical results obtained from an Available Water Source within the sampling area provided:

The previous water sample was obtained within the 18 months preceding the initial sampling event required pursuant to Rule 615.d.(1), or any subsequent sampling event required pursuant to Rule 615.d.(2);

The sampling procedures, including the constituents sampled for, and the analytical procedures used for the previous water sample were substantially similar to those required pursuant to Rules 615.e.(1) & (2), below; and

The Director timely received the analytical data from the previous sampling event.

615.c.

Prior to spudding, an Operator may request an exception from the requirements of this Rule 615 by filing a Form 4 for the Director's review and approval if the owners of all Water Sources suitable for testing under this Rule refuse to grant access despite an Operator's reasonable, good faith efforts to obtain consent to conduct sampling. 615.f.

Copies of all final laboratory analytical results will be provided to the Director and the water well owner or landowner within 3 months of collecting the samples. The analytical results including PDF of lab results, the surveyed sample Water Source locations, and the field observations will be submitted to the Director in an electronic data deliverable format approved by the

COGCC 1200-Series Rules Address specific wildlife protections.

COGCC Sensitive Area Definition: SENSITIVE AREA is an area vulnerable to potential significant adverse groundwater impacts, due to factors such as the presence of shallow groundwater or pathways for communication with deeper groundwater; proximity to surface water, including lakes, rivers, perennial or intermittent streams, creeks, irrigation canals, and wetlands. Additionally, areas classified for domestic use by the Water Quality Control 100-16 As of January 15, 2021 Commission, local (water supply) wellhead protection areas, areas within 1/8 mile of a domestic water well.

GW Comments April Rule Draft

Mandatory 3-site review should be waivable based on site-specific factors and where not necessary to be protective.

The restrictive requirements for potential sites is not be feasible, necessary or reasonable. The limitation of 500' from another site could heavily impact surface owner rights and preferences.

A neighborhood meeting required within 2,640' of the Oil and Gas Facility is not shown to be necessary or reasonable – radius should maintain consistent with COGCC Rules.

GW has evaluated this proposed amendment and has no comments at this time.

The 2,000' hard setback measurement to the property line, including platted lots, is not reasonable or necessary regulation and violative of SB 19-181.

The same 1,000' setback from GUDI and Type III Wells measures from the Oil and Gas Facilities whereas COGCC Rules measure from the Working Pad Surface; measurement points should be the same for consistency with Rule 411. In addition, COGCC Rule 411 contains a Variance process that can be supported by the Public Water Supplier with significant weight given by the Commission.

General concerns over not having a waiver for all situations. Modify proposed Rule to allow for waivers in all instances. Clarify "groundwater wells" definition.

GW has evaluated this proposed amendment and has no comments at this time.

GW has evaluated this proposed amendment and has no comments at this time.

COGCC Rules do not require ambient noise surveys for all new Form 2As; where there are no sensitive receptors, Adams should incorporate a waiver process.

COGCC Rule for background ambient requires a 3-day period, including one weekend day, not a 5-day period; this duration should match COGCC at 3-days.

Continuous noise monitoring within 1/2 a mile by a third party consultant is not reasonable or necessary; could result in continuous monitoring at all locations, including potentially redrilled locations already permitted.

This regulation does not recognize a higher maximum permissible noise level in a noise mitigation plan with COGCC and RLG approval. Requiring an Operator to comply with residential levels even if operations are in ag/commercial/industrial is not necessary or reasonable.

Requirement for a qualified sound professional is not necessary or reasonable and is highly subjective.

The COGCC requires notice to the RLG only at the request of the Director; in addition, actions to reduce odors are only required at the request of the Director; the proposed amendment makes this mandatory in all instances, which is not necessary or reasonable in all cases. The proposed language implies that action will be taken in all instances of an odor complaint. This provision should be modified to mirror COGCC Rules.

Requirement for air samples by a third-party approved by the County does not correspond to COGCC requirements and is not necessary or reasonable in all circumstances.

Remove i. which requires shutdown in the event of 30 mph winds. Should match language in iv related to minimizing dust, and not dictate wind speed. With proper BMPs, 30 mph wind speed may not be an issue.

GW has evaluated this proposed amendment and has no comments at this time.

GW has evaluated this proposed amendment and has no comments at this time.

COGCC Financial Assurance does not include planted vegetation throughout duration of operations and production

GW has evaluated this proposed amendment and has no comments at this time.

GW has evaluated this proposed amendment and has no comments at this time.

Quarterly neighborhood meetings measured 2,640' from residences, platted development, high occupancy and schools/daycares are not necessary or reasonable after permit approval through drilling of the first wellbore. It is far more beneficial for informational for meetings to occur prior to construction.

GW has evaluated this proposed amendment and has no comments at this time.

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GW has evaluated this proposed amendment and has no comments at this time.

Required sampling of all sources within ½ mile is not necessary or reasonable when there could be hundreds of water wells in this radius.

Requirement that sampling be conducted by an approved third party consultant is not necessary or reasonable.

Frequency of sampling events and extended water sources is not necessary or reasonable.

Addition of analytes in Table 4-11 are not required by COGCC and pose operational concerns:

Dissolved Organic Carbon (or Total Organic Carbon) Bacteria

Hydrogen Sulfide

Arsenic

Chromium

Copper

Lead

and water level which typically cannot be measured.

Broad requirement to share “all findings, recommendations, and reports resulting from any consultation with CPW with the County within seven (7) days” could include a large amount of data shared with the County and should be narrowed.



GW Comments May Rule Draft

No change, concerns remain.

No change, concerns remain.

Expanded to one mile from the Oil and Gas Facility, which is not a necessary or reasonable radius for any potential impacts.

Notice expanded to one mile from the proposed parcel, which is far more expansive than COGCC Rules and not shown to be a necessary or reasonable notification radius.

A 3 year drilling obligation is not necessary or reasonable, particularly considering the lengthy COGCC permitting process after Adams County approval. The reduced term of a permit to 3 years does not acknowledge the longer COGCC permit expirations in an approved CAP (6 years or longer). Rules should allow a waiver process for approved CAPs with longer permit duration.

No change, concerns remain.

No change, concerns remain.

Measuring from edge of disturbance including landscaping boundaries expands the COGCC Working Pad Surface definition and could lead to significant uncertainty

The BOCC hearing for a non-administrative waiver requires a substantially equivalent protection showing; did not clarify "groundwater" definition to only mean those associated with a PWS.

Inert fill permit requirements should be modified for one fill source, not for each location receiving fill.

Modified containment requirements track COGCC Rule 603.

Requirement to notify residents and property owners within 1/2 mile is not reasonable or necessary.

Notifying an unapproved Form 6 will cause great uncertainty. Sometimes the COGCC will change our plans slightly on plug depths, volumes etc. which is reflected in the Approved Form 6. The Approved Form 6 should be provided in lieu of a draft.

No change, concerns remain.

No change, concerns remain.

Requirement to reduce noise to the maximum permissible noise levels for the corresponding land use or zone district is not necessary or reasonable. There is no reasonable basis for noise modeling to be deemed unusable after 12 months.

Edited draft does not alleviate this issue.

No change, concerns remain.

No change, concerns remain.

No change, concerns remain.

Modified meeting notice requirement from 1/2 mile to 1 mile with quarterly meetings for return visits and recordkeeping requirements is not necessary or reasonable and presents significant operational and feasibility concerns.

Support substantially equivalent information prepared in accordance with COGCC Rules.

No change, concerns remain.

Added Waters of the State definition to Sensitive Area which unnecessarily and unreasonably broadens the scope of the regulations and subjects Waters of the State to a 2,000' setback that cannot be administratively waived.

The County must guarantee confidentiality of documents as required by state law.

GW has evaluated this proposed amendment and has no comments at this time.

GW has evaluated this proposed amendment and has no comments at this time.

Proposed Rule Revisions

Incorporate waiver language for site review where not necessary or reasonable; include review of loss or prohibition of mineral interest development.

Incorporate waiver language for site review where not necessary or reasonable.

Neighborhood meeting radius should track the COGCC's 2000' distance; include invitations to mineral interest owners potentially impacted by the surface development.

Notification radius should track the COGCC's 2,000' distance; include mineral interest owners potentially impacted by the surface development.

Add a waiver process for extended permit duration within an approved COGCC CAP; allow extension of term if well is not completed or has not commenced production operations and new permit is required.

Modify setback measurement from the edge of disturbance to the residential building, schools, daycare or high occupancy building unit; provide offramps/waivers for setbacks in approved COGCC CAPs and where determined to be protective

Modify setback measurement from the edge of disturbance with a waiver process with Public Water Supplier support.

Setback measurement should track the COGCC's definition of Working Pad Surface.

Incorporate waiver allowance, including locations in approved COGCC CAPs; add definition of "groundwater" to track COGCC and DWR for consistency.

Modify for one fill source.

Modify notice radius to 2,000' for an approved Form 6.

Incorporate a waiver process and background measurements taken over a 3-day period.

Require continuous noise monitoring only within 2,000' of the listed sensitive receptor structures, not property line; eliminate third party consultant requirement.

Eliminate requirement to comply with the lower maximum permissible noise level within 2,000'; incorporate a waiver process where noise can be avoided, minimized or mitigated to be protective.

Eliminate requirement for a qualified sound professional.

Modify informational requirement to apply only at the request of the County LGD where there is evidence of a valid odor complaint.

Eliminate air sampling requirements for odor complaints; require only where reasonably necessary to be protective.

Eliminate subpart "i"

Propose deleting planted vegetation from financial assurance obligation.

Decrease neighborhood meeting notice radius to a reasonable distance; eliminate requirement for quarterly neighborhood meetings for return site visits after a well has been drilled.

Modify sampling locations to a maximum of 4; eliminate requirement that sampling be conducted by an approved third party consultant; eliminate added analytes in Table 4-11 (Dissolved Organic Carbon (or Total Organic Carbon, Bacteria, Hydrogen Sulfide, Arsenic, Chromium, Copper, Lead and water level); modify sampling frequency for consistency with COGCC requirements.

Modify requirement to share reasonable, necessary and relevant findings, recommendations, and reports resulting from any consultation with Colorado Parks and Wildlife with the County within seven (7) days.

Eliminate Waters of the State from Sensitive Areas; eliminate hard setback from water features and instead require BMPs to protect all water resources within 2,000'.

Proposed Amended Adams County Regulation	Corresponding COGCC Rule	GW Comments April Rule Draft	GW Comments May Rule Draft	Proposed Rule Revisions
242-14451 Conceptual Review. Description of potential sites. Applicant must submit descriptions of at least three (3) potential sites for the O&G that were considered by applicant. All potential site descriptions shall include Geographic Information System (GIS) data. The GIS data shall include, at a minimum, the surface degree of those sites and the associated water for each proposed site. The descriptions shall include an explanation of the locations considered, whether mineral extraction is possible and reasonable from those sites, the effects impacts associated with those sites, and why a particular site is proposed, if any.	242.14451 AEA applies to any proposed O&G and Gas Location. 242.14452(1) The Director or County determines that an alternative location analysis is not necessary to protect and minimize adverse impacts to public health, safety, welfare, the environment, or wildlife resources. The Director may not waive the alternative location analysis requirement for any O&G and Gas Location that meets the criteria listed in Rule 242.14452(1)(2). (2) which the Director or County determines that an alternative location analysis is necessary to evaluate whether the proposed O&G and Gas Location reasonably protects and minimizes adverse impacts to public health, safety, welfare, the environment, and wildlife resources. (2) which the Director or County determines that an alternative location analysis is necessary to evaluate whether the proposed O&G and Gas Location.	Modestly 3-mile review should be workable based on site-specific factors, and where not necessary to be protective.	No change, concerns remain.	Incorporate waiver language for site review where not necessary or reasonable; include review of fans or possibility of mineral interest development.
242-14451 Conceptual Review. Potential sites shall be (1) a minimum of 500 feet away from each well that can be located on the same parcel, and (2) required to be located from one another as determined by the Director of Community and Economic Development.	242.14452 AEA for proposed O&G and Gas Locations within 2,000 feet of a Dispersely Impacted Community must include community outreach efforts conducted by the Operator prior to preparing the alternative location analysis, including whether the Operator made information available in languages other than English based on the linguistic needs of the community, questions and Operator responses to questions from residents of the Dispersely Impacted Community, and any public meetings conducted (including location, time of day, and whether interpreters were requested and provided) with residents of the Dispersely Impacted Community.	The restrictive requirements for potential sites is not feasible, reasonable. The limitation of 500' from another site could heavily impact surface owner rights and preferences.	Expanded to one mile from the O&G and Gas Facility, which is not a necessary or reasonable radius for any potential impacts.	Incorporate waiver language for site review where not necessary or reasonable; include review of fans or possibility of mineral interest development.
242-14452 Neighborhood Meetings. Where Dispersely Impacted Communities are located within one mile of the proposed O&G, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate representation and documentation of concerns based on primary and secondary languages, culturally sensitive methods of communication and representation, and ensure public availability and participation in neighborhood meetings. If any additional neighborhood meetings are required, these meetings shall comply with the requirements of Sections 4-11-02-03-03-03.	242.14452 AEA for proposed O&G and Gas Locations within 2,000 feet of a Residential Building Unit, or School Facility Building Unit, or School Facility Building Unit within a Dispersely Impacted Community, a consultation, outreach, and engagement plan that includes: The proposed data, time, and location of any public meetings (that are held at a location in close proximity to the Dispersely Impacted Community); The Operator will provide a child care and interpretation services at such a public meeting; and any other information that the Operator may determine is necessary to ensure adequate representation and documentation of concerns based on primary and secondary languages, culturally sensitive methods of communication and representation, and ensure public availability and participation in neighborhood meetings. If any additional neighborhood meetings are required, these meetings shall comply with the requirements of Sections 4-11-02-03-03-03.	A neighborhood meeting required within 2,400' of the O&G and Gas Facility is not shown to be necessary or reasonable - radius should maintain consistency with COGCC Rules.	No change, concerns remain.	Neighborhood meeting radius should track the COGCC's 2,000' distance; include invitation to mineral interest owners potentially impacted by the surface development.
242-14455 Notice 7. Notice: Applicant, except notice that be sent by the applicant to all property owners and current residents within 1/2 mile of the proposed parcel where an application for an O&G and Gas Facility has been filed by the County, or a notice, as appropriate, as determined by the Director of Community and Economic Development.	242.14455 Notice 7. Notice: Applicant, except notice that be sent by the applicant to all property owners and current residents within 1/2 mile of the proposed parcel where an application for an O&G and Gas Facility has been filed by the County, or a notice, as appropriate, as determined by the Director of Community and Economic Development.	No change, concerns remain.	No change, concerns remain.	No change, concerns remain.
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242-14455 Notice 7. Notice				

[illegible]



Mid-Continent Energy

Oil & Natural Gas

June 9, 2021

Eva Henry Chair of the Board District 1
Chaz Tedesco District 2
Emma Pinter District 3
Steve O'Dorisio District 4
Lynn Baca District 5
Adams County Commissioners
Greg Dean
Adam County Oil and Gas Liaison

RE: Proposed Adams County Oil and Gas Regulations

Dear Madams and Sirs:

This letter is in response to the above referenced Oil and Gas regulations your council is planning on hearing next month.

Mid-Continent Energy, LLC is a substantial mineral interest and royalty interest owner in Adams County. We are opposed to these onerous regulations. As tax payers and investors we implore you to vote against these regulations that have the potential to injure our investment which is substantial and the Oil and Gas industry as a whole. Ultimately, if approved, these regulations will negatively impact the local Adams County and Colorado State economy.

Very truly yours,

Clinton M. Blum
Manager
Mid-Continent Energy, LLC



June 8, 2021

Greg Dean
Adams County Community and Economic Development
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601

RE: Adams County Oil and Gas Regulation Amendments, Chapters 2 and 4
TCHD Case No. 7005

Dear Mr. Dean,

Thank you for the opportunity to review and comment on the second submittal of the proposed amendments to the oil and gas regulations, chapters 2 and 4. Tri-County Health Department (TCHD) staff previously reviewed the proposed amendments and responded in a letter dated April 29, 2021. After reviewing the second submittal of the proposed revision, TCHD has the following comments.

Chapter 2

Section 2-02-14-05.2

OGF Permit Review Steps

According to Human Impact Partners, Health Equity means everyone has a fair and just opportunity to be as healthy as possible. To achieve this, we must remove obstacles to health such as poverty, discrimination, and deep power imbalances, and their consequences, including lack of access to good jobs with fair pay, quality education and housing, safe environments, and health care.

The proposed amendment states "Where Disproportionately Impacted Communities are located within one-half mile of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns. Any additional neighborhood meetings shall comply with the Community outreach requirements of Adams County Development Standards and Regulations (Chapter 4)." TCHD commends the County for recognizing that communities are impacted disproportionately, and taking steps to make the process more equitable. TCHD commends the County for adding criteria to define Disproportionately Impacted Communities.

Chapter 4

Section 4-11-02-03-03.4

General Provisions

The amendment proposes to increase from 1000 feet to 2000 feet, the setback from the property line of any existing or platted residences, schools, state licensed daycares, or occupied buildings to an Oil and Gas Facility (OGF.) TCHD recommends the term “daycare” be replaced with “child care” for consistency with Colorado Department of Human Services Division of Child Care terminology.

Based on several studies identified in our August 14, 2019 comment letter, TCHD recommended that the County increase setback distances to a distance greater than the proposed 1000 feet, to at least one-quarter mile (1320 feet) from property lines, and, for settings where vulnerable groups (e.g. children in schools, childcare centers) are found, consider an even longer distance (e.g. the 2000-foot setback recommended by study # 3 above). TCHD commends the County for increasing the setback to 2000 feet. TCHD commends the County for disallowing Administrative Waivers from setback requirements for schools, future schools, state licensed day cares, groundwater wells, environmentally sensitive areas, and open spaces.

Section 4-11-02-03-03.7

Incident and Accident Reporting

TCHD commends the County for strengthening this section by specifying that incidents must be reported as soon as practicable; and including threats to public health, safety, welfare, and environmental resources.

Section 4-11-02-03-03.14

Noise

Regular exposure to elevated sound levels can have a negative impact on both physical and mental health by increasing the risk of stress, hearing impairment, hypertension, ischemic heart disease, and sleep disturbance. TCHD commends the County for strengthening this section by requiring continuous noise monitoring for OGF within one-half mile or greater, for considering the type of receptor, for specifying that noise must be attenuated for the neighboring land use zone designation, when within 2000 feet of a land use or zoning boundary, and for specifying that the entity conducting the study be a qualified professional.

Section 4-11-02-03-03.16

Odors

Subsection c. states “Operators shall prevent odors from oil and gas facilities from affecting the health and welfare of the public by proactively addressing and, to the fullest extent, resolving complaints filed by members of the community, in coordination with County and Tri-County Health Department staff.”

Currently, air quality concerns or complaints received by TCHD would be directed to the Colorado Department of Public Health and Environment Air Pollution Control Division (APCD). At the County’s request, TCHD has provided Adams County Air Monitoring Options for Consideration, dated February 6, 2019, which proposes options that would

help to enhance monitoring in the County. A locally funded air quality monitoring program would assist in responding to citizen concerns and helps to address health impacts. Such a monitoring program would be coordinated with CDPHE, who currently has regulatory authority over odors and air emissions. Models were provided based on locally funded air quality monitoring efforts in Broomfield and Garfield Counties that also enhance the CDPHE's existing monitoring network. Additionally, the City and County of Denver recently implemented an odor ordinance that could be used as a model in responding to odor complaints, if the County chooses. More information is available here <https://www.denvergov.org/content/denvergov/en/environmental-health/environmental-quality/odors.html>. At this time, TCHD does not have the authority or the staffing to resolve odor or air quality complaints. Response to such complaints would be coordinated with APCD, who has regulatory authority over air emissions and odors.

Section 4-11-02-03-03-03.21

TCHD commends the County for requiring the evaluation of cumulative impacts of receptors within 1 mile of the proposed facility, including air quality, public health and welfare, traffic, water resources, and wildlife, ecosystems, and soil. These impacts should be considered through a health equity lens, with consideration being given to whether the receptor(s) are part of a Disproportionately Impacted Community.

Please feel free to contact me at 720-200-1575 or kboyer@tchd.org if you have any questions on TCHD's comments.

Sincerely,

A handwritten signature in cursive script, appearing to read 'K Boyer', followed by a horizontal line.

Kathy Boyer, REHS
Land Use and Built Environment Specialist III

cc: Sheila Lynch, Monte Deatrich, Dylan Garrison, Brian Hlavacek, TCHD



April 29, 2021

Greg Dean
Adams County Community and Economic Development
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601

RE: Adams County Oil and Gas Regulation Amendments, Chapters 2 and 4
TCHD Case No. 6901

Dear Mr. Dean,

Thank you for the opportunity to review and comment on the proposed amendments to the oil and gas regulations, chapters 2 and 4. Tri-County Health Department (TCHD) staff has reviewed the draft amendments, and has the following comments.

Chapter 2

Section 2-02-14-05.2

OGF Permit Review Steps

According to Human Impact Partners, Health Equity means everyone has a fair and just opportunity to be as healthy as possible. To achieve this, we must remove obstacles to health such as poverty, discrimination, and deep power imbalances, and their consequences, including lack of access to good jobs with fair pay, quality education and housing, safe environments, and health care.

The proposed amendment states "Where Disproportionately Impacted Communities are located within one-half mile of the proposed OGF, the Operator may be required to hold separate or additional neighborhood meetings to ensure adequate engagement and documentation of concerns. Any additional neighborhood meetings shall comply with the Community outreach requirements of Adams County Development Standards and Regulations (Chapter 4)." TCHD commends the County for recognizing that communities are impacted disproportionately, and taking steps to make the process more equitable. If Disproportionately Impacted Community is not defined in the regulation, TCHD recommends the term be defined using data and metrics to identify such communities.

Chapter 4

Section 4-11-02-03-03.4

General Provisions

The amendment proposes to increase from 1000 feet to 2000 feet, the setback from the property line of any existing or platted residences, schools, state licensed daycares, or

occupied buildings to an Oil and Gas Facility (OGF.) TCHD recommends the term “daycare” be replaced with “child care” for consistency with Colorado Department of Human Services Division of Child Care terminology.

Based on several studies identified in our August 14, 2019 comment letter, TCHD recommended that the County increase setback distances to a distance greater than the proposed 1000 feet, to at least one-quarter mile (1320 feet) from property lines, and, for settings where vulnerable groups (e.g. children in schools, childcare centers) are found, consider an even longer distance (e.g. the 2000-foot setback recommended by study # 3 above). TCHD commends the County for increasing the setback to 2000 feet. TCHD commends the County for disallowing Administrative Waivers from setback requirements for schools, future schools, state licensed day cares, groundwater wells, environmentally sensitive areas, and open spaces.

Section 4-11-02-03-03-03.7

Incident and Accident Reporting

TCHD commends the County for strengthening this section by specifying that incidents must be reported as soon as practicable; and including threats to public health, safety, welfare, and environmental resources.

Section 4-11-02-03-03-03.14

Noise

TCHD commends the County for strengthening this section by requiring continuous noise monitoring for OGF within one-half mile or greater, and for considering the type of receptor.

Section 4-11-02-03-03-03.16

Odors

Subsection c. states “Operators shall prevent odors from oil and gas facilities from affecting the health and welfare of the public by proactively addressing and, to the fullest extent, resolving complaints filed by members of the community, in coordination with County and Tri-County Health Department staff.”

Currently, air quality concerns or complaints received by TCHD would be directed to the Colorado Department of Public Health and Environment Air Pollution Control Division (APCD). At the County’s request, TCHD has provided Adams County Air Monitoring Options for Consideration, dated February 6, 2019, which proposes options that would help to enhance monitoring in the County. A locally funded air quality monitoring program would assist in responding to citizen concerns and helps to address health impacts. Such a monitoring program would be coordinated with CDPHE, who currently has regulatory authority over odors and air emissions. Models were provided based on locally funded air quality monitoring efforts in Broomfield and Garfield Counties that also enhance the CDPHE’s existing monitoring network. Additionally, the City and County of Denver recently implemented an odor ordinance that could be used as a model in

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Section 4-11-02-03-03-03.21

TCHD commends the County for requiring the evaluation of cumulative impacts of receptors within 1 mile of the proposed facility, including air quality, public health and welfare, traffic, water resources, and wildlife, ecosystems, and soil. These impacts should be considered through a health equity lens, with consideration being given to whether the receptor(s) are part of a Disproportionately Impacted Community.

Please feel free to contact me at 720-200-1575 or kboyer@tchd.org if you have any questions on TCHD's comments.

Sincerely,

A handwritten signature in cursive script, appearing to read 'K Boyer', followed by a horizontal line.

Kathy Boyer, REHS
Land Use and Built Environment Specialist III

cc: Sheila Lynch, Monte Deatrich, Dylan Garrison, Brian Hlavacek, TCHD



Development Review Team Comments

Date: 4/29/2021

Project Number: PLN2021-00004

Project Name: 2021 Oil & Gas Amendments to the Adams County
Development Standards & Regulations

Commenting Division: Planner Review

Name of Reviewer: Greg Barnes

Date: 04/29/2021

Email: gjbarnes@adcogov.org

Resubmittal Required

PLN01: The term "Disproportionately Impacted Communities" does not seem to be defined.

PLN02: In 2-02-14-15 (2), I would change "Any additional neighborhood meetings shall comply with the Community Outreach requirements of Adams County Development Standards and Regulations (Chapter 4)" to "If any additional neighborhood meetings are required, those meetings shall comply with the requirements of Section 4-11-02-03-03"

PLN03: The Development Application Submittal section should be numbered 3 in Section 2-02-14-05. In this section, "check list" should be one word. I also think the wording of this Section is unnecessary. Why not just say, "incomplete applications shall not be accepted"

PLN04: Section 4-11-02-03-03 is worded "Signage: A sign providing contact information shall be placed near the intersection of the access road and the right-of-way. The messaging shall be legible from the public right-of-way. The contact information provided shall have an available person at all times. The required signage shall conform to Colorado Oil and Gas Conservation Commission Regulations for signage and posting."

PLN05: Please review all language and remove unnecessary spacing between words and sentences.

PLN06: Please avoid undefined acronyms like COGCC, GUDI

PLN07: Please change all instances of "shall follow COGCC" to "shall conform to CoGCC"

Commenting Division: ROW Review

Name of Reviewer: David Dittmer

Date: 04/07/2021

Email:

Complete

BOARD OF COUNTY COMMISSIONERS

Eva J. Henry
DISTRICT 1

Charles "Chaz" Tedesco
DISTRICT 2

Emma Pinter
DISTRICT 3

Steve O'Dorisio
DISTRICT 4

Lynn Baca
DISTRICT 5

From: [Ryan M. Nalty](#)
To: [David Rausch](#); [Brian Staley](#); [Katie Keefe](#); [Gregory Dean](#)
Cc: [Gordon Stevens](#)
Subject: RE: For Review: 2021 Adams County Oil & Gas Regulation Amendments
Date: Tuesday, April 13, 2021 3:07:30 PM

David,

Thank you very much for the comment. I am going to loop in Katie Keefe and Greg Dean from the Environmental division.

It is my understanding the language below is actually existing already within the regulations and is not an addition. Sounds like it would be good to have a conversation about this.

All the very best,

Ryan

Ryan M. Nalty

Director of Economic Development

Interim Director, Community and Economic Development Department

ADAMS COUNTY, COLORADO

4430 S. Adams County Parkway

Brighton, CO 80601

O: 720.523.6842 | **C:** 720.656.6575 | rnalty@adcogov.org

-

County operating hours: Tuesday through Friday, 7 a.m. to 5:30 p.m

**** Please note the County is continuing to encourage staff to work remotely to minimize COVID risk.****

From: David Rausch <DRausch@adcogov.org>
Sent: Tuesday, April 13, 2021 2:44 PM
To: Ryan M. Nalty <RNalty@adcogov.org>; Brian Staley <BStaley@adcogov.org>
Cc: Gordon Stevens <GStevens@adcogov.org>
Subject: RE: For Review: 2021 Adams County Oil & Gas Regulation Amendments

Hi Ryan,

Public Works disagrees with the use of existing County drainage culverts as this will impede stormwater flow and cause localized flooding and damage at these locations.

32. Temporary surface water lines

a. Operator shall use temporary surface water lines, unless infeasible.

b. Operator may use County Road Right-of-Way, and County drainage culverts for the

laying and operation of temporary water lines on the surface and in accordance with Adams County Standards and Regulations, unless infeasible.

c. Operator will bury temporary water lines at existing driveway and gravel road crossings, or utilize existing culverts, if available, with County approval.

From: Gordon Stevens <GStevens@adcogov.org>

Sent: Tuesday, April 13, 2021 10:38 AM

To: David Rausch <DRausch@adcogov.org>

Subject: FW: For Review: 2021 Adams County Oil & Gas Regulation Amendments

F.Y.I.

Gordon Stevens

Construction Inspection Supervisor,
Department of Public Works

Infrastructure Management Division

ADAMS COUNTY, COLORADO

4430 So, Adams County Parkway,

1st Floor, Suite W5802

Brighton, CO 80601-8218

O: 720-523-6965 | gstevens@adcogov.org, www.adcogov.org

C: 303-947-9633

From: Gregory Dean

Sent: Wednesday, April 7, 2021 11:47 AM

To: Gregory Dean <GDean@adcogov.org>

Subject: For Review: 2021 Adams County Oil & Gas Regulation Amendments

The Adams County Planning Commission and Board of County Commissioners are requesting comments on the following application: **Text Amendments to Chapters 2 and 4 of the Adams County Development Standards and Regulations.**

Applicant Information:

RYAN NALTY

4430 S. ADAMS COUNTY PKWY

BRIGHTON, CO 80601

Please forward any written comments on this application to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 or call (720) 523-6800 by 04/28/2021 in order that your comments may be taken into consideration in the review of this case. If you would like your comments included verbatim please send your response by way of e-mail to gdean@adcogov.org.

Once comments have been received and the staff report written, the staff report and notice of public hearing dates may be forwarded to you upon request. The full text of the proposed request can be obtained by contacting this office or by accessing the Adams County web site at: www.adcogov.org/regulation-amendments.

From: [Marette - DNR, Brandon](#)
To: [Gregory Dean](#)
Cc: [Hannah Posey - DNR](#); [Jordan Likes - DNR](#); [Matt Martinez - DNR](#)
Subject: Re: Review: 2021 Adams County Oil & Gas Regulation Amendments
Date: Thursday, June 10, 2021 5:27:14 PM

Please be cautious: This email was sent from outside Adams County

Good afternoon Greg,

My apologies for my delayed response. Overall it looks good.

Some questions/suggestions:

1. (Chapter 2, pdf page 5) I see that the county wants potential sites at least 500 feet apart from each other. However, CPW is incentivizing operators that co-locate (e.g., expanding an existing pad vs. a whole new pad nearby). From a wildlife perspective, our goal is to maximize the connectivity of landscapes (e.g., minimizing fragmentation). Is that addressed somewhere else or what are your thoughts on this disconnect?
2. (Chapter 2, overall) How is "wildlife" or "wildlife resources" defined by the county? Is it CPW's HPH list? All species (e.g., even meadowlarks)? Perhaps put a definition in Chapter 11?
3. (Chapter 4, pdf page 34, Cum Effects) How will the County be looking at Cum effects to wildlife from multiple facilities across time? Will there be an annual check-in with CPW to see what they are seeing on the landscape?
4. (Chapter 4, pdf page 45) Could a certain % of the penalties/fines go toward habitat protection (e.g., owned by Adams County Open Space) as way to further protect wildlife habitat (esp. those species affected by development)?

Regards,

Brandon B. Marette, CWB®
Northeast Region Energy Liaison and Land Use Coordinator



Direct [\(303\) 291-7327](tel:3032917327)

[6060 Broadway, Denver, CO 80216](mailto:6060Broadway.Denver.CO.80216)

brandon.marette@state.co.us

[CPW's Energy Webpage](#)



THINK SAFETY FIRST!



On Wed, May 19, 2021 at 11:45 AM Gregory Dean <GDean@adcogov.org> wrote:

The Adams County Planning Commission and the Board of County Commissioners are requesting comments on the second draft of text amendments to the County's oil & gas regulations via case number PLN2021-00004.

The full text of the proposed request can be obtained by accessing the Adams County website: www.adcogov.org/regulation-amendments or contacting this office. Proposed changes presented during the first public comment period are denoted in ~~red underlined and/or strikethrough text~~ while proposed changes for this second draft are denoted in ~~blue highlighted and/or strikethrough red text~~.

Please submit comments by way of e-mail to Greg Dean, Oil & Gas Liaison at gdean@adcogov.org by **June 9, 2021** for your comments to be taken into consideration in the review of this case. You may also forward any written responses on this application to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 or call (720) 523-6891.

Thank you for your review of this case and please let me know if you have any questions,



Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

O: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information



Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: **303.571.3306**
Facsimile: 303. 571. 3284
donna.l.george@xcelenergy.com

June 9, 2021

Adams County Community and Economic Development Department
4430 South Adams County Parkway, 3rd Floor, Suite W3000
Brighton, CO 80601

Attn: Greg Dean

**Re: 2021 Adams County Oil & Gas Regulation Amendments – Chapters 2 and 4
– 2nd referral, Case # PLN2021-0004**

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the documentation **2021 Adams County Oil & Gas Regulation Amendments**. Please be advised that Public Service Company has existing natural gas and electric *transmission* and *distribution* facilities throughout Adams County. PSCo has no objection to the proposed regulation amendments, contingent upon PSCo's ability to maintain all existing rights and these amendments should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities.

Should there be any issues regarding *transmission* facilities, the following must be contacted for review:

- **for Electric Transmission:** email coloradorightofway@xcelenergy.com or website www.xcelenergy.com/rightofway
- **for High Pressure Natural Gas Transmission:** https://www.xcelenergy.com/working_with_us/builders/encroachment_requests

Although "branded" as Xcel Energy, the legal owner and operator of the utility facilities in Colorado is Public Service Company of Colorado. All utility facilities and related land rights, including fee property, easements, permits, etc., are owned by, operated by and held in the name of Public Service Company of Colorado, a Colorado Corporation.

Donna George
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-571-3306 – Email: donna.l.george@xcelenergy.com

From: [BFR Plan Reviews](#)
To: [Gregory Dean](#)
Subject: RE: Review: 2021 Adams County Oil & Gas Regulation Amendments
Date: Monday, June 7, 2021 10:40:50 AM
Attachments: [image002.png](#)

Please be cautious: This email was sent from outside Adams County

Hello Greg,

Brighton Fire Rescue District does not have any comments for this project at this time. Please let us know if there is anything else you need from us.

Thank you



Julie Sovizdraniouk

Administrative Assistant
Brighton Fire Rescue District
500 S. 4th Ave – 3rd Floor
Brighton CO 80601
Office: 303.654.8016
www.brightonfire.org

From: Gregory Dean <GDean@adcogov.org>
Sent: Wednesday, May 19, 2021 11:46 AM
To: Gregory Dean <GDean@adcogov.org>
Subject: Review: 2021 Adams County Oil & Gas Regulation Amendments

The Adams County Planning Commission and the Board of County Commissioners are requesting comments on the second draft of text amendments to the County's oil & gas regulations via case number PLN2021-00004.

The full text of the proposed request can be obtained by accessing the Adams County website: www.adcogov.org/regulation-amendments or contacting this office. Proposed changes presented during the first public comment period are denoted in **red underlined and/or strikethrough text** while proposed changes for this second draft are denoted in **blue highlighted and/or strikethrough red text**.

Please submit comments by way of e-mail to Greg Dean, Oil & Gas Liaison at gdean@adcogov.org by **June 9, 2021** for your comments to be taken into consideration in the review of this case. You may also forward any written responses on this application to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 or call (720) 523-6891.

Thank you for your review of this case and please let me know if you have any questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

From: [Leonard - DNR, Mike](#)
To: [Gregory Dean](#); [Katie Keefe](#)
Subject: Ambient Sound Studies
Date: Thursday, April 22, 2021 11:31:45 AM

Please be cautious: This email was sent from outside Adams County

Greg,

I see you require ambient noise data and modeling during the permitting process. I'm not sure how long you process or how long your permits are good for, but a couple of things. Since the COGCC permit process may be lengthy and permits good for 3 years, operators may not be able to know what specific rigs or fleets they will be using, so it is tough to model. The same for ambient. We have been asking in the plan for the methodology for performing the study and modeling, then do it sooner to construction. We can discuss if you want.

--

Mike Leonard

Compliance Unit Manager



P [303.894.2100](tel:303.894.2100) x5109 | F [303.894.2109](tel:303.894.2109) | C 719.343.0130

1120 Lincoln Street, Suite 801, Denver, CO 80203

mike.leonard@state.co.us | www.colorado.gov/cogcc

Always try to associate yourself with and learn as much as you can from those who know more than you do, who do better than you, who see more clearly than you.

Dwight D.Eisenhower

April 28, 2021

Adams County, Community and Economic Development Department
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601-8216
GDean@adcogov.org

Dear Adams County Community and Economic Development Department,

Adams 12 Five Star Schools (Adams 12) appreciates the opportunity to comment on Adams County's proposed revisions to Chapters 2 and 4 of the Adams County Development Standards and Regulations that address oil and gas development within the county.

For the past five years, Adams 12 has been an active participant in advocating increased minimum setbacks for new oil and gas development to schools. Adams 12 Board of Education members also supported Senate Bill 19-181 which amended both the Local Government Land Use Control Enabling Act and the Colorado Oil and Gas Conservation Act.

Senate Bill 19-181 changed the mandate of the COGCC to better protect public health, safety, welfare and the environment resulting in the "Mission Change" rulemaking at the COGCC. During this rulemaking, the COGCC increased minimum setbacks from schools and childcare centers from 1,000 feet to 2,000 feet. (COGCC Rule 604.a.(3)). Adams 12 supported the change through written and direct testimony before the COGCC.

Senate Bill 19-181 also gave clear authority to local governments to pass stricter regulations than the rules of the COGCC – eliminating the threat of state preemption of local government land use regulations. (C.R.S. §34-60-131).

Adams 12 appreciates that Adams County has proposed to increase its setback from schools from 1,000 feet to 2,000 feet. Sec. 4-11-02-03-03(4). Adams 12 supports Adams County's proposed regulations that would increase protections provided by the COGCC rules. These include the following:

- Increased setbacks by measuring from the "edge of maximum disturbance."
- Increased setbacks from "designated parks and open space" to 2,000 feet. (Sec. 4-11-02-03-03-03(4))
- Increased community outreach that will require the operator to hold quarterly neighborhood meetings through the completion of the first well bore, if oil and gas development is located within ½ mile (2,640 feet) of any residential development, a school, or a child care facility. (Sec. 4-11-02-03-03-03(20))

One change that Adams 12 offers is to increase the time period for required neighborhood meetings. Drilling and completion activities have the greatest potential to cause nuisance and public health impacts. These drilling and completion activities can continue, 24 hours a day seven days a week, for many months. For that reason, Adams 12 requests that the quarterly neighborhood meetings be required through final drilling and completion activities rather than ending after completion of the first well bore.

Thank-you for allowing Adams 12 the opportunity to comment.

Sincerely,

A handwritten signature in blue ink, appearing to read "Chris Gdowski", with a long, sweeping horizontal line extending to the right.

Chris Gdowski
Superintendent

From: [Posey - DNR, Hannah](#)
To: [Gregory Dean](#)
Cc: [Marette - DNR, Brandon](#); [Jordan Likes - DNR](#)
Subject: Re: Adams County 20201 Oil & Gas Regulations - Stakeholder Meeting Follow-up
Date: Tuesday, April 27, 2021 12:29:20 PM

Please be cautious: This email was sent from outside Adams County

Hi Greg,

Thanks for having that agency stakeholder call last Thursday.

CPW appreciates the inclusion of wildlife and waterways in the new rules, and we don't have any major concerns, though we do have the following questions:

- Can you help us understand the county's process for reviewing new O&G permits and how they expect CPW to be involved? For example, would these be Zoom meetings that CPW could discuss site-specific wildlife concerns (or no wildlife concerns)? Or does CPW need to send the County a response with every new O&G permit?
- On one of your first slides, you mentioned "migration pathways". Is that in reference to birds or deer? If it's in reference to deer, please change to "movement corridors" since there isn't the seasonal migration that West Slope deer species complete.
- Will solar facilities have a similar 2,000-foot setback from creeks?
 - (Also to clarify for the O&G rules, that's 1,000 on each side of the creek, right?)
- While we're still having internal wildlife mitigation sideboard meetings, would the County's Open Space program possibly be interested in teaming with CPW for habitat protections (fee title and conservation easements) primarily for deer severe winter ranges?

Regards,

Hannah Posey

On Thu, Apr 22, 2021 at 2:57 PM Gregory Dean <GDean@adcogov.org> wrote:

Good afternoon - Thank you to all those who were able to attend and participate in today's stakeholder meeting. The slides from today's presentation are included with this email, I encourage you all to submit written comments on the draft regulations by April 28, 2021 (use link below) – however the County will accept comments until the hearing deadlines. Also attached are the County's setback maps presented in today's meeting as requested by several stakeholders. The recordings of today's meeting should be posted on the oil and gas information page soon.

<https://www.adcogov.org/regulation-amendments>

<https://www.adcogov.org/oil-and-gas-information>



Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information

County operating hours are Tuesday through Friday, 7 a.m. to 5:30 p.m. Staff are working flexible schedules to accommodate operating hours, however, my office hours and availability remain Monday – Friday, 8 a.m. to 4:30 p.m.

--

Hannah Posey
District Wildlife Manager - Brighton



P 303.291.7214
6060 Broadway, Denver, CO 80216
hannah.posey@state.co.us | cpw.state.co.us

Gregory Dean

From: Williams - DNR, Joanna <joanna.williams@state.co.us>
Sent: Thursday, April 8, 2021 3:53 AM
To: Gregory Dean
Subject: Re: For Review: 2021 Adams County Oil & Gas Regulation Amendments

Please be cautious: This email was sent from outside Adams County

Good Morning Gregory,
Our office does not have any comments on the 2021 Adams County Oil & Gas Regulation Amendment. However, please contact me if the county has any specific questions for our office.
Regards,

Joanna Williams, P.E.
Water Resource Engineer



P 303.866.3581 x 8265
1313 Sherman Street, Room 821, Denver, CO 80203
Joanna.Williams@state.co.us | www.colorado.gov/water

On Wed, Apr 7, 2021 at 11:47 AM Gregory Dean <GDean@adcogov.org> wrote:

The Adams County Planning Commission and Board of County Commissioners are requesting comments on the following application: **Text Amendments to Chapters 2 and 4 of the Adams County Development Standards and Regulations.**

Applicant Information:

RYAN NALTY

4430 S. ADAMS COUNTY PKWY

BRIGHTON, CO 80601

Please forward any written comments on this application to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 or call (720) 523-6800 by 04/28/2021 in order that your comments may be taken into consideration in the review of this



Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: **303.571.3306**
Facsimile: 303. 571. 3284
donna.l.george@xcelenergy.com

April 26, 2021

Adams County Community and Economic Development Department
4430 South Adams County Parkway, 3rd Floor, Suite W3000
Brighton, CO 80601

Attn: Greg Dean

Re: 2021 Adams County Oil & Gas Regulation Amendments – Chapters 2 and 4

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the documentation **2021 Adams County Oil & Gas Regulation Amendments**. Please be advised that Public Service Company has existing natural gas and electric *transmission* and *distribution* facilities throughout Adams County. PSCo has no objection to the proposed regulation amendments, contingent upon PSCo's ability to maintain all existing rights and these amendments should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities.

Should there be any issues regarding *transmission* facilities, the following must be contacted for review:

- **for Electric Transmission:** email coloradorightofway@xcelenergy.com or website www.xcelenergy.com/rightofway
- **for High Pressure Natural Gas Transmission:** https://www.xcelenergy.com/working_with_us/builders/encroachment_requests

Although "branded" as Xcel Energy, the legal owner and operator of the utility facilities in Colorado is Public Service Company of Colorado. All utility facilities and related land rights, including fee property, easements, permits, etc., are owned by, operated by and held in the name of Public Service Company of Colorado, a Colorado Corporation.

Donna George
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-571-3306 – Email: donna.l.george@xcelenergy.com

From: [Diane Kocis](#)
To: [Gregory Dean](#)
Cc: [Terri Maulik](#); [Referrals](#)
Subject: Arapahoe County's referral comments/questions on Adams County's O&G rules revisions
Date: Wednesday, June 2, 2021 6:39:47 PM

Please be cautious: This email was sent from outside Adams County

Hello Greg,

We don't really have comments. Just questions.

We have no comments/questions on Chapter 2.

Re Chapter 4:

I'm not clear on what the rough grading footprint is. I only understand that it's part of the disturbed area. Could you elaborate?

Is this phrase from communication with CPW? "... *within 300 feet of the ordinary high-water mark of any water body, unless the dust suppressant is water.*"

We have no comments/questions on Chapter 11.

Thank you for the opportunity to review the rule changes! It's obvious that a lot of work went into the rules.

Diane Kocis

Energy Specialist

Arapahoe County Planning Division

dkocis@arapahoegov.com



Engineering Services Division Referral Comments

May 25, 2021

The Community and Economic Development Department
Adams County
4430 South Adams County Parkway, 1st Floor, Suite W2000A
Brighton, CO 80601
Attn: Greg Dean at gdean@adcogov.org, Oil & Gas Liaison

RE: PLN2021-00004 OIL & GAS REGULATIONS

Engineering Services Division of Arapahoe County Public Works and Development (Staff) thanks you for the opportunity to review the outside referral for the proposed Oil and Gas Regulations. The Engineering Division has no comments regarding the referral at this time based on the information submitted.

Please know that other Divisions in the Arapahoe County Public Works Department may submit comments as well.

If you have any questions, please feel free to contact our offices at 720-874-6500.

Thank you,

Sue Liu, PE, CFM
Engineering Services Division
Arapahoe County Public Works & Development
Re: County Case # O21-097

MEMO

COMMUNITY DEVELOPMENT DEPARTMENT

To: Gregory Dean, Oil & Gas Liaison

From: Omar Yusuf, City Planner

Subject: PLN2021-00004

Date: June 8th, 2021

To the Adams County Board of Commissioners,

Thank you for allowing Commerce City to comment on the Text Amendments to Chapters 2 and 4 of the Adams County Development Standards and Regulations which is County-wide that may have an impact on our jurisdiction. The city has no additional comments:

If you have any questions, please contact me at oyusuf@c3gov.com or (303) 227-7187



MEMO

COMMUNITY DEVELOPMENT DEPARTMENT

To: Gregory Dean, Oil & Gas Liaison

From: Omar Yusuf, City Planner

Subject: PLN2021-00004

Date: April 29th, 2021

To the Adams County Board of Commissioners,

Thank you for allowing Commerce City to comment on the Text Amendments to Chapters 2 and 4 of the Adams County Development Standards and Regulations which is County-wide that may have an impact on our jurisdiction. The city has the following comments:

1. There is reference made to an Appendix A (regarding the Water Quality Plan) in the notes; however, I do not see it referenced in the revised body of chapter 4.
Chris Hodyl, P.E., CFM Development Review Manager – Public Works Department

If you have any questions, please contact me at oyusuf@c3gov.com or (303) 227-7187





Referral Listing
Case Number PLN2021-00004
2021 Oil & Gas Amendments to the ACDS&R

Agency	Contact Information
27J Schools	Kerrie Monti 1850 Egbert St Suite 140, Box 6 Brighton CO 80601 303-655-2984 kmonti@sd27j.net
ABERDEEN METROPOLITAN DISTRICT NO 2	BARBARA VANDER 7400 E ORCHARD RD SUITE 3300 GREENWOOD VILLAGE CO 80111 303 770-2700
Aberdeen Metropolitan District, No. 1	Barbara Vander Wall Seter & Vander Wall, P.C. 7400 E Orchard Rd, Suite 3300 Greenwood Village CO 80111 303.7 svw@svwpc.com
ADAMS 12 FIVE STAR SCHOOLS	MATT SCHAEFER - PLANNING MANAGER 1500 E. 128TH AVENUE THORNTON CO 80241 720-972-4289 matt.schaefer@adams12.org
ADAMS ARAPAHOE SCHOOL DISTRICT 28J	Joshua Hensley 15701 E 1ST AVE STE 206 AURORA CO 80011 303-365-7812 jdhensley@aurorak12.org
Adams County Attorney	Christine Fitch 4430 S Adams County Pkwy Brighton CO 80601 720-523-6352 CFitch@adcogov.org
Adams County CEDD Administrative	Gina Maldonado 4430 S Adams County Pkwy Brighton CO 80601 720-523-6823 gmaldonado@adcogov.org
Adams County CEDD Building Safety	Justin Blair 4430 S Adams County Pkwy Brighton CO 80601 720-523-6825 JBlair@adcogov.org

Agency	Contact Information
Adams County CEDD Engineer	Devt. Services Engineering 4430 S Adams County Pkwy Brighton CO 80601 720-523-6800 Contact Person May Vary Depending on Case
Adams County CEDD Right-of-Way	David Dittmer 4430 S Adams County Pkwy. Brighton CO 80601 720-523-6837 ddittmer@adcogov.org
Adams County CSWB Code Compliance Officer	Brooke Pettry 4430 S Adams County Pkwy Brighton CO 80601 720.523.6206 bpettry@adcogov.org
Adams County CSWB Code Compliance Officer	Ryan Dodge 4430 S Adams County Pkwy Brighton CO 80601 720.523.6207 rdodge@adcogov.org
Adams County CSWB Code Compliance Officer	Kerry Gress 4430 S Adams County Pkwy Brighton CO 80601 720.523.6832 kgress@adcogov.org
Adams County CSWB Code Compliance Officer	Rudy Martinez 4430 S Adams County Pkwy Brighton CO 80601 720.523.6833 rrmartinez@adcogov.org
Adams County CSWB Neighborhood Services Division	Gail Moon 4430 S Adams County Pkwy Brighton CO 80601 720-523-6856 gmoon@adcogov.org
Adams County Fire Protection District	Carla Gutierrez 7980 Elmwood Ln. Denver CO 80221 303-539-6862 cgutierrez@acfpd.org
Adams County Fire Protection District	Whitney Even 7980 Elmwood Lane Denver CO 80221 303-539-6802 weven@acfpd.org
Adams County POSCA Deputy Director	Marc Pedrucci 9755 Henderson Rd Brighton CO 80601 303-637-8014 mpedrucci@adcogov.org

303-539-6802

Agency	Contact Information
Adams County POSCA Director	Byron Fanning 9755 Henderson Rd Brighton CO 80601 303-637-8000 bfanning@adcogov.org
Adams County POSCA Natural Resource Specialist	Aaron Clark 9755 Henderson Rd Brighton CO 80601 (303) 637-8005 aclark@adcogov.org
Adams County School District 14	Leo Rodriguez 4211 E 68th Ave Commerce City CO 80022 303.853.7901 lrodriguez@adams14.org
Adams County Sheriff	Rick Reigenborn 4430 S Adams County Pkwy Brighton CO 80601 (303) 654-1850 rreigenborn@adcogov.org
Adams County Sheriff	Community Connections 4430 S Adams County Pkwy Brighton CO 80601 303-655-3283 CommunityConnections@adcogov.org
Adams East Metropolitan District	160TH AVENUE HOLDINGS LLC 5460 S QUEBEC STREET SUITE 110 GREENWOOD VILLAGE CO 80111 .
AMBER CREEK METROPOLITAN DISTRICT	BARBARA VANDER 7400 E ORCHARD RD, SUITE 3300 GREENWOOD VILLAGE CO 80111 303 770-2700
Arvada Fire Department	Steven Parker 7903 Alison Way Arvada CO 80005 303-424-3012 steven.parker@arvadafire.com
Aspen Hills Metropolitan District	Barbara Vander Wall Seter & Vander Wall, P.C. 7400 E Orchard Rd, Suite 3300 Greenwood Village CO 80111 303.770.2700 svw@svwpc.com
Bennett Fire Protection District #7	Captain Caleb J Connor 355 4th St Bennett CO 80102 303-532-7733 CalebConnor@BennettFireRescue.org

303-644-3572

Agency	Contact Information
Bennett Fire Protection District #7	Chief Earl Cumley 355 4th St Bennett CO 80102 303-644-3572 earlcumley@bennettfirerescue.org
Bennett Parks & Recreation District	Leila Schaub 455 S 1st Street Bennett CO 80102-0379 303-644-5040 director@bennettrec.org
BENNETT SCHOOL DISTRICT 29J	Robin Purdy 615 7TH ST. BENNETT CO 80102 303-644-3234 Ext: 8203 robinp@bsd29j.com
Berkeley Neighborhood Association	Wendy Carter 4420 W 52nd Pl Denver CO 80212 (303) 888-6350 (303) 477-9669 berkeleyneighborhoodassoc@gmail.com
Berkeley Sanitation District	Sharon Whitehair 1600 W 12th Ave (303)628-6620 berkeleywater@gmail.com
Box Elder Estates Home Owners Association	Todd Larson 3190 S. Vaughn Way Suite 550 Aurora CO 8023480014 720.571.1440 970.581.8939 tlarson@servicepluscm.com
Box Elder Water & Sanitation District	Barbara Vander Wall c/o Collins, Cockrel, & Cole P.C. 390 Union Boulevard, Suite 400 Lakewood CO 80228 303 770-2700
BRIGHTON FIRE DISTRICT	Elizabeth Bednarcik 500 S 4th Ave 3rd Floor Brighton CO 80601 (303) 659-4101 planreviews@brightonfire.org
Bromley Park Metro District	. . 6399 S Fiddlers Green Circle Greenwood Village CO 80111-4949 303-779-4525
Byers Fire Protection District	Chief Michael Disher PO Box 85 Byers CO 80103 303-822-5208 mdisher@byersfire.org

Agency	Contact Information
BYERS SCHOOL DISTRICT 32J	TOM TURRELL 444 E FRONT ST BYERS CO 80103 303-822-5292 x111 turrell.tom@byers.k12.co.us
Central Colorado Water Conservancy District	Randy Ray 3209 W 28th Street Greeley CO 80634 970-330-4540 rray@ccwcd.org
Century Link	Joseph Osbourne 303.518.3360 RCUs only: joseph.osborne@centurylink.com
Century Link	Network Real Estate Team 303.518.3360 VSPs ONLY: relocations@centurylink.com
Century Link	NRE Easement 303.518.3360 PLTs ONLY: nre.easement@centurylink.com
Century Link, Inc	Ken Miller 5325 Zuni St, Rm 728 Denver CO 80221 303.518.3360 RCUs ONLY: kenneth.r.miller@lumen.com
City of Arvada	Rob Smetana 8101 Ralston Rd Arvada CO 80002 (720)898-7444 rsmetana@arvada.org
City of Aurora	Aja Tibbs 15151 E Alameda Pkwy 2nd Floor Aurora CO 80012 (303) 739-7227 atibbs@auroragov.org
City of Aurora - Aurora Water	Marshall Brown 15151 E Alameda Pkwy #3600 Aurora CO 80012 303-739-7370 mbrown@ci.aurora.co.us
City of Brighton Planning	Jason Bradford 500 S 4th Ave Brighton CO 80601 303-655-2024 jbradford@brightonco.gov

Agency	Contact Information
City of Commerce City	Omar Yusuf 7887 E 60th Ave Commerce City CO 80022 303-289-3693 oyusuf@c3gov.com
City of Federal Heights	Tim Williams 2380 W 90th Ave Federal Heights CO 80260 303-428-3558 twilliams@fedheights.org
City of Federal Heights	Renae Stavros 2380 W 90th Ave Federal Heights CO 80260 303.412.3530 rstavros@fedheights.org
CITY OF NORTHGLENN	Brook Svoboda 11701 COMMUNITY CENTER DRIVE NORTHGLENN CO 80233-8061 303-450-8937 bsvoboda@northglenn.org
City of Thornton	Warren Campbell 9500 Civic Center Dr Thornton CO 80229 303-538-7670 developmentsubmittals@cityofthornton.net
City of Thornton	James Kaiser 12450 Washinton St Thornton CO 80241 720.977.6266 jim.kaiser@thorntonco.gov
CITY OF THORNTON	JASON O'SHEA 9500 CIVIC CENTER DR THORNTON CO 80229 0
City of Westminster	Alexander Gan Public Works & Utilities 4800 W 92nd Ave 303.658.2272 agan@cityofwestminster.us
CITY OF WESTMINSTER	Rita McConnell 4800 W 92ND AVE. WESTMINSTER CO 80031 303-658-2093 planning@cityofwestminster.us
Colorado Department of Transportation (CDOT)	Steve Loeffler 2829 W Howard Pl 2nd Floor Denver CO 80204 303-757-9891 steven.loeffler@state.co.us

Agency	Contact Information
COLORADO INTERNATIONAL CENTER	BJ MURATA 141 UNION BLVD., SUITE 150 LAKEWOOD CO 80228 303-987-0835
COMCAST	JOE LOWE 8490 N UMATILLA ST FEDERAL HEIGHTS CO 80260 303-603-5039
Creekside South Estates Metro District	White Bear Ankele Tanaka Waldron 2154 East Commons Avenue, Suite 2000 Centennial CO 80122 303-858-1800 jtanaka@wbapc.com
Crestview Water & Sanitation District	Mitchell Terry PO Box 666 Westminster CO 80036 303-429-1881 manager@crestviewwater.com
Deer Trail Fire Department	Chief Richard Loveless PO Box 257 Deer Trail CO 80105 303.619.7898 rloveless.dtfire@gmail.com
Deer Trail School District 26J	BJ Buchmann PO Box 129 Deer Trail CO 80105 303-769-4421X110 bbuchmann@dt26j.com
Denver Water	Paul Peloquin 4455 W 58th Ave Unit A Arvada CO 80002 (303) 477-1914 paul.peloquin@denverwater.org
Denver Water	Kela Naso 4455 W 58th Ave Unit A Arvada CO 80002 303-628-6620 Kela.Naso@denverwater.org
Eagle Creek Metropolitan District	Barbara Vander Wall Seter & Vander Wall, P.C. 7400 E Orchard Rd, Suite 3300 Greenwood Village CO 80111 30 303 770-2701 svw@svwpc.com

Agency	Contact Information
Eagle Shadow Metropolitan District No 1	Russell W Dykstra Spencer Fane 1700 Lincoln Street, Suite 2000 Denver CO 80203 303-839-3800 rdykstra@spencerfane.com
Eastern Adams County Metropolitan District	Mike Serra, III 270 St. Paul Street Suite 300 Denver CO 80206 (303) 371-9000 mike.serra@paulscorp.com
FIRST CREEK RANCH METRO DIST.	. . c/o Miller & Associates Law Offices, LLC 1641 California Street, Suite 300 DENVER CO 80202 303-285-5320
GOAT HILL	SHARON WHITEHAIR 2901 W 63RD AVE SP:0047 DENVER CO 80221 720 480-2831 sharonwhitehair@gmail.com
GREATROCK NORTH HOA	CYRENA DRUSE 28650 E 160TH PL BRIGHTON CO 80603 720-233-8817
Greatrock Water District	Lisa Johnson Clifton Larson Allen, LLP 8390 E Crescent Pkwy, Ste 300 Greenwood Village CO 80111 303.779.5710 lisa.johnson@claconnect.com
HAZELTINE HEIGHTS WATER & SANITATION	KEITH SABIN P.O. BOX 38 HENDERSON CO 80640 303-916-3800 hhw_sd@comcast.net
HERITAGE AT TODD CREEK METRO DIST.	GARY BEUTLER 2154 E. Commons Ave. Suite 2000 Centennial CO 80122 303-868-8131
Hi-Land Acres Water & Sanitation District	Gabby Begeman 10086 E 159th Ave Brighton CO 80601 303-912-3769 bigwind111@yahoo.com
HIMALAYA WATE AND SANT. DIST	MATHEW DALTON 1700 LINCOLN ST., SUITE 3800 DENVER CO 80203 303-839-3800

Agency	Contact Information
HORSE CREEK METROPOLITAN DISTRICT	.. 12000 N WASHINGTON ST #100 THORNTON CO 80241 303-451-6270 ddfinley@juno.com
INDUSTRIAL PARK	KEARBY COTTER 6625 E. 49TH AVE. COMMERCE CITY CO 80022 303-288-1511
Intermountain Rural Electric Association (IREA)	Brooks Kaufman PO Box Drawer A 5496 North US Hwy 85 Sedalia CO 80135 720.733.5493 bkaufman@irea.coop
Intermountain Rural Electric Association (IREA)	Customer Contact 5496 N US Hwy 85 Sedalia CO 80135 303-688-3100 customercontact@irea.coop
Mapleton School District #1	Charlotte Ciano 7350 N Broadway Denver CO 80221 303-853-1015 charlotte@mapleton.us
METRO WASTEWATER RECLAMATION	CRAIG SIMMONDS 6450 YORK ST. DENVER CO 80229 303-286-3338 CSIMMONDS@MWRD.DST.CO.US
MOBILE GARDENS	VERA MARIE JONES 6250 FEDERAL #29 DENVER CO 80221 303-429-5856
MORGAN COUNTY RURAL ELECTRIC	KEVIN MARTENS P.O. BOX 738 FORT MORGAN CO 80701-0738 970-867-5688 kmartens@mcrea.org
Neighborhood Improvement Committee	LARRY QUINTANA 7780 MAGNOLIA ST COMMERCE CITY CO 80022 3039557758
North Lincoln Water and Sanitation District	- - - nlwsdistrict1@gmail.com

Agency	Contact Information
North Lincoln Water and Sanitation District	JORGE HINOJOS 1560 Broadway Suite 1400 Denver CO 80202 303-861-0061 jorge.hinojos@tetrattech.com
North Metro Fire District	Steve Gosselin 101 Spader Way Broomfield CO 80020 (303) 252-3540 sgosselin@northmetrofire.org
North Pecos Water & Sanitation District	Courtney Salazar 6900 Pecos St Denver CO 80221 303-429-5770 ar@northpecoswater.org
North Washington Street Water & San Dist	Mike DeMattee 3172 E 78th Ave Denver CO 80229 303-288-6664 mdemattee@nwsbsd.com
Northridge Estates at Gold Run HOA	Shane Lussier 14901 E Hampden Ave Suite 320 AURORA CO 80014 303-693-2118 shane@cchoapros.com
Pecos Park Logistics Park Metro District	Matt Mitchell 4221 Brighton Blvd Denver CO 802163719 303-298-1111 mmitchell@westfield-co.com
PERL MACK NEIGHBORHOOD GROUP	DAN MICEK - PRESIDENT 7294 NAVAJO ST. DENVER CO 80221 303-428-8557 DANMICEK54@COMCAST.NET
Pomponio Terrace Metropolitan District	Zachary White 2154 E Commons Ave #2000 Centennial CO 80122 303-858-1800 zwhite@wbapc.com
PRAIRIE CENTER METRO NO. #1	MCGEADY SISNEROS, P.C. 141 Union Boulevard, Suite 150 Lakewood CO 80228 303.592.4380

Agency	Contact Information
Public Service Company of Colorado (PSCo) dba Xcel Energy	- - 1123 W 3rd Ave Denver CO 80223 303.571.3306 bdrco@xcelenergy.com
Public Service Company of Colorado (PSCo) dba Xcel Energy	- - 1123 W 3rd Ave Denver CO 80223 303.571.3306 bdrco@xcelenergy.com
Public Service Company of Colorado (PSCo) dba Xcel Energy	Donna George 1123 W 3rd Ave DENVER CO 80223 303-571-3306 Donna.L.George@xcelenergy.com
Public Service Company of Colorado (PSCo) dba Xcel Energy	Donna George 1123 W 3rd Ave DENVER CO 80223 303-571-3306 Donna.L.George@xcelenergy.com
PVPOA / PRAIRIE VIEW HOMEOWNERS ASSOC.	DIANA HUTCHERSON P.O. BOX 96 WATKINS CO 80137 720 891-2192
Regional Transportation District (RTD)	Paul Von Fay 1560 Broadway Suite 700 Denver CO 80202 303-299-2317 engineering@rtd-denver.com
RIVERDALE DUNES METRO DIST. #1	- - 141 UNION BLVD. LAKEWOOD CO 80228-1814 303-987-0835
Riverdale Peaks Metro District	Lisa Johnson 141 Union Blvd, Suite 150 Lakewood CO 80228 303-987-0835 ljohnson@sdmsi.com
Rocky Mountain Rail Park Metropolitan District	Brian Fallin Rail Land Company LLC 4601 DTC Blvd Ste 120 Denver CO 80237 303-872-3451 bfallin@rockymountainindustrials.com
Sable Altura Fire District	Hope Williams 26900 E. Colfax Ave Space 52 Aurora CO 80018 303-364-7187 admin@sablealturafire.org

Agency	Contact Information
Sand Creek Metropolitan District	Mike Serra III 100 St Paul Street Suite 300 Denver CO 80206 303.371.9000 mike.serra@paulscorp.com
SECOND CREEK RANCH METRO DIST	CREEK SECOND c/o Miller & Associates Law Offices, LLC 1641 California Street, Suite 300 DENVER CO 80202 303-285-5320
SHAW HEIGHTS WATER DISTRICT	LLOYD-PRESIDENT O'NEAL 8870 Hunter Way WESTMINSTER CO 80031 .
South Adams County Fire District	Fire Prevention Division 6050 Syracuse St Commerce City CO 80022 303-288-0835 planreview@sacfd.org
South Adams County Fire District	Randall Weigum 6050 Syracuse St Commerce City CO 80022 720-573-9790 rweigum@sacfd.org
South Adams County Water & San Dist	Abel Moreno 10200 E 102nd Ave Henderson CO 80022 720-206-0590 amoreno@sacwsd.org
South Adams County Water & San Dist	Sharleen Maier 10200 E 102nd Avenue Henderson CO 80022 720.206.0590 smaier@sacwsd.org
South Adams County Water & Sanitation District	Nelson Jeff 10200 E 102nd Avenue Henderson CO 80640 720.206.0593 jnelson@sacwsd.org
Southeast Weld Fire Protection District	Chief Tom Beach 95 W Broadway Ave Keenesburg CO 80643 303-732-4203 tbeach@seweldfire.org
Strasburg Fire Protection District #8	Sheri Mills PO Box 911 Strasburg CO 80136 303-622-4814 sheri.mills@svfd8.org

FAX: 303-288-5977

720.530.8396

Agency	Contact Information
Strasburg Fire Protection District #8	Patrick Conroy PO Box 911 303.775.8515 pconroy@svfd.org
STRASBURG PARKS AND REC DIST.	Angie Graf P.O. BOX 118 STRASBURG CO 80136 (303) 622-4260 angie@strasburgparks.org
Strasburg School District 31J	Monica Johnson 56729 E Colorado Ave Strasburg CO 80136 303-622-9211 mjohnson@strasburg31j.com
Strasburg Water & Sanitation Dist	Tracy Griffin PO Box 596 Strasburg CO 80136 303-622-4443 strawaternsan@tds.net
The TOD Group	THE TOD GROUP 1431 Euterpe Street New Orleans LA 70130 5047174718
Thornton Fire Department	Stephanie Harpring 9500 Civic Center Dr Thornton CO 80229-4326 303-538-7602 firedept@cityofthornton.net
TODD CREEK FARMS METRO DIST #2	Zachary White 2154 E. Commons Ave, STE 2000 Centennial CO 80122 303-858-1800 zwhite@wbapc.com
TODD CREEK METRO DISTRICT #2	. . 141 UNION BLVD SUITE 150 LAKEWOOD CO 80228 (303) 592-4380 dmccoy@sdmsi.com
Todd Creek Village Metropolitan District	Don Summers 10450 E. 159th Ct. BRIGHTON CO 80602 303-637-0344 don@toddcreekvillage.org
Todd Creek Village Metropolitan District	Jimmy Ogé Equinox Land Group 10450 E. 159th Court BRIGHTON CO 80602 (303) 659-8866 jimmy@equinoxland.com

Agency	Contact Information
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Town of Bennett - Water & Sanitation District	. . 355 4th St. BENNETT CO 80102 303-644-3249
TOWN OF LOCHBUIE	MARI SANCHEZ 703 WCR 37 Lochbuie LOCHBUIE CO 80603 (303) 655-9308
TRANSPORT METROPOLITAN DISTRICT NO. 1	GARY R WHITE c/o White Bear & Ankele 1805 SHEA CENTER DR, SUITE 100 HIGHLANDS RANCH CO 80129 303 858-1800
Union Pacific Railroad	Rod Carroll 1400 Douglas St Stop 1690 Omaha NE 68179 402-544-2255 rscarroll@up.com
United Power	Samantha Riblett 500 Cooperative Way Brighton CO 80603 303-659-0551 platreferral@unitedpower.com
VANTAGE ESTATES	JERILYN JAMES 30085 E 128TH AVE COMMERCE CITY CO 80022 .
WADLEY FARMS HOA	Bob Olivier PO BOX 1208 EASTLAKE CO 80614 303.457.9789 303.550.9682 wadleyfarmshoa@msn.com
Welby Citizen Group	Norma Frank 7401 Race St Denver CO 80229 (303) 288-3152 nfrank@coloradolighting.com
WELD COUNTY SCHOOL DIST. RE-3J	MARVIN WADE P.O. BOX 269 KEENESBURG CO 80643 303-536-2000 marvin@rebel-net.tec.co.us

Agency

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Westminster Fire Department

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9110 Yates St
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303.658.4545
jgaglian@cityofwestminster.us

WESTMINSTER SCHOOL DISTRICT #50

Jackie Peterson
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WESTMINSTER CO 80030
720-542-5100
jpeterson@adams50.org

WIGGINS SCHOOL DIST. RE50J

DR. SHAROL LITTLE
320 CHAPMAN ST
WIGGINS CO 80654
970-483-7762 x 202
rmiller@wiggins50.k12.co.us

WRIGHT FARMS METRO DISTRICT

KIM J. SETER, ESQ
7400 E ORCHARD RD STE 3300
GREENWOOD VILLAGE CO 80111
303-770-2700
svw@svwpc.com

From: [Gregory Dean](#)
To: [Gregory Dean](#)

Bcc: [admin@sablealturafire.org](#); [Alan Sielaff](#); [Christine Fitch](#); [clintf@esrta.com](#); [CSIMMONDS@MWRD.DST.CO.US](#); [customercontact@irea.coop](#); [cwilder@acfpd.org](#); [cwjones@auroragov.org](#); [DANMICEK54@COMCAST.NET](#); [dbach@erieco.gov](#); [dbeaver@coloradohazard.com](#); [ddfinley@juno.com](#); [David Dittmer](#); [deertraileastadams@gmail.com](#); [denplanningreferrals@flydenver.com](#); [DenverRegulatoryMailbox@usace.army.mil](#); [Development.Services@denvergov.org](#); [developmentsubmittals@cityofthornton.net](#); [Douglas Fish](#); [director@bennettrec.org](#); [dmallory@udfcd.org](#); [dmccoy@sdmsi.com](#); [dmerkle@bennett.co.us](#); [don.halffield@xcelenergy.com](#); [don@toddcreekvillage.org](#); [Donna.L.George@xcelenergy.com](#); [dpepper@associacolorado.com](#); [David Rausch](#); [Dave Ruppel](#); [eburke@brightonco.gov](#); [Chief Earl Cumley](#); [Eric Hammond](#); [elise.brenninkmeyer@flydenver.com](#); [engineering@rtd-denver.com](#); [firedept@cityofthornton.net](#); [mike.leonard@state.co.us](#); [fireprevention@northmetrofire.org](#); [frankdoyle@tds.net](#); [garry.zieske@kindermorgan.com](#); [gb173@outdrs.net](#); [GChiapella@drcog.org](#); [GDANGLER@RMRHOLDINGS.COM](#); [Gina Maldonado](#); [Gail Moon](#); [grgalcaro@aol.com](#); [Gordon Stevens](#); [hannah.posey@state.co.us](#); [hausenberger@blingfoo.com](#); [henrygo1125@gmail.com](#); [hhw_sd@comcast.net](#); [jared.ebert@state.co.us](#); [Jared Pahl@tdtelecom.com](#); [Jason.G.Eddleman@usps.gov](#); [jbradford@brightonco.gov](#); [jdhenley@aurorak12.org](#); [jerry.foster@denverwater.org](#); [jgaglian@cityofwestminster.us](#); [jimmy@equinoxland.com](#); [jmegggers@crs.ofcolorado.com](#); [jnelson@sacwsd.org](#); [joanna.williams@state.co.us](#); [jody@steelepc.com](#); [joe.busto@state.co.us](#); [john.sweeney@faa.gov](#); [jorge.hinojos@tetrattech.com](#); [jpeterson@adams50.org](#); [jrodriqu@email.usps.gov](#); [Jen Rutter](#); [jitanaka@wbapc.com](#); [jwolfort@jeffco.us](#); [Kela.Naso@denverwater.org](#); [Kerry Gress](#); [Katie Griego](#); [Katie Keefe](#); [klloyd@raqc.org](#); [kmartens@mcrea.org](#); [Kevin Mills](#); [kmonti@sd27j.net](#); [landuse@tchd.org](#); [Lisa Culpepper](#); [lgonzales@brightonco.gov](#); [lionconsult@qwest.net](#); [lisa.johnson@claconnect.com](#); [ljohnson@sdmsi.com](#); [Irodriquez@adams14.org](#); [Libby Tart](#); [manager@crestviewwater.com](#); [manager@henrylyn.com](#); [manuel@farmersres.com](#); [martinccinc@msn.com](#); [marvin@rebel-net.tec.co.us](#); [matt.schaefer@adams12.org](#); [mbrown@ci.aurora.co.us](#); [Max Daffron](#); [mdeatrich@tchd.org](#); [mdemattee@nwsd.com](#); [mdisher@byersfire.org](#); [Matthew Emmens](#); [Margaret Grondalski](#); [mike.serra@paulcorp.com](#); [Juliana J. 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Subject: Review: 2021 Adams County Oil & Gas Regulation Amendments
Date: Wednesday, May 19, 2021 11:45:00 AM

The Adams County Planning Commission and the Board of County Commissioners are requesting comments on the second draft of text amendments to the County's oil & gas regulations via case number PLN2021-00004.

The full text of the proposed request can be obtained by accessing the Adams County website: www.adcogov.org/regulation-amendments or contacting this office. Proposed changes presented during the first public comment period are denoted in **red underlined and/or strikethrough text** while proposed changes for this second draft are denoted in **blue highlighted and/or strikethrough red text**.

Please submit comments by way of e-mail to Greg Dean, Oil & Gas Liaison at gdean@adcogov.org by **June 9, 2021** for your comments to be taken into consideration in the review of this case. You may also forward any written responses on this application to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 or call (720) 523-6891.

Thank you for your review of this case and please let me know if you have any questions,

Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org www.adcogov.org/oil-and-gas-information



Request for Comments

Case Name: 2021 Oil & Gas Amendments to the Adams County Developr
Case Number: PLN2021-00004

April 6, 2021

The Adams County Planning Commission and Board of County Commissioners are requesting comments on the following application: **Text Amendments to Chapters 2 and 4 of the Adams County Development Standards and Regulations.**

Applicant Information: Adams County
Ryan Nalty
4430 S. Adams County Pkwy
Brighton, CO 80601

Please forward any written comments on this application to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 or call (720) 523-6800 by 04/28/2021 in order that your comments may be taken into consideration in the review of this case. If you would like your comments included verbatim please send your response by way of e-mail to GDean@adcogov.org.

Once comments have been received and the staff report written, the staff report and notice of public hearing dates may be forwarded to you upon request. The full text of the proposed request can be obtained by contacting this office or by accessing the Adams County web site at: www.adcogov.org/regulation-amendments.

Thank you for your review of this case.

Gregory Dean
Oil & Gas Liaison

BOARD OF COUNTY COMMISSIONERS

Eva J. Henry
DISTRICT 1

Charles "Chaz" Tedesco
DISTRICT 2

Emma Pinter
DISTRICT 3

Steve O'Dorisio
DISTRICT 4

Lynn Baca
DISTRICT 5

PUBLICATION REQUEST

Oil and Gas Amendments to the County's Development Standards and Regulations

Case Number: PLN2021-00004

Planning Commission Hearing Date: 7/8/2021 at 6:00 p.m.

Board of County Commissioners Hearing Date: 7/27/2021 at 9:30 a.m.

Request: Text amendments to the Adams County Development Standards and Regulations

Case Manager: Greg Dean gdean@adcogov.org

**Applicant: ADAMS COUNTY GOVT
4430 S ADAMS CO PKWY
BRIGHTON, CO 80601**

Both meetings will be held at the Adams County Government Center at 4430 S. Adams County Pkwy, Brighton, CO 80601. These will be public hearings and any interested parties may attend and be heard. If you require any special accommodations, please contact the staff at cedd-pod@adcogov.org at least one hour prior to the meeting.

PUBLICATION REQUEST

Oil and Gas Amendments to the County's Development Standards and Regulations

Case Number: PLN2021-00004

Planning Commission Hearing Date: 7/8/2021 at 6:00 p.m.

Board of County Commissioners Hearing Date: 7/27/2021 at 9:30 a.m.

Request: Text amendments to the Adams County Development Standards and Regulations

Case Manager: Greg Dean gdean@adcogov.org

Applicant: ADAMS COUNTY GOVT
4430 S ADAMS CO PKWY
BRIGHTON, CO 80601

Both meetings will be held at the Adams County Government Center at 4430 S. Adams County Pkwy, Brighton, CO 80601. These will be public hearings and any interested parties may attend and be heard. If you require any special accommodations, please contact the staff at cedd-pod@adcogov.org at least one hour prior to the meeting.

Legal #2492

Published in the *Eastern Colorado News* Friday, June 25, 2021

Public open house on Oil & Gas Regulations for residents and neighborhood groups.

Tuesday, June 29 | 5:30-6:30 p.m.

Adams County Government Center | West Conference Center | Room W8101 | 4430 S. Adams County Pkwy., Brighton

For more information: adcogov.org/regulation-amendments



ADAMS COUNTY
COLORADO

Reunión pública en regulaciones de petróleo y gas para residentes y grupos de vecinos.

Martes, 29 de junio | 5:30-6:30 p.m.

Adams County Government Center | West Conference Center | Room W8101 | 4430 S. Adams County Pkwy., Brighton

Más información: adcogov.org/regulation-amendments



ADAMS COUNTY
COLORADO



Public Open House Sign-In Sheet

Project Name: Oil and Gas Regulation Amendments

Meeting Date: 6/29/2021

Name	Dept./Org.	E-mail Address	Phone #
Jeff Stoll	Adams Resident Adams employee	jeffstoll14@msn.com	720-376-8591
Lindsey Stelmach	Resident	stel7659@yahoo.com	970-580-2828
Frank Gallagher	Adco Resident & Bus. Owner	FrankG7FC6Photos.com	3-86-0584
Jason Emery	Business Owner	jason.emery@exceldriverservices.com	303-906-1906
John Sprouse	Retired	sprouse - 47@yahoo.com	303-514-3935
Timmy Harper	Caregiver	timmyharper@hotmail.com	303-815-4163
Jacob Harold	Resident	jacob.harold@gmail.com	843-575-5546

BOARD OF COUNTY COMMISSIONERS

Eva J. Henry
DISTRICT 1

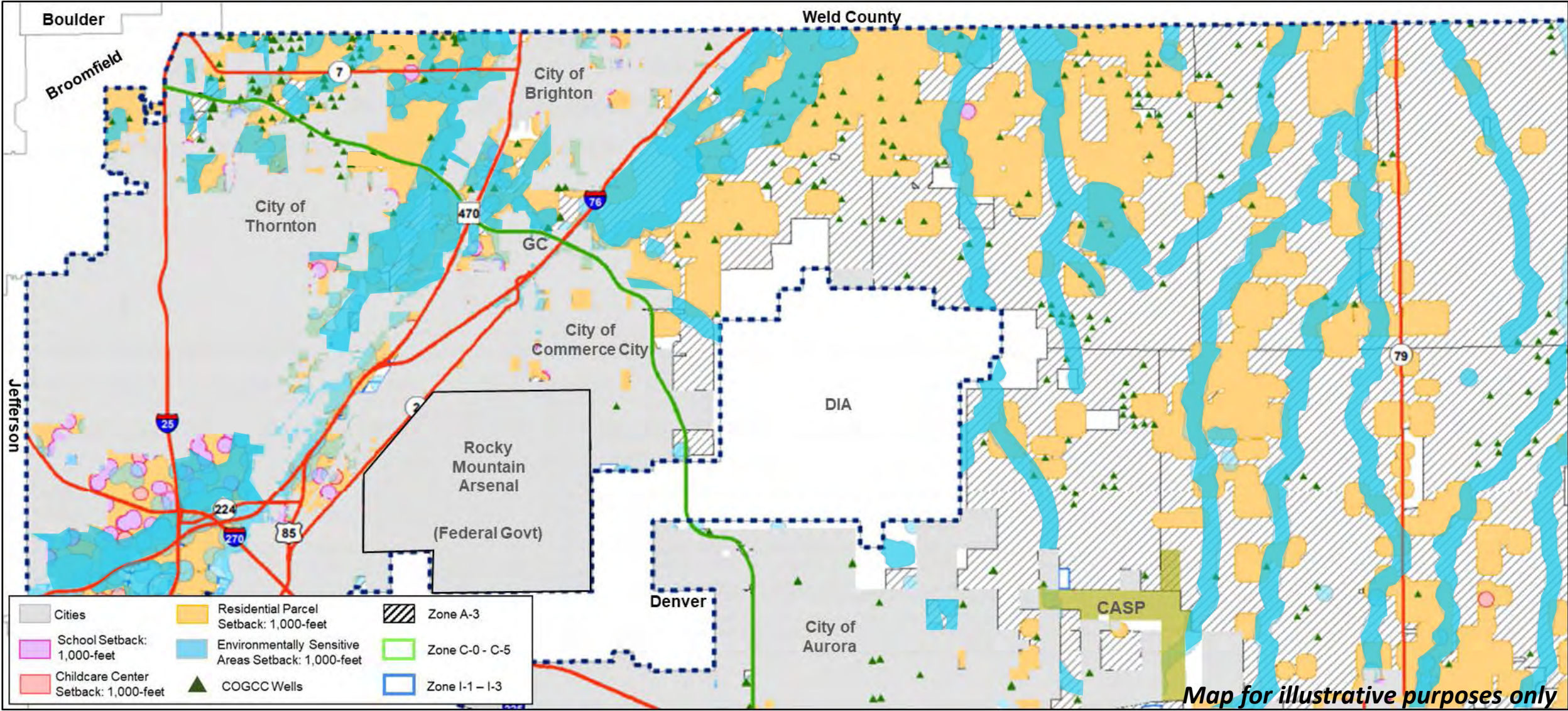
Charles "Chaz" Tedesco
DISTRICT 2

Emma Pinter
DISTRICT 3

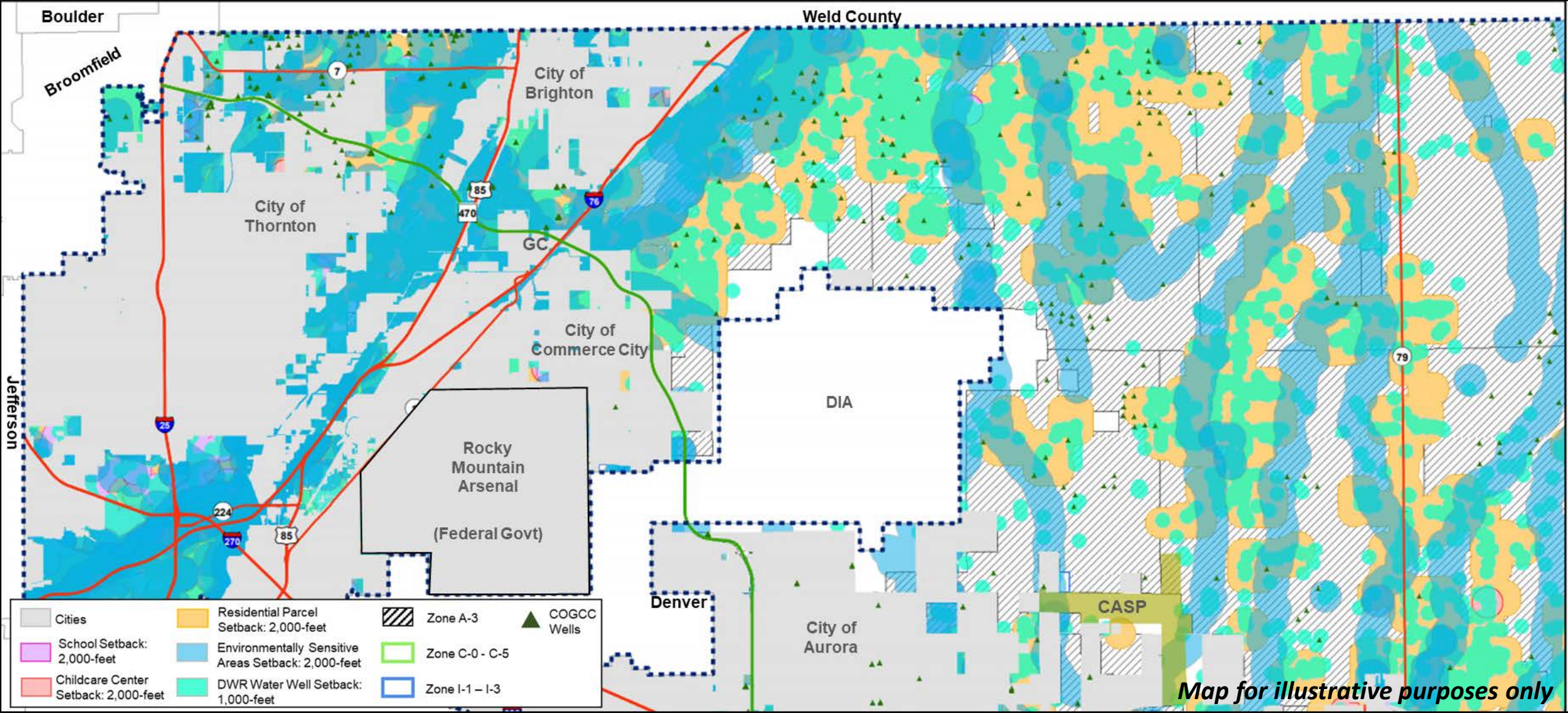
Steve J. O'Dorisio
DISTRICT 4

Lynn E. Baca
DISTRICT 5

Current AdCo Setback Map:



Staff Proposed Setback Map





April 13, 2021

Adams County has officially initiated text amendments to the County's oil and gas regulations via Case Number PLN2021-00004 . The County released the draft regulation redlines and application guide for public and referral agency comment on April 7, 2021. The County will be hosting virtual stakeholder meetings via Zoom with interested parties to solicit feedback and comments and to answer questions on the proposed changes. This specific stakeholder group meeting is intended for local governments, emergency management personnel, and other governmental agencies.

The full text of the proposed draft regulation redlines and application guide can be found by assessing the Adams County web site at:

www.adcogov.org/regulation-amendments.

We encourage you to attend our virtual meeting for on **Thursday, April 22, 2021 from 11:00a.m - 12:00p.m. (Mountain Standard Time)**. The Zoom meeting information for April 22 has been provided below:

Join Zoom Meeting – Wednesday, April 22:

<https://zoom.us/j/98882905738?pwd=Zk9nUmZ6VzdKQXFhY0ZvbmdRbWpyUT09>

Meeting ID: 988 8290 5738

Passcode: 424101

Dial by your location

- +1 669 900 6833 US (San Jose)
- +1 253 215 8782 US (Tacoma)
- +1 346 248 7799 US (Houston)
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)
- +1 312 626 6799 US (Chicago)

Meeting ID: 988 8290 5738

Passcode: 424101

Please forward any written comments on these proposed amendments to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 c/o Gregory Dean or call (720) 523-6891 by **04/28/2021** in order that your comments may be taken into consideration in the review of this case. **If you would like**

your comments included verbatim please send your response by way of e-mail to GDean@adcogov.org.

To stay informed about the process please visit <http://www.adcogov.org/oil-and-gas-information> or <http://www.adcogov.org/regulation-amendments>. Please feel free to contact me if you have further questions.



Greg Dean

Oil & Gas Liaison, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 South Adams County Parkway, 1st Floor, Suite W2000A
Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org



April 13, 2021

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The full text of the proposed draft regulation redlines and application guide can be found by assessing the Adams County web site at:

www.adcogov.org/regulation-amendments.

We encourage you to attend our virtual meeting for on **Wednesday, April 21, 2021 from 6:00 - 7:00p.m. (Mountain Standard Time)**. The Zoom meeting information for April 21 has been provided below:

Join Zoom Meeting – Wednesday, April 21:

<https://zoom.us/j/95927141564?pwd=UHE5ZFkzK2lmRDhGVUtEZ0d6dTFmUT09>

Meeting ID: 959 2714 1564

Passcode: 460922

Dial by your location

+1 346 248 7799 US (Houston)

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+1 253 215 8782 US (Tacoma)

+1 312 626 6799 US (Chicago)

+1 929 205 6099 US (New York)

+1 301 715 8592 US (Washington DC)

Meeting ID: 959 2714 1564

Passcode: 460922

If you cannot attend the first virtual meeting on April 21, the County is holding a second virtual stakeholder meeting on **Tuesday, April 27, 2021 from 5:30 – 6:30p.m. (Mountain Standard Time)**. The Zoom meeting information for April 27 has been provide below:

Join Zoom Meeting – Tuesday, April 27

<https://zoom.us/j/96987711389?pwd=ZkcycWtMaFZRczJLb2VHeUc2U3ZtQT09>

Meeting ID: 969 8771 1389

Passcode: 146693

Dial by your location

+1 346 248 7799 US (Houston)

+1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)

+1 312 626 6799 US (Chicago)

+1 929 205 6099 US (New York)

+1 301 715 8592 US (Washington DC)

Meeting ID: 969 8771 1389

Passcode: 146693

Please forward any written comments on these proposed amendments to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 c/o Gregory Dean or call (720) 523-6891 by **04/28/2021** in order that your comments may be taken into consideration in the review of this case. **If you would like your comments included verbatim please send your response by way of e-mail to GDean@adcogov.org.**

To stay informed about the process please visit <http://www.adcogov.org/oil-and-gas-information> or <http://www.adcogov.org/regulation-amendments>. Please feel free to contact me if you have further questions.



Greg Dean

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April 13, 2021

Adams County has officially initiated text amendments to the County's oil and gas regulations via Case Number PLN2021-00004 . The County released the draft regulation redlines and application guide for public and referral agency comment on April 7, 2021. The County will be hosting virtual stakeholder meetings via Zoom with interested parties to solicit feedback and comments and to answer questions on the proposed changes. This specific stakeholder group meeting is intended for Industry groups, Operators, and trade groups.

The full text of the proposed draft regulation redlines and application guide can be found by assessing the Adams County web site at:

www.adcogov.org/regulation-amendments.

We encourage you to attend our virtual meeting for on **Monday, April 26, 2021 from 9:00 - 10:00a.m. (Mountain Standard Time)**. The Zoom meeting information for April 26 has been provided below:

Join Zoom Meeting – Wednesday, April 26:

<https://zoom.us/j/96940307491?pwd=ajBhRlpDckNjdjVUMXRkdEhSdThPQT09>

Meeting ID: 969 4030 7491

Passcode: 730878

Dial by your location

+1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)

+1 346 248 7799 US (Houston)

+1 929 205 6099 US (New York)

+1 301 715 8592 US (Washington DC)

+1 312 626 6799 US (Chicago)

Meeting ID: 969 4030 7491

Passcode: 730878

Please forward any written comments on these proposed amendments to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A, Brighton, CO 80601-8216 c/o Gregory Dean or call (720) 523-6891 by **04/28/2021** in order that your comments may be taken into consideration in the review of this case. **If you would like your**

comments included verbatim please send your response by way of e-mail to GDean@adcogov.org.

To stay informed about the process please visit <http://www.adcogov.org/oil-and-gas-information> or <http://www.adcogov.org/regulation-amendments>. Please feel free to contact me if you have further questions.



Greg Dean

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www.adcogov.org

Reuniones virtuales sobre regulaciones de petróleo y gas para residentes

Miércoles, 21 de abril | 6-7 p.m. on Zoom

Martes, 27 de abril | 5:30-6:30 p.m. on Zoom

*Detalles acerca de cómo entrar a las sesiones
y más información en
adcgov.org/regulation-amendments*



Reuniones virtuales sobre regulaciones de petróleo y gas para residentes y vecindarios.

Miércoles, 21 de abril | 6-7 p.m. *en Zoom*

Martes, 27 de abril | 5:30-6:30 p.m. *en Zoom*

Detalles acerca de cómo entrar a las sesiones y más información en adcgov.org/regulation-amendments





February 11, 2021

Adams County is initiating text amendments to the County's oil and gas regulations. The County will be hosting a series of initial virtual stakeholder meetings via Zoom with interested parties to solicit feedback and comments on proposed changes. This specific stakeholder group meeting is intended for citizens, neighborhood groups, and environmental advocacy groups.

We encourage you to attend our virtual meeting for on **Thursday, February 18, 2021 at 6:00 p.m. (Mountain Standard Time)**. The Zoom meeting information for February 18 has been provided below:

Join Zoom Meeting – Thursday, February 18:

<https://zoom.us/j/99068362659?pwd=NVINd3kvcmxpdjRmRUx4MGV1OWRUdz09>

Meeting ID: 990 6836 2659

Passcode: 268925

Dial by your location

- +1 346 248 7799 US (Houston)
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- +1 253 215 8782 US (Tacoma)
- +1 312 626 6799 US (Chicago)
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)

Meeting ID: 990 6836 2659

Passcode: 268925

If you cannot attend the virtual meeting on February 18, the County is holding a second virtual stakeholder meeting on **Tuesday, February 23, 2021 at 5:30 p.m. (Mountain Standard Time)**. The Zoom meeting information for February 23 has been provide below:

Join Zoom Meeting – Tuesday, February 23:

<https://zoom.us/j/91856832469?pwd=Q0tGZHRpdXRBaUpGenpHcjBxOGprQT09>

Meeting ID: 918 5683 2469

Passcode: 265118

Dial by your location

- +1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 929 205 6099 US (New York)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)

Meeting ID: 918 5683 2469

Passcode: 265118

If you are unable to attend either of these initial stakeholder meetings, there will be numerous additional opportunities throughout the text amendment process to participate and submit public comment.

To stay informed about the process please visit <http://www.adcogov.org/oil-and-gas-information> or <http://www.adcogov.org/regulation-amendments>. Please feel free to contact me if you have further questions.



Greg Dean

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o: 720.523.6891 | gdean@adcogov.org

www.adcogov.org



February 11, 2021

Adams County is initiating text amendments to the County's oil and gas regulations. The County will be hosting a series of initial virtual stakeholder meetings via Zoom with interested parties to solicit feedback and comments on proposed changes. This specific stakeholder group meeting is intended for emergency management and emergency response personnel.

We encourage you to attend our virtual meeting for on **Thursday, February 18, 2021 at 1:30 p.m. (Mountain Standard Time)**. The Zoom meeting information for February 18 is provided below:

Join Zoom Meeting – Thursday February 18:

<https://zoom.us/j/92180147387?pwd=KzRwbDFuYkc0VjE0UVRGcDQ1SFo4QT09>

Meeting ID: 921 8014 7387

Passcode: 851278

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- +1 312 626 6799 US (Chicago)
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)

Meeting ID: 921 8014 7387

Passcode: 851278

If you are unable to attend this initial stakeholder meeting, there will be numerous additional opportunities throughout the text amendment process to participate and submit public comment.

To stay informed about the process please visit <http://www.adcogov.org/oil-and-gas-information> or <http://www.adcogov.org/regulation-amendments>. Please feel free to contact me if you have further questions.



Greg Dean

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February 11, 2021

Adams County is initiating text amendments to the County's oil and gas regulations. The County will be hosting a series of initial virtual stakeholder meetings via Zoom with interested parties to solicit feedback and comments on proposed changes. This specific stakeholder group meeting is intended for industry groups, Operators, and trade groups.

We encourage you to attend our virtual meeting for on **Monday, February 22, 2021 at 10:00 a.m. (Mountain Standard Time)**. The Zoom meeting information for February 22 is provided below:

Join Zoom Meeting – Monday, February 22:

<https://zoom.us/j/98158851860?pwd=NGYrNHhjZ2ZRUU5QNjc3ZjdYU003QT09>

Meeting ID: 981 5885 1860

Passcode: 790323

Dial by your location

- +1 346 248 7799 US (Houston)
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- +1 253 215 8782 US (Tacoma)
- +1 312 626 6799 US (Chicago)
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)

Meeting ID: 981 5885 1860

Passcode: 790323

If you are unable to attend this initial stakeholder meeting, there will be numerous additional opportunities throughout the text amendment process to participate and submit public comment.

To stay informed about the process please visit <http://www.adcogov.org/oil-and-gas-information> or <http://www.adcogov.org/regulation-amendments>. Please feel free to contact me if you have further questions.



Greg Dean

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Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org



February 11, 2021

Adams County is initiating text amendments to the County's oil and gas regulations. The County will be hosting a series of initial virtual stakeholder meetings via Zoom with interested parties to solicit feedback and comments on proposed changes. This specific stakeholder group meeting is intended for other local governments.

We encourage you to attend our virtual meeting for on **Monday, February 22, 2021 at 2:30 p.m. (Mountain Standard Time)**. The Zoom meeting information for February 22 is provided below:

Join Zoom Meeting – Monday, February 22:

<https://zoom.us/j/94401465967?pwd=NnN1N1R5NHE1WWVVSktVM21NU0ZZdz09>

Meeting ID: 944 0146 5967

Passcode: 583245

Dial by your location

- +1 346 248 7799 US (Houston)
- +1 669 900 6833 US (San Jose)
- +1 253 215 8782 US (Tacoma)
- +1 312 626 6799 US (Chicago)
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)

Meeting ID: 944 0146 5967

Passcode: 583245

If you are unable to attend this initial stakeholder meeting, there will be numerous additional opportunities throughout the text amendment process to participate and submit public comment.

To stay informed about the process please visit <http://www.adcogov.org/oil-and-gas-information> or <http://www.adcogov.org/regulation-amendments>. Please feel free to contact me if you have further questions.



Greg Dean

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Brighton, CO 80601

o: 720.523.6891 | gdean@adcogov.org



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2h • 🌐

Tomorrow, Feb. 23, at 5:30 p.m., there will be a virtual meeting on the proposed text amendments to the Adams County's oil and gas regulations. The pu... See More



Greg Dean



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Comment



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2021 Adams County Oil & Gas Regulation Amendments Stakeholder Meeting

February 18 and 23, 2021

Greg Dean: Oil & Gas Liaison, CEDD





2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Agenda



Housekeeping items and expectations



Objective and Goals



Background

- Current regulations & permit process for Adams County
- New COGCC rule overview



Text Amendment process and timeline



Staff's proposed focus areas

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Objective and Goals

Objective

- Obtain input, comments, and concerns from various individuals and stakeholder groups

Goal

- Amendments to the County's Oil and Gas Regulations for alignment with revised state rules recently adopted by COGCC and AQCC

Overall Goals

- Amend regulations for oil and gas development in unincorporated Adams County that are necessary and reasonable to protect public health, safety, welfare, the environment, and wildlife resources while ensuring facilities are sited in appropriate areas and utilize best management practices to avoid and minimize adverse impacts.

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Background

Current Adams County Regulations - Overview

Adopted in September 2019, after the passage of SB19-181

- Alternative Site Analysis required for all applications
- 1,000-foot setbacks from residential building units, schools, and environmentally sensitive areas - as measured from the edge of a disturbance to a parcel line
- Site-specific protections for air quality monitoring, visual impact mitigation and others
- Safety compliance audits
- Baseline noise monitoring
- Prohibited chemical additives
- Groundwater well testing and surface water setbacks
- Closed-loop recycling of drill fluids
- Automatic safety systems
- Emergency Response Plan requirement
- Reduced Emissions Completions
- No new wastewater injection wells

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction

- ✓ County permit process (OGF) requires conceptual review with internal and external stakeholders prior to application submittal
- ✓ One-half mile resident notification for public comment
- ✓ Administrative or BoCC approval processes
- ✓ Defined waiver processes for setbacks, zone districts, and performance standards



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Background

New COGCC Rules - Overview

Went into effect on January 15, 2021 for new and pending applications at the COGCC and include:

- Alternative Location Analysis required in some instances
- 2,000-foot setback from residences and schools measured from the edge of the pad to a physical structure
 - Defined exceptions for setbacks
- 1,000-foot water well setbacks
- Continuous noise monitoring at locations closer than 2,000-feet
- Reduced maximum allowable noise levels in residential areas
- Prohibited chemical additives
- Cumulative Impact Evaluation required for all applications
- Reduced allowable Venting and Flaring of natural gas
- Consultation with Colorado Parks and Wildlife

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction

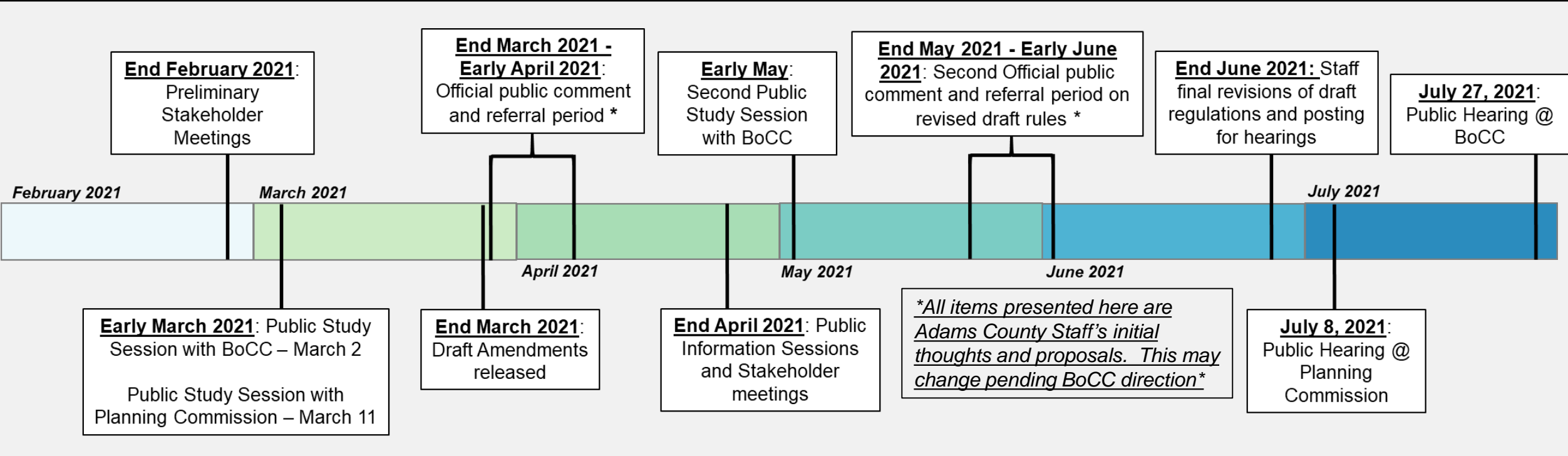
- ✓ Established a co-regulatory framework between COGCC and local governments, allowing for more coordination
- ✓ Combined numerous permitting processes into one, Oil and Gas Development Plan (OGDP)



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Text Amendment Process and Timeline

AdCo Staff's Proposed Timeline



** The County will accept all public comments until the final hearing deadlines*



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Staff's Proposed Focus Areas

Phase I – February – July 2021

- **Permitting Process & Application Submittals**
 - Referral Agencies
 - Role of COGCC/CPW/AQCC
 - Alternative Site Analysis
 - Impact Plans
- **Setbacks**
 - Residential Buildings, School Facilities, Parks/Open Spaces, Surface Water, water wells
 - Evaluate current setback distances
- **Other Performance Standards**
 - Noise
 - Traffic Impact Studies
 - Other conforming changes

Phase II – End 2021 - 2022

- **Air Quality Monitoring regulation revisions**
 - Monitoring Plan specifics and duration
 - Data and report sharing
- **Other topics not covered in Phase I**
 - County permit expirations
 - Non-emergency notices
 - Financial assurances
- **Reciprocal Setbacks (setbacks from new development to existing and permitted oil and gas facilities)**
 - Reciprocal setback distance by well status
 - Measurement of reciprocal setbacks

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Staff's Proposed Focus Areas

Conceptual Review Process – Pre-Application

- COGCC, CPW, and Proximate Local Governments (2,000-feet) as automatic referral agencies for all pre-applications
- Alternative Site Analysis (ASA):
 - Include all referral agencies, internal stakeholders, and Operator
 - ASA will remain largely unchanged from current ACDS&R
- ✓ *These changes will align with the new co-equal regulatory framework for siting between the COGCC and local governments adopted in SB19-181 and introduce initial state review prior to submission of applications to AdCo and COGCC.*

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction

Impact Plans – OGF Application Submittal

- Require individualized plans for all impacts associated with proposed location
 - **Examples:** Cumulative Impacts Plan, Noise Mitigation Plan, Community Outreach Plan, other plans
 - ✓ When will plans be required
 - ✓ Plan specifics
 - ✓ Decision and evaluation criteria

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Staff's Proposed Focus Areas

Setbacks

- Evaluating current setback distances
 - ✓ Residential building units
 - ✓ School facilities
 - ✓ Environmentally Sensitive areas / Parks & Open Spaces
 - ✓ Water wells / surface water / wildlife habitats
- Assessing off-site impacts
 - ✓ Mitigation
 - ✓ Best Management Practices
 - ✓ Exception / Waiver processes

All items presented here are Adams County Staff's initial thoughts and proposals. This may change pending BoCC direction



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

County Staff - Primary Point of Contact

Greg Dean, Oil & Gas Liaison

gdean@adcogov.org

720-523-6891

Oil and Gas Information page: <https://www.adcogov.org/oil-and-gas-information>



Questions, comments, feedback or other input?



2021 Adams County Oil & Gas Regulation Amendments Stakeholder Meeting

April 22, 2021

Greg Dean
Oil & Gas Liaison
gdean@adcogov.org

adcogov.org/regulation-amendments





2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Agenda



Amendment Process Timeline



Phase I Focus Areas



Proposed Regulation Summary



Noise Standards



Setbacks

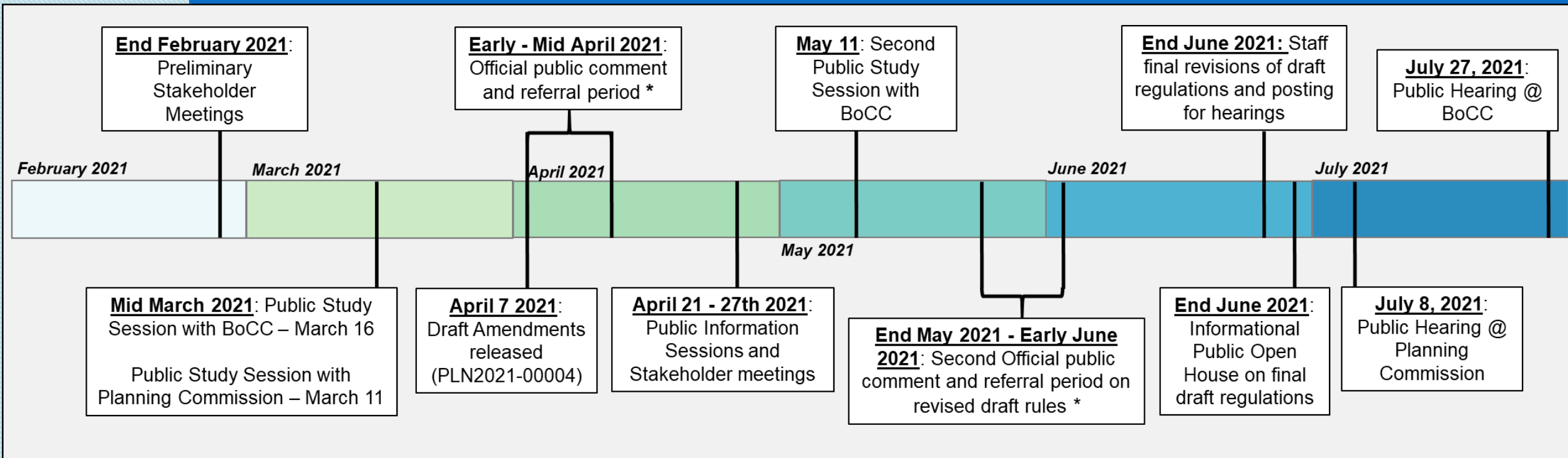
- **Setback Measurement**
- **Setback spatial analysis**



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Timeline

AdCo Staff's Timeline



** The County will accept all public comments until the final hearing deadlines*



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Amendment Focus Areas

★ Staff's focus areas for Phase I
of text amendments

Regulation / Topic Area	Current AdCo Regulations vs. new state standards
Pre-Application Process – agency coordination	Not directly regulated by COGCC
Alternative Site Analysis	ACDS&R already exceed new state standards
Emergency Preparedness and Response Plan	ACDS&R already exceed new state standards
Landscaping / Visual Impacts Mitigation	ACDS&R already exceed new state standards
Engineering Plans / Documents	ACDS&R already meet/exceed new state standards
★ Environmental Resources & Water Quality	ACDS&R already meet new state standards
★ Traffic & Transportation	Not directly regulated by COGCC
★ Setbacks	ACDS&R do not meet new state standards
★ Cumulative Impacts	ACDS&R do not meet new state standards
★ Community Outreach	ACDS&R do not meet new state standards
★ Noise Mitigation	ACDS&R incorporates COGCC noise standards, already exceeds many new state standards
★ Dust, Odor, and Lighting Impacts	ACDS&R partially meet/exceed new state standards for Dust ACDS&R already meet new state standards for Odor ACDS&R partially meet/exceed new state standards for Lighting
Air Emissions / Air Quality Monitoring	ACDS&R already meet new state emissions standards ACDS&R can require air quality monitoring for any application, AQCC now regulates air monitoring



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Proposed Regulation Changes - Summary

***This summary table is for reference only and does not represent all proposed changes to the Adams County regulations for this amendment process*

Regulation / Topic	Current Adams County Regulations	Proposed Adams County Regulations	Proposed changes vs. COGCC standards
Setbacks	<ul style="list-style-type: none"> 1,000-feet from the property line of: <ul style="list-style-type: none"> Existing and high occupancy residences Platted residential lots Schools, future schools, and childcare/daycare centers Environmentally sensitive areas 	<ul style="list-style-type: none"> 2,000-feet from the property line of: <ul style="list-style-type: none"> All currently protected entities in AdCo regulations Designated Parks and Open Spaces 1,000-feet from certain groundwater wells 	Proposed AdCo regulations exceed COGCC standards
Cumulative Impacts	<ul style="list-style-type: none"> Not directly regulated in County rules 	<ul style="list-style-type: none"> Cumulative Impacts Plan submission for all applications that submit quantitative and qualitative analysis of short-term and long-term cumulative impacts to: <i>Air, Noise, Light, Dust, Odor, Water (Public Health & Welfare), Traffic, Wildlife, Ecosystems, & Soil</i> Plans for addressing, mitigating, and offsetting 	Proposed AdCo regulations meet or exceed COGCC standards
Noise	<ul style="list-style-type: none"> AdCo adopted COGCC noise standards Required Background Noise Study 	<ul style="list-style-type: none"> Retains COGCC increased noise standards in AdCo rules 2,000-foot pseudo-setback for noise Requires background noise and noise modelling analysis for all applications 	Proposed AdCo regulations exceed COGCC standards
Community Outreach	<ul style="list-style-type: none"> Neighborhood meetings during pre-application/conceptual review process 	<ul style="list-style-type: none"> Identification of Disproportionately Impacted Communities within ½ mile of the site Requires quarterly neighborhood meetings for locations within ½ mile of any residences or schools post-approval Can require Operators to provide interpretation services and publish all information in languages other than English 	Proposed AdCo regulations exceed COGCC standards



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Proposed Regulation Changes - Summary

***This summary table is for reference only and does not represent all proposed changes to the Adams County regulations for this amendment process*

Regulation / Topic	Current Adams County Regulations	Proposed Adams County Regulations	Proposed changes vs. COGCC standards
Traffic	<ul style="list-style-type: none"> Traffic Impact Analysis requirement Traffic Impact Fees based on size of location and proposed infrastructure 	<ul style="list-style-type: none"> Retains Traffic Impact Analysis and Traffic Impact fees Requires lifetime truck traffic estimates during each phase of operations both cumulatively and for each proposed route 	Traffic not directly regulated by COGCC
Alternative Site Analysis	<ul style="list-style-type: none"> Required for all applications Minimum 3 alternative sites, that are at least 1,000-feet apart Can require any plans necessary for Staff to review protectiveness of sites 	<ul style="list-style-type: none"> Required for all locations Minimum of 3 alternative sites, that are at least 500-feet apart and must be distinctly unique Can require any plans necessary for Staff to review the protectiveness of sites 	Proposed AdCo regulations exceed COGCC standards
Water and Wildlife Protection	<ul style="list-style-type: none"> Proof of adequate water supply from applicable source or Water District available for industrial use Water Quality plan and various water source sampling requirements Natural Resource Conservation Overlay Resource Review, where applicable 	<ul style="list-style-type: none"> Maintains all current AdCo water protection standards Requires identification of contaminant migration pathways Natural Resources Evaluation for all applications Requires plans for consultation with Colorado Parks and Wildlife 	Proposed AdCo regulations meet or exceed COGCC standards
Other Changes		<ul style="list-style-type: none"> Creation of an entirely new Development Application Guide for OGF Permits and the relocation of all application submittal requirements from Chapter 2 Creation and consolidation of development standards for various topics into Chapter 4 Other formatting and grammatical changes 	Not applicable



2021 Oil & Gas Regulation Amendments Stakeholder Meeting

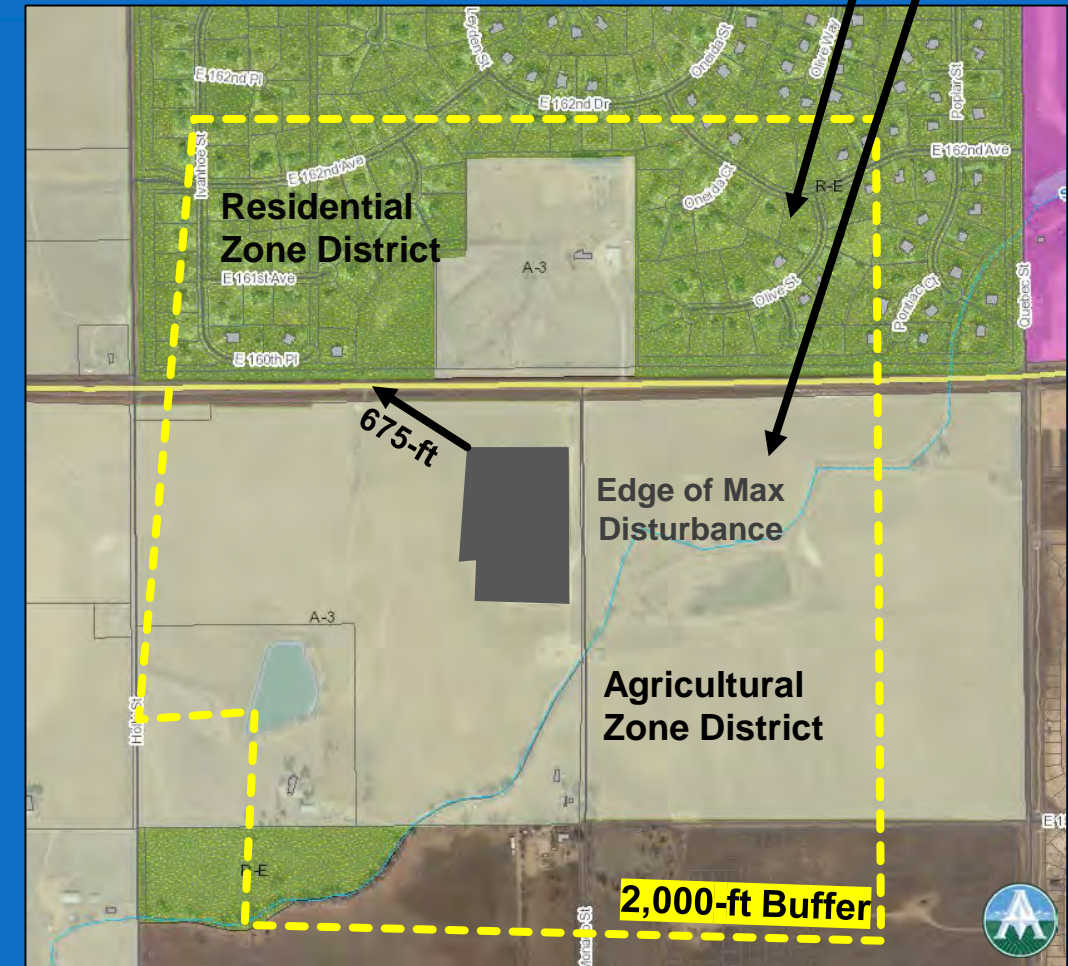
Proposed Noise Standards

Noise Mitigation Requirements:

- **Noise Mitigation Plan:** Will require an Operator to demonstrate compliance with ACDS&R and COGCC R.423 for noise
 - AdCo will require noise modeling and ambient baseline noise studies for all applications. Submissions must demonstrate compliance during each phase of operation:
 - ✓ Ambient noise study shall measure A and C-weighted noise levels for minimum of 5 days
 - ✓ Noise modeling study shall estimate noise during each phase of operations for A and C-weighted noise
 - ✓ Noise modeling shall include a low frequency noise impact analysis, available C-weighted control measures, and topographic considerations of noise propagation
 - AdCo will require continual noise monitoring at all OGFs located within ½ mile of any residential buildings, schools, or residentially zoned parcels
 - AdCo will require an Operator to comply with the lowest maximum permissible noise level in COGCC R.423 for a location within 2,000-feet of a land-use designation boundary

COGCC Table 423-1: Maximum Permissible Noise Levels

LAND USE DESIGNATION	7:00 am to next 7:00 pm	7:00 pm to next 7:00 am
Residential/ Rural/State Parks & State Wildlife Areas	55 db(A)	50 db(A)
Commercial/Agricultural	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)
All Zones	60 db(C)	60 db(C)



Example for illustrative purposes

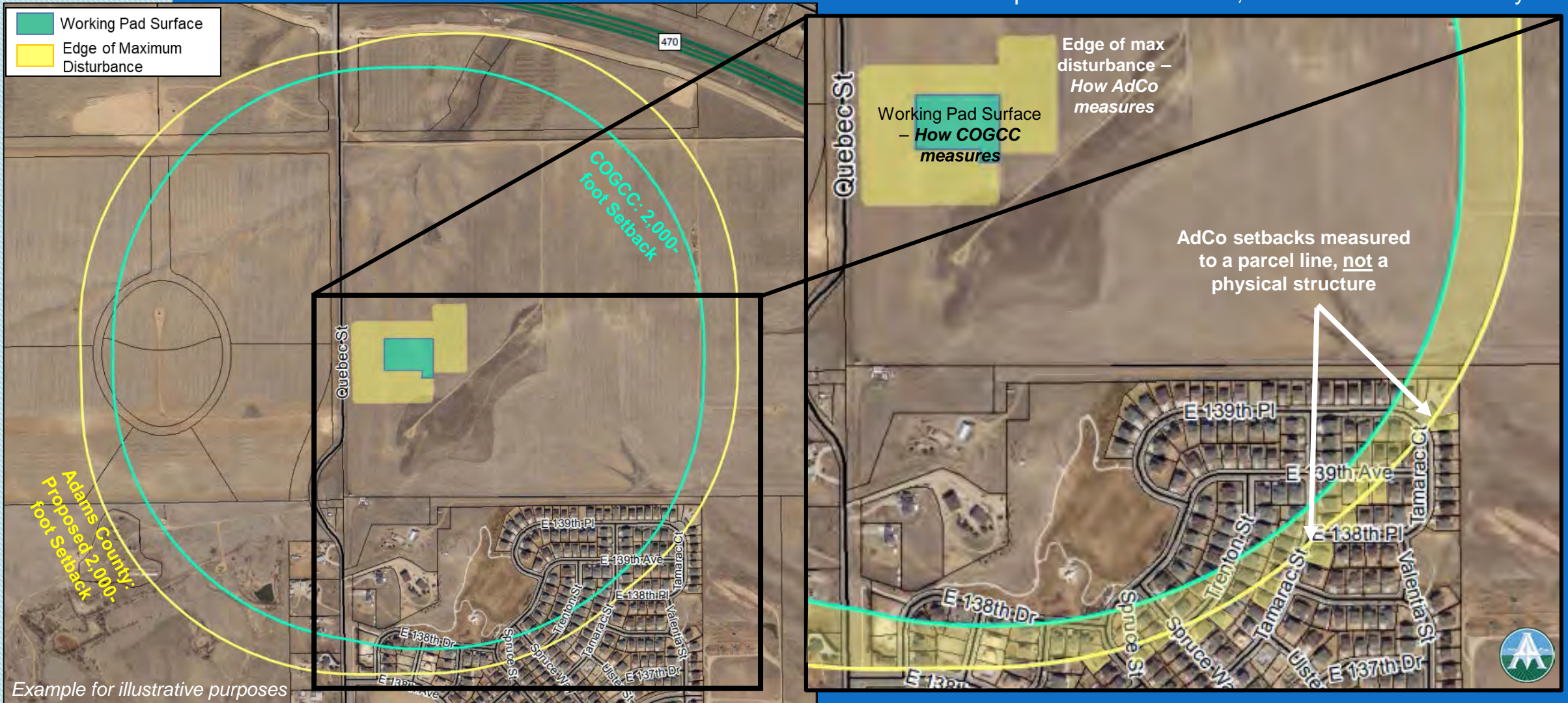


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Measurement of Setbacks

Proposed setback measurements:

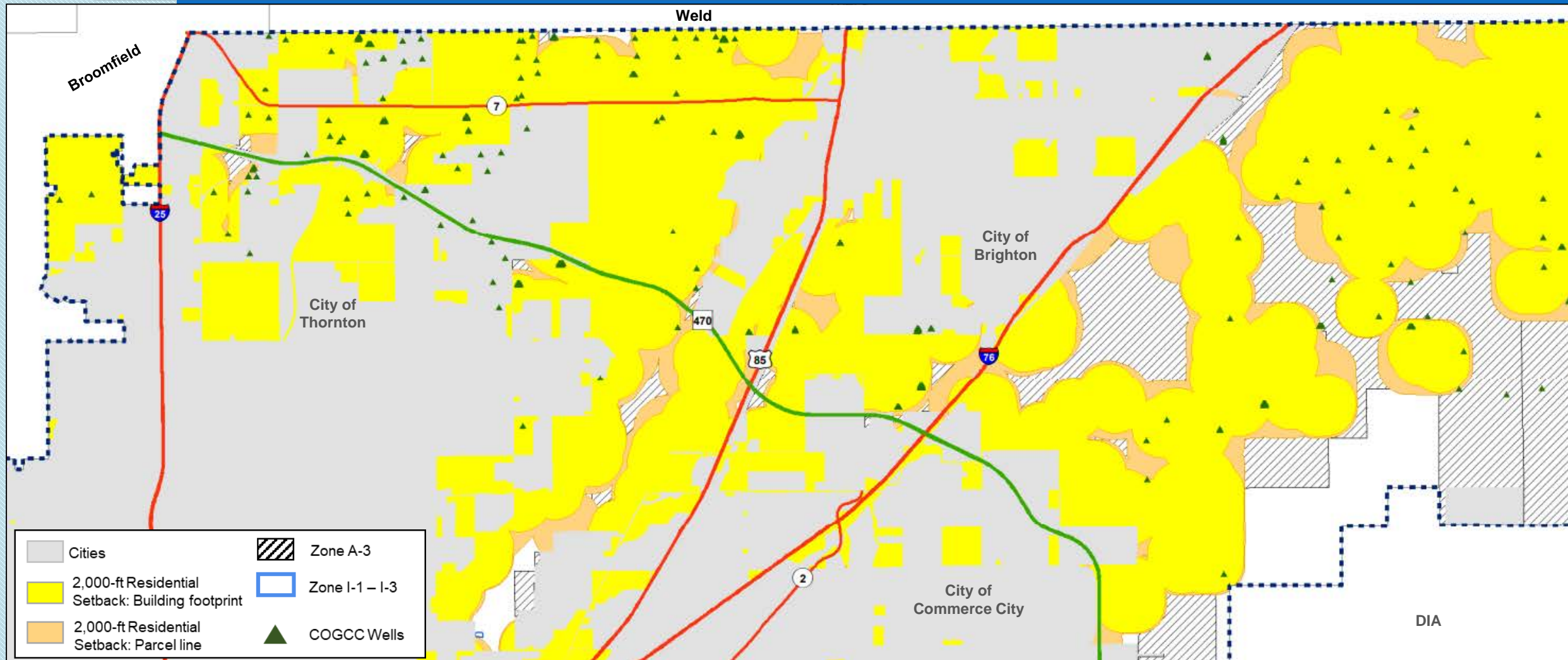
- From the edge of maximum disturbance to the parcel or property line of an existing residence, platted residential lot, school or childcare facility





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Measurement of Setbacks



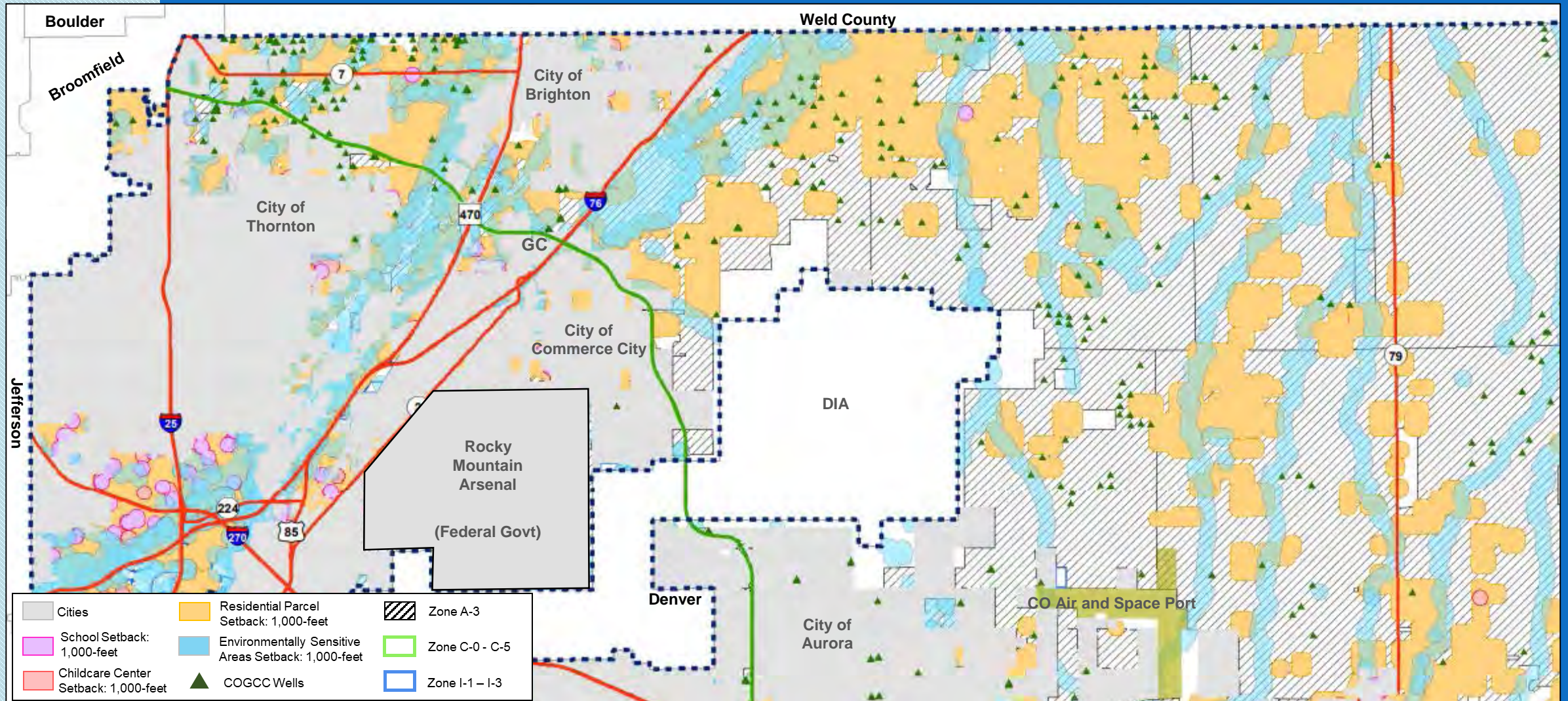


2021 Oil & Gas Regulation Amendments Stakeholder Meeting

Current Setbacks

Current Adams County Setbacks:

- Residential Buildings and Schools: 1,000-feet
- Environmentally Sensitive Areas: 1,000-feet



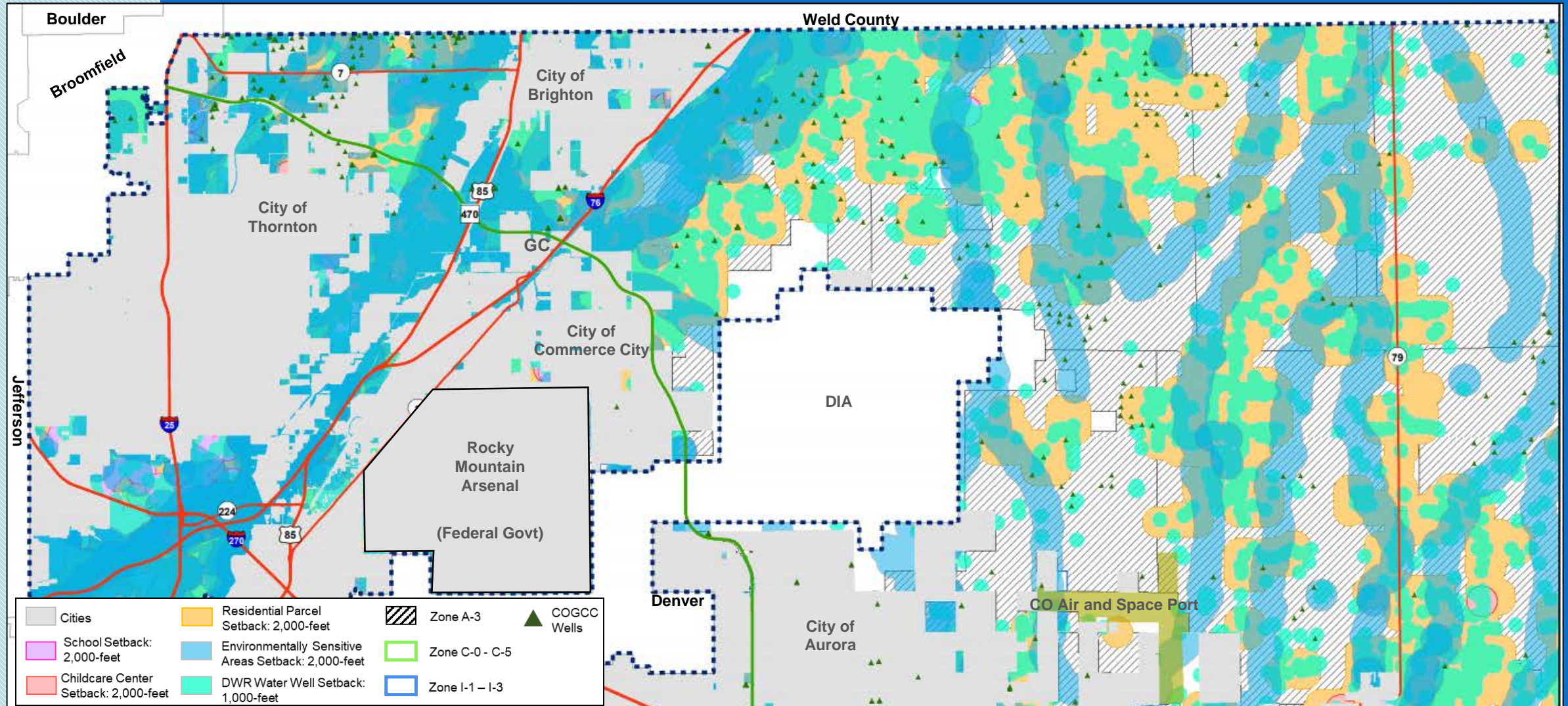


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Proposed Setbacks

Proposed Setbacks:

- Residential Buildings and Schools: 2,000-feet (yellow and red)
- Environmentally Sensitive Areas: 2,000-feet (blue)
- DWR Water Wells: 1,000-feet (teal)





2021 Oil & Gas Regulation Amendments Stakeholder Meeting



Questions or Comments?

- Written Public Comments due by Wednesday April 28, 2021



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Oil & Gas Liaison

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adcogov.org/oil-and-gas-information

Summary Table of Proposed Regulation Text Amendments

<i>Regulation / Topic</i>	<u>Current Adams County Regulation</u>	<u>Proposed Adams County Regulations</u>	Proposed changes vs. COGCC standards
<i>Setbacks</i>	<ul style="list-style-type: none">1,000-feet from the property line of:<ul style="list-style-type: none">Existing and high occupancy residencesPlatted residential lotsSchools, future schools, and childcare/daycare centersEnvironmentally sensitive areas	<ul style="list-style-type: none">2,000-feet from the property line of:<ul style="list-style-type: none">All currently protected entities in AdCo regulationsDesignated Parks and Open Spaces1,000-feet from groundwater / aquifer wellsClearly defined criteria for granting of waivers from Setbacks by the BoCC	Proposed AdCo regulations exceed COGCC standards
<i>Cumulative Impacts</i>	<ul style="list-style-type: none">Not directly regulated in County rules	<ul style="list-style-type: none">Cumulative Impacts Plan submission for all applications that includes quantitative and qualitative analysis of short-term and long-term cumulative impacts to: <i>Air, Noise, Light, Dust, Odor, Water, Public Health & Welfare, Traffic, Wildlife, Ecosystems, & Soil</i>Plans for addressing, mitigating, and offsetting	Proposed AdCo regulations meet or exceed COGCC standards
<i>Noise</i>	<ul style="list-style-type: none">AdCo adopted COGCC noise standardsRequired Background Noise Study	<ul style="list-style-type: none">Retains COGCC increased noise standards in AdCo rulesAdjacent land uses - lower maximum noise level provisionRequires background noise and noise modelling analysis for all applications	Proposed AdCo regulations exceed COGCC standards
<i>Community Outreach</i>	<ul style="list-style-type: none">Neighborhood meetings during pre-application/conceptual review process	<ul style="list-style-type: none">Identification of Disproportionately Impacted Communities within 1 mile of the site with plans for engagementRequires quarterly neighborhood meetings for locations within 1 mile of any residences or schools post-approvalExpanded automatic notice to landowners and residents within 1 mile of a proposed siteRequired resident notice prior to plugging and abandonment operationsCan require Operators to provide interpretation services and publish all information in languages other than English	Proposed AdCo regulations exceed COGCC standards

Summary Table of Proposed Regulation Text Amendments

<i>Regulation / Topic</i>	<u>Current Adams County Regulation</u>	<u>Proposed Adams County Regulations</u>	Proposed changes vs. COGCC standards
<i>Traffic</i>	<ul style="list-style-type: none">• Traffic Impact Analysis requirement• Traffic Impact Fees based on size of location and proposed infrastructure	<ul style="list-style-type: none">• Retains Traffic Impact Analysis and Traffic Impact Fees• Requires lifetime truck traffic estimates during each phase of operations both cumulatively and each proposed route	Traffic not directly regulated by COGCC
<i>Alternative Site Analysis</i>	<ul style="list-style-type: none">• Required for all applications• Minimum 3 alternative sites, that are at least 1,000-feet apart• Can require any plans necessary for Staff to review protectiveness of sites	<ul style="list-style-type: none">• Required for all applications• Minimum of 3 alternative sites, that are at least 500-feet apart and determined to be distinctly unique by AdCo• Can require any plans necessary for Staff to review the protectiveness and compatibility of potential sites	Proposed AdCo regulations exceed COGCC standards
<i>Water and Wildlife Protection</i>	<ul style="list-style-type: none">• Proof of adequate water supply from applicable source or Water District available for industrial use• Water Quality plan and various water source sampling requirements• Natural Resource Conservation Overlay Resource Review, where applicable	<ul style="list-style-type: none">• Maintains all current AdCo water protection standards• Requires identification of contaminate migration pathways• Natural Resources Evaluation for all applications• Requires plans for consultation with Colorado Parks and Wildlife• Revised definition of Environmentally Sensitive Areas to include lakes, streams, rivers, and springs.	Proposed AdCo regulations meet or exceed COGCC standards
<i>Permit Expirations</i>	<ul style="list-style-type: none">• 3 year permit expiration term, drilling of one well permanently vests the permit.	<ul style="list-style-type: none">• 3 year permit expiration term, approvals lapse for any wells not in production by end of primary term• Requires new permit to return to a site after expiration	Proposed AdCo regulations exceed COGCC standards
<i>Other Changes</i>		<ul style="list-style-type: none">• Creation of an entirely new Development Application Guide for OGFs Permits and the relocation of all application submittal requirements from Chapter 2• Creation and consolidation of development standards for various topics into Chapter 4• Other formatting and grammatical changes	N/A



Final Report: Human Health Risk Assessment for Oil & Gas Operations in Colorado

October 17, 2019

Submitted to:
Colorado Department of Public
Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530

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Abbreviations and Acronyms

Abbreviation	Definition
AEGL	Acute Exposure Guidance Level
AERMAP	AERMOD terrain pre-processor
AB_Vrain	Anheuser-Busch/Ft. St. Vrain
AERMET	AERMOD meteorology pre-processor
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
APEX	Air Pollutants Exposure Model
ATSDR	Agency for Toxic Substances and Disease Registry (U.S. Department of Health and Human Services)
BMCL	benchmark concentration-low. 95% lower confidence limit on the estimated concentration at the BR level
BMR	benchmark risk; magnitude of effect identified as “adverse” in dose-response modeling; 1.0 standard deviation change versus controls in this analysis
BTEX	benzene, toluene, ethylbenzene, xylene
CDPHE	Colorado Department of Public Health and Environment
CHAD	Consolidated Human Activity Database
Chi/Q	air concentration per unit emission, or exposure concentration per unit air concentration (depending on the context)
cm	centimeter
COGCC	Colorado Oil and Gas Conservation Commission
COOP	Cooperative Observer Network
CSU	Colorado State University
D-J	Denver-Julesburg
deg	degrees
EPA	U.S. Environmental Protection Agency
ESL	Effects Screening Level (from TCEQ)
°F	degrees Fahrenheit
fracking	hydraulic fracturing
ft	feet
g/s	gram per second
GC	Garfield County
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System (from EPA)
IUR	inhalation unit risk
LOD	limit of detection
LOAEL	lowest observed adverse effect level; lowest dose or exposure associated with statistically significant effect
log10	logarithm base 10
m	meters
m/s	meters per second
max	maximum
mg/kg/day	milligrams per kilogram per day
micro	microenvironment

Abbreviation	Definition
min	minimum
MRL	Minimum Risk Level (from ATSDR)
NA	not applicable
NFR	Northern Front Range
NLCD	National Land Cover Database
NWS	National Weather Service
O&G	oil and gas
OEHHA	California Office of Environmental Health Hazard Assessment
PD	pharmacodynamics adjustment
PK	pharmacokinetic adjustment
POD	point of departure; experimental or human endpoint used to derive health criteria
ppm	parts per million
ppb	parts per billion
PPRTV	Provisional Peer-reviewed Toxicity Value (from EPA)
Q	emission rate, or air concentration (depending on the context)
QA	quality assurance
QC	quality control
PEN	penetration factor
RBC	red blood cells
REL	Reference Exposure Level (from OEHHA)
ReV	Reference Value (from TCEQ)
RfC	Reference Concentration (from EPA)
RGDR	regional gas dose ratio; used to adjust for differences in absorption of inhaled toxicants between animals and humans
SD	standard deviation
St_Vrain	Ft. St. Vrain
TCEQ	Texas Commission on Environmental Quality
TRM	Tracer Ratio Method
U-P	Uinta-Piceance
U.S.	United States
UF	uncertainty factor
ugm-3, ug/m ³ , µg/m ³	microgram per cubic meter
UTM	Universal Transverse Mercator
VOC	volatile organic compound
V _p	vapor pressure

Executive Summary

In 2017, the Colorado Department of Public Health and Environment conducted a screening assessment and systematic review of potential risks associated with chemicals released to the air from oil and gas operations. The assessment found that the concentrations of chemicals detected in air near oil and gas operations were consistent with low risks of harmful health effects. Systematic review of 27 studies of populations residing near oil and gas operations found limited and inconsistent evidence for harmful health effects.

One of the recommendations of the 2017 assessment was for “continued evaluation of health risk using more comprehensive exposure data such as data from the Colorado State University studies that directly measured emissions of substances from oil and gas operations....” This report summarizes the results of a quantitative human health risk assessment, based on those emission measurements, which ICF (we) conducted in conjunction with the Colorado Department of Public Health and Environment.

Scientists from Colorado State University conducted on-site air monitoring of 47 volatile organic compounds at oil and gas extraction facilities in Garfield County and the Northern Front Range in Colorado, which are areas of historically intense oil and gas extraction activity. Utilizing emission rates estimated from the air monitoring during specific activities (drilling, hydraulic fracturing, flowback, and production), we employed state-of-the-science air dispersion models to estimate short- and long-term chemical air concentrations around hypothetical oil and gas facilities of various sizes, located in Garfield County and the Northern Front Range. We then used advanced exposure modeling and protective health-based guidelines to estimate chemical exposures and potential health risks for hypothetical people of all ages living within 2,000 feet of the hypothetical facilities. This includes areas 500 feet from the facilities, which is the current Exception Zone Setback distance for well and production facilities relative to a building unit (as established by the Colorado Oil and Gas Conservation Commission). We focused particularly on conservative (health-protective) hypothetical scenarios where people spend all of their time at a location close to an oil and gas facility for the lifetime of the facility. These hypothetical locations are those that tend to experience higher modeled air concentrations, relative to other locations, due to the interaction between emissions and meteorological conditions. The modeled people at these hypothetical locations are often outdoors or in highly ventilated areas, especially during times of short-term peak modeled concentrations. We assessed 1-hour (acute) exposures as well as multi-day (subchronic) exposures and exposures greater than one year (chronic).

Exposure modeling for most chemicals indicated that acute exposures were below guideline levels for all hypothetical people and facilities. At the 500-foot distance, for a small number of chemicals (including benzene, toluene, and ethyltoluenes), the highest estimated acute exposures exceeded guideline levels at the most-exposed (downwind) locations, in isolated cases by a factor of 10 or more during oil and gas development activities, particularly during flowback activities at smaller well pads. Those highest predicted acute exposures decreased rapidly with distance from the hypothetical facilities, but remained above guideline levels out to 2,000 feet under a relatively small number of oil and gas development scenarios. Our identification of these estimated exceedances of acute health guidelines is highly conservative, in that these highest-estimated exposures occur when the highest chemical emissions are

highly concentrated by “worst-case” meteorological conditions onto a hypothetical person who is outdoors or in a highly ventilated area, which might happen only rarely. For example, at the 500-foot distance from the facility, central-tendency acute benzene exposures during flowback activities tended to be a factor of 1.6–2.7 smaller than the absolute maximum exposures, and while some of the highest acute benzene exposures were more than a factor of 10 above guideline levels at the NFR site, they were below 10 for most people on most days of the simulations. The average differences in acute exposure between sites were less than a factor of 2, and exposures were much smaller during production activities relative to development activities.

Most modeled subchronic exposures (lasting less than one year) were also far below guideline levels during development activities (not evaluated for production activities, which last decades). This was true for all chemicals at the 500-foot distance from the facility, although emissions of trimethylbenzenes during fracking activities helped lead to subchronic exposures slightly above guideline levels for combined exposures to multiple chemicals with neurotoxicity critical effects. These exposures were generally higher near smaller well pads, and the exposures generally decreased with increasing distance from the facility. As with the highest acute exposures, our identification of these estimated exceedances of subchronic health guidelines is conservative—these are scenarios when emissions tended to be much higher than average and concentrated frequently (by meteorological conditions conducive to worse air quality) onto a hypothetical person who is always relatively close to the hypothetical facility and is often outdoors or in a highly ventilated area. During more typical conditions, central-tendency multi-chemical exposures related to neurotoxicity critical effects at locations 500 feet from the facility (for example) tended to be a factor of 1.7–2.5 smaller than the absolute maximum exposures, and while some of the highest neurotoxicity-related exposures were slightly above guideline levels at the Garfield County sites, they were below guideline levels for the majority of people during most of the simulations. The average differences in subchronic exposure between sites were less than a factor of 2 or 3.

We also estimated chronic exposures for production operations, which can continue for up to 30 years after well development, as well as for some large flowback operations that can last 14–15 months. At the 500-foot distance from the facility, chronic exposures during the 14–15-month flowback activities were far below guideline levels for individual chemicals and only slightly above guideline levels for combined exposures to multiple chemicals with neurotoxicity or hematological critical effects (which include n-nonane, benzene, m+p-xylene, and trimethylbenzenes). Extending the exposure period to also include the preceding drilling and fracking activities led to similar results. The chronic exposures during production operations were generally the lowest, relative to guideline levels, from among all simulated exposures in the assessment. At the 500-foot distance from the facility, all chronic non-cancer exposures during production activities were below guideline levels, and the average incremental lifetime cancer risk from chronic benzene exposure was 5-in-one million or less (dropping below 1-in-one million before the 2,000-foot distance). When estimates of chronic exposure include exposure to development activities occurring sequentially with exposure to production activities, exposures were only slightly higher than those estimated during the production activities alone.

Additional measurements could help to refine the risk estimates in these assessments and/or allow for assessments that are more site-specific. Such measurements could include additional air monitoring similar to what this study is based on, or continuous measurements near oil and gas sites and inside and outside buildings near those sites, including personal-exposure

measurements. Whereas the assessment in this study is primarily focused on identifying the potential for risks above levels of concern, assessments based on additional or different data may be more focused on time sequences of exposure that are more site- and population-specific.

1. Project Background

Colorado's rapidly growing population, in parallel with increased oil and gas extraction activities in Colorado's Northern Front Range (NFR) and Garfield County, has led to populations living and working in close proximity to oil and gas (O&G) operations. As a result, **growing public health concern has developed in recent years about the health risks to people living near existing and potential future O&G operations.** To date, assessing the public health risk has been challenging due to the lack of high quality measurements of the types and emission rates of volatile organic compounds (VOCs) that are emitted from O&G well development and production activities.

Colorado State University (CSU) recently completed two studies, listed below, quantifying emission rates of 47 VOCs¹ during different phases of O&G development and during O&G production.

- Colorado's Garfield County (Uinta-Piceance [U-P] Basin): (CSU, 2016a)
- Colorado's NFR (Denver-Julesburg [D-J] Basin): (CSU, 2016b)

In 2015, the Colorado Governor's Oil and Gas Task Force developed a set of recommendations that would foster responsible development of O&G in Colorado. One of the recommendations from the Task Force was to **address public health concerns in part by conducting human health risk assessments (HHRAs) using the CSU VOC emission-rate studies.**

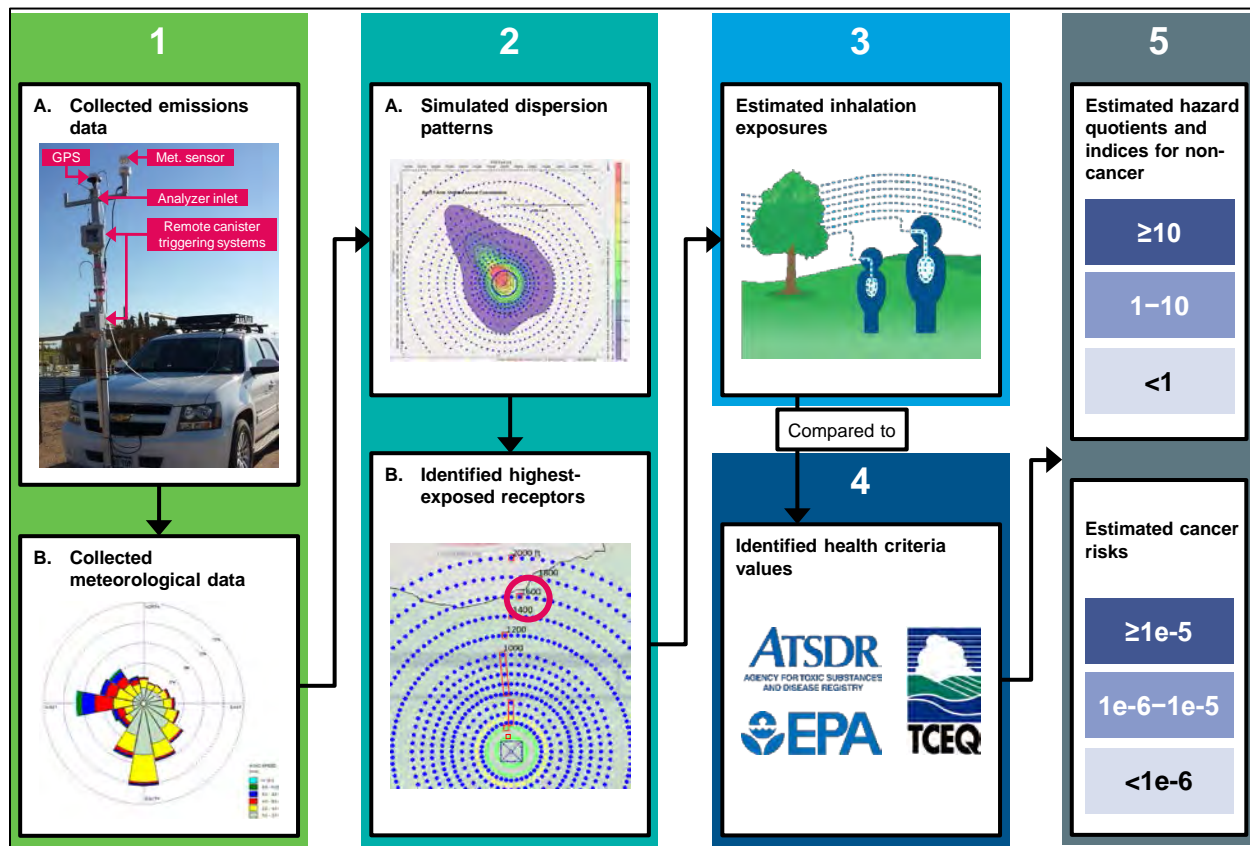
The Colorado Department of Public Health and Environment (CDPHE) developed a request for proposal to solicit a contractor to conduct the two HHRAs listed below.

1. HHRA for O&G operations in **Colorado's NFR**
2. HHRA for O&G operations in **Colorado's Garfield County**

ICF was the contractor selected to **conduct these HHRAs in a probabilistic fashion to quantify the potential cancer and non-cancer (acute, subchronic, and chronic) health risk to people from inhalation of the VOCs emitted during the different phases of O&G development and production.** ICF ("we") are conducting this study within the framework set by CDPHE, and all work undertaken is in consultation with CDPHE staff on the overall approach, major assumptions, and parameterizations.

In this report, we describe the approach and results of these HHRAs. Briefly here, we show in Figure 1-1, and enumerate below, the steps of the risk assessment methodology that we followed for the HHRAs.

¹ CSU collected samples in some cases of 49 VOCs. However, one was the tracer (acetylene, also known as ethyne) and we do not include it in these HHRAs. Another was i-butene, which CSU did not collect during most experiments and is chemically very similar to 1-butene, which they collected regularly; we do not include i-butene in these HHRAs. We therefore refer to 47 VOCs in these HHRAs.



Notes: The methods for each step of the figure are more fully described as noted: 1A = Section 2.3; 1B = Section 2.5; 2A = Section 2; 2B = Sections 2.7.3 and 2.8; 3 = Section 3; 4 = Section 4; 5 = Section 5. Figure depicting collection of emissions data is from Figure 2.3 of (CSU, 2016a).

Figure 1-1. Illustration of the Steps in the Risk Assessment

- 1. Collect emissions** of VOCs of interest using air sampling during O&G activities in Garfield County and the NFR (as we describe in Section 2.3, utilizing work conducted by CSU), and **download meteorology data** for several sites in those areas (as we describe in Section 2.5).
- 2. Simulate spatial dispersion** of the VOCs, based on collected emissions data and meteorology data (as we describe in Section 2).
 - For each scenario, we determined where VOC air concentrations are likely to be highest (as we describe in Sections 2.7.3 and 2.8), and we used these receptor locations for further analysis.
- 3. Estimate inhalation exposure** to each VOC and groups of VOCs with similar critical effects for individual adults and children, at each receptor location identified above and across different durations of exposure (acute, subchronic, and chronic) (as we describe in Section 3; supported by Appendix A).
- 4. Identify protective health criteria values** for each VOC and duration of exposure (as described in Section 4; supported by Appendix B, Appendix C, and Appendix D).

-
5. **Identify activities and scenarios where inhalation exposures exceed health criteria** for hypothetical individuals living and working near the modeled, hypothetical well pads, during each of the O&G activities (as shown in Section 5; supported by Appendix E). Also, examine distributions of air concentrations, exposures, and hazards for the assessed VOCs.
 - a. We report in Section 4 the specific methods used to calculate each risk metric.

In Section 6, we present a summary of the data gaps, uncertainties, and variabilities within the data and methods used in the HHRAs, as well as the sensitivity of the risk results to certain aspects of the assessments (we discuss these in more detail in each preceding section). Finally, in Section 7, we look ahead to possible future work, at the discretion of CDPHE, which may further refine these estimates of potential health risks to individuals living and spending time near O&G facilities.

2. Modeling of Air Concentrations

2.1. Overview of Approach

Air-dispersion model formulations and methods used to simulate the dispersion processes (e.g., steady-state Gaussian, Gaussian-puff, Eulerian grid models) have inherent spatial limitations for estimating concentrations. These limitations are essential to consider in model selection, along with how emissions are incorporated into the model, the distance over which the model formulation is appropriate, the regulatory status, and model-evaluation history. **U.S. EPA's AERMOD model is the best candidate model for this assessment** because

1. its model formulation represents the state of the science, with similarity-theory-based boundary layer calculations;
2. the steady-state Gaussian assumption is valid over the distances under consideration in this study, which are 150–2,000 feet (ft) (45.7–609.6 meters [m]);
3. the model will estimate concentrations to the nearest meter; and
4. it has a long history of application and as well as model evaluation, although model-validation studies for low-level or ground-level emission source releases are limited to Project Prairie Grass (Haugen, 1959).

Near-source air concentrations are largely determined from the emission source strength and ambient meteorological conditions. In both of their emission-rate studies (CSU, 2016a, 2016b), CSU identified that individual **VOC emission rates from each O&G activity may vary by several orders of magnitude** within each O&G activity type. Dispersion models applied in a regulatory context are designed for emission sources with known emission rates or well-defined patterns of temporal variation. For sources that emit with substantial irregularity, the acute (short-term) health risk can be exaggerated when applying an air dispersion model to the improbable coincidence of the highest emission-release rate with worst-case meteorological conditions. To provide information on the probability for these events, the results are best expressed as a probability distribution that can be solved by randomizing the emission source strength and meteorological conditions by applying the Monte Carlo method to determine

expected maxima of acute air concentrations, rather than using just the absolute highest (and improbable) worst-case concentration.

A Monte Carlo air-concentration analysis builds a set of results of possible outcomes (a distribution of values) by varying the input variables—in this case, the widely varying VOC emission rates and meteorology, and also the variable durations of the activities. Each AERMOD simulation, or “iteration”, creates a set of results. Thousands of simulations are made, each using a different set of input values selected at random from the range of possible meteorology and emission inputs as well as activity durations. The result is a distribution of possible air-concentration outcomes. In general, we retain from each iteration the mean and maximum air concentration at each modeling receptor (location of model outputs), creating a distribution of mean and maximum values from across the iterations. These values are then passed to the exposure assessment for use in exposure modeling. A sufficient number of simulations is reached when the statistical characteristics (mean, standard deviation) of the distribution minimally changes when more realizations are added. We conduct this Monte Carlo analysis for well-development activities, but not for well-production activities where we are less concerned with hour-by-hour and day-by-day variabilities and more concerned with longer-term averages across the many years of O&G production.

Application of the Monte Carlo approach is widely used in addressing problems associated with emissions from irregularly emitting sources, as it provides more realistic estimates of health risk (Li et al., 2008; Lonati and Zanoni, 2013). In addition, Monte Carlo is used to establish protective zones for intermittent irregular sources (Balter and Faminskaya, 2016). For irregularly varying power-plant emissions, the Electric Power Research Institute sponsored the development of a Monte Carlo tool, EMVAP (Paine et al., 2014), useful in assessing compliance with National Ambient Air Quality Standards (Guerra, 2014). The approach is endorsed by the State of Washington’s Department of Ecology (Washington State DOE, 2011) for use in compliance with the 1-hour NO₂ standard for diesel generators.

We provide further discussion and details on the Monte Carlo approach in Section 2.7.

2.2. Oil and Gas Activities

The **D-J Basin** extends over an area of more than 70,000 square miles covering northeastern Colorado and extending into southwest Nebraska and southeast Wyoming. The Wattenberg field has been the center of unconventional O&G extraction (COGCC, 2007) and is mostly in Weld County but also extends into portions of Adams and Boulder Counties. More than half of COGCC permits in 2015 and 2016 were for Weld County, with about 87 percent of Colorado’s active wells located in Weld County and five surrounding counties. This broad area is referred to in these HHRAs as the **NFR**.

The other location of concentrated O&G activity is **Garfield County**, located in western Colorado on top of the **U-P Basin** where natural gas is trapped within shale/tight sand sedimentary formations. Most of the hydrocarbons extracted in this basin are in the form of natural gas from sandstone lenses in the Williams Fork Formation. Extracting the gas economically from this basin mostly requires the use of unconventional gas-extraction techniques.

O&G development in both of these locations is anticipated to continue using methods such as horizontal drilling and hydraulic fracturing along with continued refinements to these technologies.

The typical vertical depth of a well is 5,000–9,000 ft; after reaching a location near the shale/sandstone formation, a directional drill may be used for horizontal drilling for 5,000 ft or more. Multiple horizontal wells accessing the same or other close-by formations can be drilled from one pad. The **drilling** phase usually takes 4–10 days per well. Most wells in Garfield County are vertically drilled, while wells in the NFR more often include horizontal drilling. After drilling is complete, **hydraulic fracturing (“fracking”)** is used to inject water, sand, and chemicals into the well at high pressures. The fluid opens the previously made fractures and connects them to create better pathways for more efficient flow of O&G to the surface. Fracking is applied to each well in sections and, at completion, each section is closed using a cement plug. The fracking phase of each well can span a period of 2–5 days. After the entire well is fracked, the plugs are drilled out to enable the flow of fracking fluid, water, oil, and natural gas to the surface. This phase of well completion is known as **flowback**. The flowback water is typically stored on-site and later transported for underground (well injection) storage or recycling and re-use in future fracking activities. Traditionally, a flowback period can last for 6–12 days for each well, until the fluid flow hits a marketed or metered line (signaling the start of the O&G production phase). In the NFR, flowback periods for vertical-only wells are much shorter, typically just a single day, while the tight sand formations in Garfield County require a flowback period of 13–30 days.

This study estimates VOC air concentrations during each phase of well development and during production in both the NFR and Garfield County. We discuss these O&G activities in the following two subsections.

2.2.1. Well Development

A new well-pad site undergoes three primary development activities sequentially² to create new, O&G-producing wells. These activities are

- drilling,
- fracking, and
- flowback.

The duration over which these activities occurs is highly variable, depending upon the geologic setting, the operator, and so on. Horizontal drilling and flowback are generally longer processes. To determine the best estimate for the duration of each activity in Garfield County, CSU held discussions with site operators/supervisors who were part of CSU’s Garfield County emission-measurement program (CSU, 2016a). The operators interviewed included: Encana,

² Sequentially: each well is drilled one at a time, then each well is fracked one at a time, and then each well undergoes flowback operations one at a time. In some cases, multiple wells may be undergoing flowback at the same time (flowback is started one well at a time, but flowback may start at another well before flowback is completed on the previous well), which may be a topic of sensitivity analysis in later stages of these HHRAs. During O&G production, multiple wells can produce at the same time.

Ursa Operating Company LLC, WPX (now Terra Energy Partners), and Williams. The companies worked together to provide average duration values for O&G activities in Garfield County. For the NFR, CDPHE estimated durations for each activity based on discussions with COGCC and environmental managers representing a number of O&G operators.

The average durations for each development activity, shown in Table 2-1, are considered generally representative based on the best available information. On average, horizontal wells make up about 70 percent of the O&G development in the NFR, while in Garfield County horizontal wells make up only about 15 percent of the O&G development. **This distribution of duration values is maintained in our Monte Carlo air-dispersion analysis**, as discussed in Section 2.7, where these durations are randomly selected and combined with randomly selected emission rates (based on CSU measurements across a total of 20 experiments, as discussed in Section 2.3) and randomly selected local meteorological conditions.

Table 2-1. Activity Durations (per Well) for Oil and Gas Development Simulations

Location	Type of Drilling	Horizontal Drilling Distance (miles)	Prevalence of Drilling Type and Distance	Average Duration per Well (days)		
				Drilling	Fracking	Flowback
Northern Front Range	Vertical	Not applicable	30%	3	2.5	1
	Horizontal	1	52%	4	2	6
		1.5	11%	5	3	7.5
		2	6%	6	4	9
		2.5	1%	7	5	11.5
Garfield County	Vertical	Not applicable	85%	4	1	13
	Horizontal	1	13%	6	2	15
		2	2%	7	4	30

Sources: Colorado State University and the Colorado Oil and Gas Conservation Commission (see text).

2.2.2. Well Production

Production from the O&G wells occurs over many years, as compared to days or weeks per well for O&G development. CSU completed a total of 11 production experiments (locations) in the NFR (CSU, 2016b), reflecting a variety of well ages, number of wells, and O&G production rates. The number of producing wells per pad in each experiment ranged from one to 18. Three of the experiments were at well pads that had recently gone into production: experiment number 7 took place two days after the well pad went into production, while experiment numbers 15 and 5 took place two and seven months, respectively, after the well pads went into production.

2.3. Emission Source Strength

A variety of VOCs can be released to the atmosphere from O&G development and production activities. The primary focus of the CSU studies (CSU, 2016a, 2016b) was to characterize the source strength of these VOC emissions from these activities.

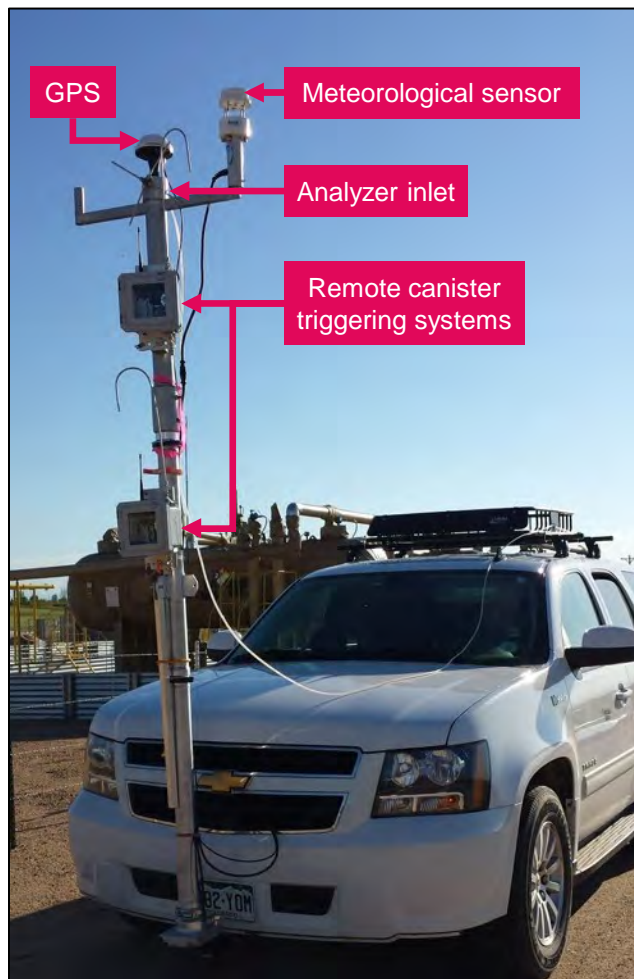
CSU researchers worked with several industry partners to identify sites suitable for conducting the studies. Table 2-2 contains a summary of the number of experiments and measurements that CSU conducted and that are viable for these HHRAs. Experiments contain one or more sampling events (separated by some amount of time but on the same day), and events contain one or more unique canister sample measurements (often at different heights). Non-viable

measurements included experiments where multiple O&G activities were occurring at the same time (e.g., flowback and fracking occurring for two wells at the same pad), liquid load-out operations, and remote fracking. CSU conducted field experiments in both Garfield County and in the NFR during flowback and fracking operations. They conducted field experiments during drilling operations only in Garfield County, and they conducted experiments during production operations only in the NFR.

Table 2-2. Summary of Colorado State University Field Experiments and Measurements Used in these Assessments

		Counts of Field Data with Available Emission Rates			
		Drilling	Fracking	Flowback	Production
Northern Front Range	Experiments (unique well pads and locations)	0	3	3	11
	Events (unique sampling events)	0 (used Garfield County data for risk assessments)	16	14	55
	Measurements (total canister samples)	0	40	36	150
Garfield County	Experiments (unique well pads and locations)	5	4	5	0
	Events (unique sampling events)	13	12	24	0 (used Northern Front Range data for risk assessments)
	Measurements (total canister samples)	35	29	80	0

The measurement approach was based on using the Tracer Ratio Method (TRM), described by Lamb et al. (1995), which enables quantification of emission rates. In this approach, CSU used acetylene as the tracer gas, which is co-located with the major emission source on the well pad and is emitted at a controlled, constant rate. At the same time, **CSU sampled air roughly downwind of the source to obtain 3-minute-average air concentrations of VOCs.** They did so by positioning a vehicle, equipped with a real-time analyzer for acetylene, downwind of the well pad to detect the tracer gas and locate the emission plume (vehicle pictured in Figure 2-1). When a plume was clearly identified, one to three evacuated Silonite®-coated stainless steel canister(s) were remotely triggered and filled to collect air samples for three minutes. They typically made canister samples at 2–3 heights (typically between 6 and 16 ft, 1.8 and 4.9 m). CSU also sampled air upwind of the source to obtain 3-minute-average background concentrations of VOCs. We assume that the VOCs measured by the background samples do not to originate from the well pad—an assumption based on the wind direction at the time of sample collection.



Source: Figure 2.3 of (CSU, 2016a).

Figure 2-1. Mobile Plume Tracker with its External Components for Plume Identification and Sampling

In a laboratory, CSU later analyzed the sampled canisters for a suite of 47 VOC species, listed in Table 2-3,¹ using Gas Chromatography with Flame Ionization Detection,³ resulting in estimates of chemical air concentrations at each canister location and time. They corrected the downwind air concentrations by removing background concentrations (VOCs that are not emitted at the well pad) as measured by the upwind canisters, resulting in air concentrations limited to emissions associated with the sources of interest on the well pad. Most of the 47 VOCs had more than 80 percent of their values above the level of detection; the exceptions were isoprene, 1-pentene, 1-butene, and trans-2-butene. Further discussion on levels of detection can be found in Section 2.10.1.2.

³ At the beginning of the CSU studies, they used a Hewlett Packard (HP) GC-FID system, coupled with an Entech pre-concentration unit, for cryogenic trapping and the subsequent analysis of VOCs. This system was only able to quantify 28 VOCs. They replaced this system with a Shimadzu GC-FID system, coupled with an in-house pre-concentration unit, by Experiment 3, at which time the full suite of 47 VOC species could be analyzed. For these HHRAs, we retained the data from these first two experiments, and we provide in Section 2.7.2 the details on how these data were incorporated into the Monte Carlo simulations.

Table 2-3. The 47 Chemicals Measured During the Field Experiments and Used in these Assessments

benzene	2-ethyltoluene	1-pentene
isobutane	3-ethyltoluene	cis-2-pentene
n-butane	4-ethyltoluene	trans-2-pentene
1-butene	n-heptane	propane
cis-2-butene	n-hexane	propene
trans-2-butene	isoprene	n-propylbenzene
cyclohexane	isopropylbenzene	styrene
cyclopentane	methylcyclohexane	toluene
n-decane	2-methylheptane	1,2,3-trimethylbenzene
1,3-diethylbenzene	3-methylheptane	1,2,4-trimethylbenzene
1,4-diethylbenzene	2-methylhexane	1,3,5-trimethylbenzene
2,3-dimethoxypropane	3-methylhexane	2,2,4-trimethylpentane
2,4-dimethylpentane	n-nonane	2,3,4-trimethylpentane
ethane	n-octane	m+p-xylene
ethene	isopentane	o-xylene
ethylbenzene	n-pentane	

Notes: Colorado State University collected samples in some cases of 49 chemicals. However, one was the tracer (acetylene, also known as ethyne) and we do not include it in this assessment. Another was i-butene, which they did not collect during most experiments and is chemically very similar to 1-butene, which they collected regularly; we do not include i-butene in this assessment. We therefore refer to 47 chemicals in these risk assessments.

The **rate of emission (mass per time) of a VOC resulting from O&G activities** is the tracer emission rate multiplied by the ratio of the background-corrected VOC air concentration to the background-corrected tracer air concentration. Through this tracer technique, the complex dispersion and turbulent mixing that occurs between the emission point and the measurement point is directly accounted for by the dilution of the tracer. To assure that the best estimate of the emission rate is used in these HHRAs, we are using the highest measured emission rate from each sampling location and experiment, with additional processing as described in Section 2.3.1.

During O&G development activities, operators typically drill each well sequentially (if there are multiple wells), then frack sequentially, then start flowback sequentially, before the multiple wells enter the production phase. We ensured that the CSU-derived emission rates used in these HHRAs reflected these typical operating procedures. Doing so allows us to estimate air concentrations from emissions during the drilling, fracking, or flowback phases of a single well, and then in later stages of the HHRA to aggregate over time people's potential exposures to O&G emissions when multiple wells undergo these activities back-to-back. At four out of the five experiments for flowback activities in Garfield County, more than one well was undergoing flowback simultaneously. In these cases, we divided the estimated emission rates by the number of wells undergoing flowback, assuming that emissions from flowback were proportional to the number of wells undergoing flowback. That is, we ensured for the HHRA that all VOC emissions during development activities reflected a single well. In several cases, we excluded measurements taken during times when multiple activities were occurring simultaneously at the well pad (e.g., flowback and fracking at the same time) and measurements taken during activities other than those listed above (e.g., liquid load-out; remote fracking).

Most of the production sites where CSU conducted experiments had multiple wells producing O&G, but we did not normalize their emissions because we found no clear and systematic correlation between VOC emissions and the number of producing wells, the number of on-site

storage tanks, or the O&G production rates. This adds a high degree of uncertainty to the scalability of O&G production emissions with the operating characteristics of the well pad.

Table 2-4 contains a summary of the 3-minute emission rates by activity for several of the VOCs: isoprene and BTEX compounds (benzene, toluene, ethylbenzene, and xylenes). We chose to illustrate these five (out of 47) VOCs because of the past importance of BTEX compounds in O&G operations (particularly benzene; see McMullin et al., 2018) and because isoprene was believed to have relatively low health-criteria values. Flowback has the highest emission rates of these VOCs, except for toluene where drilling was highest. For a given chemical within a given activity, the maximum and minimum emission rates differ by at least 1.49 orders of magnitude (a factor of 30), up to over 4.67 orders of magnitude (a factor of 46,700) for benzene during drilling.

Table 2-4. Statistics on 3-minute-average Emission Rates for Selected Chemicals

Activity	Site	Statistic	3-minute-average Emission Rate (grams per second)				
			Benzene	Toluene	Ethylbenzene	Xylenes ^a	Isoprene
Drilling	Garfield County (used for all sites in these assessments)	Maximum	7.67E-01	1.17E+01	1.63E-02	2.59E-01	1.07E-02
		Mean	1.34E-01	2.70E+00	3.29E-03	4.87E-02	1.41E-03
		Minimum	1.63E-05	7.27E-03	3.98E-04	3.90E-04	1.71E-05
		Range ^b	4.67E+00	3.21E+00	1.61E+00	2.82E+00	2.80E+00
Fracking	Garfield County	Maximum	5.34E-01	2.20E+00	2.21E-01	6.65E+00	2.54E-02
		Mean	1.57E-01	8.07E-01	6.01E-02	1.67E+00	3.14E-03
		Minimum	4.36E-03	1.91E-02	3.57E-03	1.93E-03	4.67E-05
		Range ^b	2.09E+00	2.06E+00	1.79E+00	3.54E+00	2.74E+00
	Northern Front Range	Maximum	3.84E-02	2.36E-01	1.88E-02	7.43E-02	3.07E-03
		Mean	1.04E-02	4.01E-02	3.62E-03	1.98E-02	7.45E-04
		Minimum	6.06E-04	1.34E-03	3.11E-04	1.57E-03	2.20E-05
		Range ^b	1.80E+00	2.25E+00	1.78E+00	1.68E+00	2.14E+00
Flowback	Garfield County	Maximum	2.29E-01	4.36E+00	1.55E+00	6.69E+00	8.32E-02
		Mean	6.37E-02	4.27E-01	8.05E-02	6.22E-01	9.72E-03
		Minimum	5.58E-03	1.92E-02	4.97E-04	2.04E-02	2.69E-05
		Range ^b	1.61E+00	2.36E+00	3.49E+00	2.52E+00	3.49E+00
	Northern Front Range	Maximum	1.34E+00	3.52E+00	2.73E-01	2.88E+00	6.42E-04
		Mean	2.75E-01	7.25E-01	5.69E-02	5.51E-01	1.82E-04
		Minimum	4.15E-02	1.15E-01	6.37E-03	6.24E-02	8.05E-06
		Range ^b	1.51E+00	1.49E+00	1.63E+00	1.66E+00	1.90E+00
Production	Northern Front Range (used for all sites in these assessments)	Maximum	2.14E-01	2.03E+00	9.43E-02	3.02E-01	4.03E-03
		Mean	1.37E-02	1.06E-01	3.73E-03	1.89E-02	4.24E-04
		Minimum	2.64E-05	4.85E-05	4.27E-05	1.70E-04	1.73E-05
		Range ^b	3.91E+00	4.62E+00	3.34E+00	3.25E+00	2.37E+00

Notes: The drilling, fracking, and flowback emissions reflect one well, while the collection of production emissions reflect a variety of numbers of wells, from one to 18.

^a All isomers of xylene are combined. All of the VOC data as reported by CSU are available in the CSU reports (CSU, 2016a, 2016b) and can be downloaded from CSU archive at <https://dspace.library.colostate.edu/>.

^b The range shown is in orders of magnitude, calculated as the difference in the logarithms (base 10) of the maximum and minimum values shown; that is, $\log(\text{maximum}) - \log(\text{minimum})$. For example, a range of 4.67E+00 is a range of 4.67 orders of magnitude (approximately a factor of 46,700).

2.3.1. Derivation of One-hour-average Emission Rates

The emission rates that CSU derived were based on 3-minute-average air concentrations and so they are best characterized as 3-minute-averaged emission rates for each measurement.

Acute health effects are assessed using 1-hour exposures, not 3 minutes. Further, AERMOD cannot model emissions and dispersion at time steps smaller than one hour, and so it typically expects 1-hour-average emission rates and outputs 1-hour-average (or longer) air concentrations. **We did not assume that the 3-minute-average emission rates were sustained for a full hour; such an assumption might be extreme in some cases, leading to large overestimations or underestimations in air concentrations at the highest or lowest emission rates**, respectively. The higher 3-minute-average emissions that CSU observed may have been short-lived times of peak emissions (e.g., several flowback collection tanks opened at the same time), and the lower emissions may have been short-lived times of low emissions (e.g., the process of laying down pipes during drilling). Without additional measurements, especially continuous measurements over longer periods of time, we cannot be certain about the frequencies and durations of particularly high and particularly low emission rates.

However, environmental concentrations and emission rates of chemicals have historically been shown to be well-represented by log-normal distributions (that is, the log of concentrations and emissions are normally distributed). It is a common assumption in stochastic modeling, and it is non-negative and has a theoretical basis whenever the process is the result of several multiplicative random factors. Therefore, **we assume that the emission rates are log-normally distributed** (both the 3-minute- and 1-hour-average rates). Theoretically, the assumption is that the 1-hour-average emission rates are obtained by the mean of 20 3-minute-average samples taken consecutively within an hour, and that those averages are log-normally distributed, with a mean similar to that of the 3-minute distribution but with a lower variance (**a tighter distribution with lower maximum rates and higher minimum rates**).

Given the relatively small number of emission experiments and samples, the non-continuous nature of the experiments, and the wide variance in emission rates overall (both between sampling events and within the same hour when available), we made use of all the highest measured emission rates for each VOC from each sampling location and experiment (as discussed in Section 2.3 above). We assumed that there was no difference in the distribution of emission rates from one day or sampling event to another. We also assumed that the 3-minute-average emission rates are uncorrelated.

We detail below the steps for deriving the new distributions of 1-hour-average emission rates. Note that all specifications of “log” in this section represent the natural logarithm.

1. For a log-normal distribution with mean m and variance v , the underlying normal has:
- 2.

$$mean = m_{log} = \log \left(\frac{m}{\sqrt{1 + \frac{v}{m^2}}} \right) \quad \text{Eq. 2-1}$$

$$standard\ deviation = s_{log} = \sqrt{\log \left(1 + \frac{v}{m^2} \right)} \quad \text{Eq. 2-2}$$

The mean of 20 3-min samples will make up a 1-hour sample.

[The variance of the mean of 20 uncorrelated 3-minute samples] is 1/20 of [the variance of one mean 1-hour sample]. However, we reduce this by one degree of freedom due to the

uncertainty in the mean of the distribution, which is calculated here rather than given or assumed (i.e., 1/19 rather than 1/20).

3. Let x represent a vector of 3-minute samples, with mean mx , standard deviation sx , and variance vx .

Let y represent the corresponding vector of 1-hour samples, assuming no correlation between 3-minute intervals used to arrive at them. Then it is expected to have:

$$mean = my = mx \quad \text{Eq. 2-3}$$

$$variance = vy = \frac{vx}{19} \quad \text{Eq. 2-4}$$

4. Let mx_log and sx_log respectively be the mean and standard deviation of the underlying normal distribution for the 3-minute samples. Then:

5.

$$mean = mx_log = \log\left(\frac{mx}{\sqrt{1 + \frac{vx}{(mx)^2}}}\right) \quad \text{Eq. 2-5}$$

$$standard\ deviation = sx_log = \sqrt{\log\left(1 + \frac{vx}{(mx)^2}\right)} \quad \text{Eq. 2-6}$$

Let my_log and sy_log respectively be the mean and standard deviation of the underlying normal distribution for the 1-hour samples. Then:

$$mean = my_log = \log\left(\frac{mx}{\sqrt{1 + \frac{vx}{19(mx)^2}}}\right) \quad \text{Eq. 2-7}$$

$$standard\ deviation = sy_log = \sqrt{\log\left(1 + \frac{vx}{19(mx)^2}\right)} \quad \text{Eq. 2-8}$$

6. From the mean mx and standard deviation sx of vector x (a set of 3-minute sample data for a chemical), we can estimate the mean and standard deviation of the underlying normal distribution (using Eq. 2-5 and 2-6).

Using Eq. 2-7 and 2-8, we can calculate mean my and standard deviation sy of the underlying normal distribution for the corresponding mean 1-hour data y .

Using the above values, we can estimate the vector of mean 1-hour data y :

Each x value has a z-score, which is the number of standard deviations above or below the mean on the underlying normal, given by:

$$z[i] = \frac{\log(x[i]) - mx_log}{sx_log} \quad \text{Eq. 2-9}$$

The z-scores for the corresponding y values (samples from the distribution of 1-hour data) are:

$$y[i] = e^{my_log + (z[i] \times sy_log)} \quad \text{Eq. 2-10}$$

Due to the relatively small sample size for the 3-minute-average data, the means will sometimes be noticeably different between the 3-minute-average and derived 1-hour-average distributions. Maximum acute exposures in these HHRAs will typically coincide with the maximum emissions, and so **we expect that maximum acute exposures and risks will tend to be several factors smaller using the 1-hour-average rates compared with 3-minute-average rates**, which we believe is reasonable given the variable nature of O&G emissions and the assumed log-normal distribution.

We replaced each CSU-measured 3-minute-average emission rate with a 1-hour-average rate from the same part of the distribution. For example, for the drilling activity, if the 3-minute-average rate for benzene in the first experiment corresponded to the 25th percentile of the overall distribution of 3-minute-average benzene emission rates from drilling, then we replaced it with the 25th-percentile value from the corresponding distribution of 1-hour-average rates. This means that we do not extrapolate out beyond the maximum and minimum percentiles present in the 3-minute data.

Whereas Table 2-4 contains summary statistics on 3-minute-average emission rates, Table 2-5 contains the same summaries but for the corresponding 1-hour-average emission rates. The means of the 1-hour-average rates and means of the 3-minute-average rates typically agree within about 10 percent for these chemicals (and generally across all chemicals and O&G activities, not shown). With the 1-hour-average rates, it still remains true that flowback has the highest emission rates for benzene, ethylbenzene, and isoprene, and drilling has the highest emission rates for toluene, though emissions of xylene are now highest during fracking in Garfield County. As expected, the maximum values in Table 2-5 are all lower than those in Table 2-4, typically by a factor of 2–3 for development activities and by a factor of about 4 for production, while the minimum values are several factors to several orders of magnitude higher (the same is generally true across all chemicals, not shown). As a result, the ranges of the 1-hour-average rates decrease sometimes by more than a factor of 2 relative to those of the 3-minute-average rates, so that the maximum and minimum 1-hour-average rates differ by at least a factor of 2.6 for the chemicals shown in the tables, up to 2 orders of magnitude for toluene during O&G production.

Table 2-5. Statistics on Derived 1-hour-average Emission Rates for Selected Chemicals

Activity	Site	Statistic	1-hour-average Emission Rate (grams per second)				
			Benzene	Toluene	Ethylbenzene	Xylenes	Isoprene
Drilling	Garfield County (used for all sites in these assessments)	Maximum	2.72E-01	4.84E+00	5.93E-03	9.51E-02	3.64E-03
		Mean	1.14E-01	2.30E+00	3.21E-03	4.36E-02	1.11E-03
		Minimum	8.57E-03	4.89E-01	1.96E-03	1.20E-02	3.48E-04
		Range ^a	1.50E+00	9.96E-01	4.81E-01	9.00E-01	1.02E+00
Fracking	Garfield County	Maximum	2.35E-01	1.11E+00	9.32E-02	2.73E+00	8.34E-03
		Mean	1.48E-01	7.59E-01	5.74E-02	1.49E+00	2.67E-03
		Minimum	6.35E-02	3.19E-01	2.97E-02	2.58E-01	8.36E-04
		Range ^a	5.68E-01	5.40E-01	4.97E-01	1.02E+00	9.99E-01
	Northern Front Range	Maximum	1.64E-02	7.86E-02	6.59E-03	3.18E-02	1.23E-03
		Mean	9.60E-03	3.74E-02	3.44E-03	1.86E-02	6.87E-04
		Minimum	5.08E-03	1.59E-02	1.95E-03	1.02E-02	2.96E-04
		Range ^a	5.09E-01	6.93E-01	5.30E-01	4.93E-01	6.19E-01
Flowback	Garfield County	Maximum	9.34E-02	1.15E+00	4.42E-01	1.77E+00	2.44E-02
		Mean	6.20E-02	4.21E-01	6.58E-02	6.04E-01	7.57E-03
		Minimum	3.55E-02	1.75E-01	1.10E-02	2.16E-01	1.53E-03
		Range ^a	4.20E-01	8.18E-01	1.60E+00	9.14E-01	1.20E+00
	Northern Front Range	Maximum	5.14E-01	1.35E+00	1.02E-01	1.07E+00	2.89E-04
		Mean	2.65E-01	6.99E-01	5.54E-02	5.30E-01	1.68E-04
		Minimum	1.74E-01	4.66E-01	3.30E-02	3.18E-01	8.13E-05
		Range ^a	4.70E-01	4.63E-01	4.92E-01	5.26E-01	5.51E-01
Production	Northern Front Range (used for all sites in these assessments)	Maximum	5.26E-02	5.20E-01	2.23E-02	7.06E-02	1.07E-03
		Mean	1.17E-02	6.96E-02	3.04E-03	1.65E-02	3.94E-04
		Minimum	1.49E-03	5.17E-03	6.98E-04	3.93E-03	1.71E-04
		Range ^a	1.55E+00	2.00E+00	1.50E+00	1.25E+00	7.96E-01

Notes: The drilling, fracking, and flowback emissions reflect one well, while the collection of production emissions reflect a variety of numbers of wells, from one to 18.

^a The range shown is in orders of magnitude, calculated as the difference in the logarithms (base 10) of the maximum and minimum values shown; that is, $\log(\text{maximum}) - \log(\text{minimum})$. For example, a range of 1.50E+00 is a range of 1.50 orders of magnitude (approximately a factor of 32).

2.4. Emission Source Characterization

The HHRA focuses on identifying potential effects of O&G emissions on neighboring residential populations. Typical O&G sites are in rural or suburban-fringe locations, and as such it is not appropriate to use AERMOD's urban setting, which is for locations with high population densities leading to urban-boundary-layer effects on local-scale air movement.

Well pads are frequently developed with multiple wells, which increases the size of the well-pad footprint. We used **three well-pad configurations for development activities** in these HHRA's:

- single well,
- low number of multiple wells, and
- high number of multiple wells.

Table 2-6 shows the number of wells and size of well pad (working area) associated with each of these three configurations, determined by CDPHE using professional judgment and recent

permits submitted to COGCC. The emissions from these work areas include a number of sources. **Emissions during drilling** operations are expected to reflect a mixture of well emissions and combustion from engines. **Emissions during fracking** include combustion sources associated with power generation and any materials volatilized from chemicals used in fracking liquids. **Emissions during flowback** are primarily from the flowback liquids emerging from the wells, while emissions associated with combustion are much lower since combustion activities are limited during flowback operations.

Table 2-6. Well-pad Configurations Used in the Modeling of Development Activities

Location	Well-pad Configurations					
	Single Well		Low Multi-well		High Multi-well	
	Number of Wells	Working Area (acres)	Number of Wells	Working Area (acres)	Number of Wells	Working Area (acres)
Northern Front Range	1	1	8	3	32	5
Garfield County			16			

For the production phase of O&G operations, we utilized one size of well pad for these HHRAs: 1 acre. This was the approximate average well-pad size for the sites that CSU sampled during production operations, which varied from 0.2 to 2.3 acres. The numbers of wells in production and the year when production started varied across the production sites where CSU sampled. The numbers of wells varied from one to 18, and the year when production started varied between 2008 and 2016. As discussed in Section 2.3, there is a high degree of uncertainty in the relationship between parameters such as well number, production rate, etc. and emission rates; thus, we have low confidence in the accuracy of scaling production emissions based on these parameters. Therefore, we modeled the CSU-derived emissions as-is (after conversion to 1-hour-average rates, as discussed in Section 2.3.1) with no normalization and from a single size of well pad without scaling to different numbers of wells. This means that the variability in air concentrations we estimate from production operations reflect the variability of emissions and well/well-pad characteristics observed by CSU during their experiments, except with the truncations inherent in our derivation of 1-hour-average rates. **Emissions during production** at the O&G sites represent a variety of operations with differing O&G production rates, numbers of wells, numbers of condensate tanks, and emissions control equipment (e.g., bulk separator, 1-, 2-, and 3-stage separators).

Because all of these emissions are dispersed over time at various locations and heights across the well pad, we characterized an emission source as a **square volume source** covering the pad. This characterization implies that the emissions come equally from all parts of the pad. Per recommendations in the AERMOD User's Guide (EPA, 2016b), we set the initial lateral dispersion equal to the length of the side of the source divided by 4.3. Emissions from the well are warmer than ambient temperatures, with an estimated exit gas temperature of 275 °F (135 °C). We parameterize the initial buoyancy of emissions on the well pad by assuming an **initial release height of 10 ft** (3.05 m) above ground level, leading to an initial vertical dispersion equal to $10/2.15=4.65$ ft (1.42 m) per AERMOD User's Guide recommendation (EPA, 2016b).

2.5. Meteorology

Representative meteorological data are needed for the two study areas to make possible the best characterization of the atmospheric dispersion conditions in which the O&G activities

operate and enable accurate estimations of air concentrations. CDPHE's Modeling and Emissions Inventory Unit has archived historical meteorological data sets from across Colorado. These surface meteorological data sets include National Weather Service (NWS) sites (primarily collected for aviation purposes), sites run by CDPHE (primarily used for CDPHE's air-quality-monitoring program), and sites run by private industry (typically for use in air-dispersion models).

The dispersion of air contaminants at the two study locations are influenced by a variety of factors including local terrain, continental-scale weather systems, local-scale weather systems, and mountain/valley wind systems. **CDPHE carefully reviewed the archive data sets and considered these dispersion factors to select the most representative surface meteorology for these HHRAs**, as discussed in the following subsections. Upper-air meteorological data for Garfield County modeling were from the Grand Junction site (Weather Bureau Army Navy identifier 23066), while for NFR they were from the Denver/Stapleton International Airport (identifier 23062).

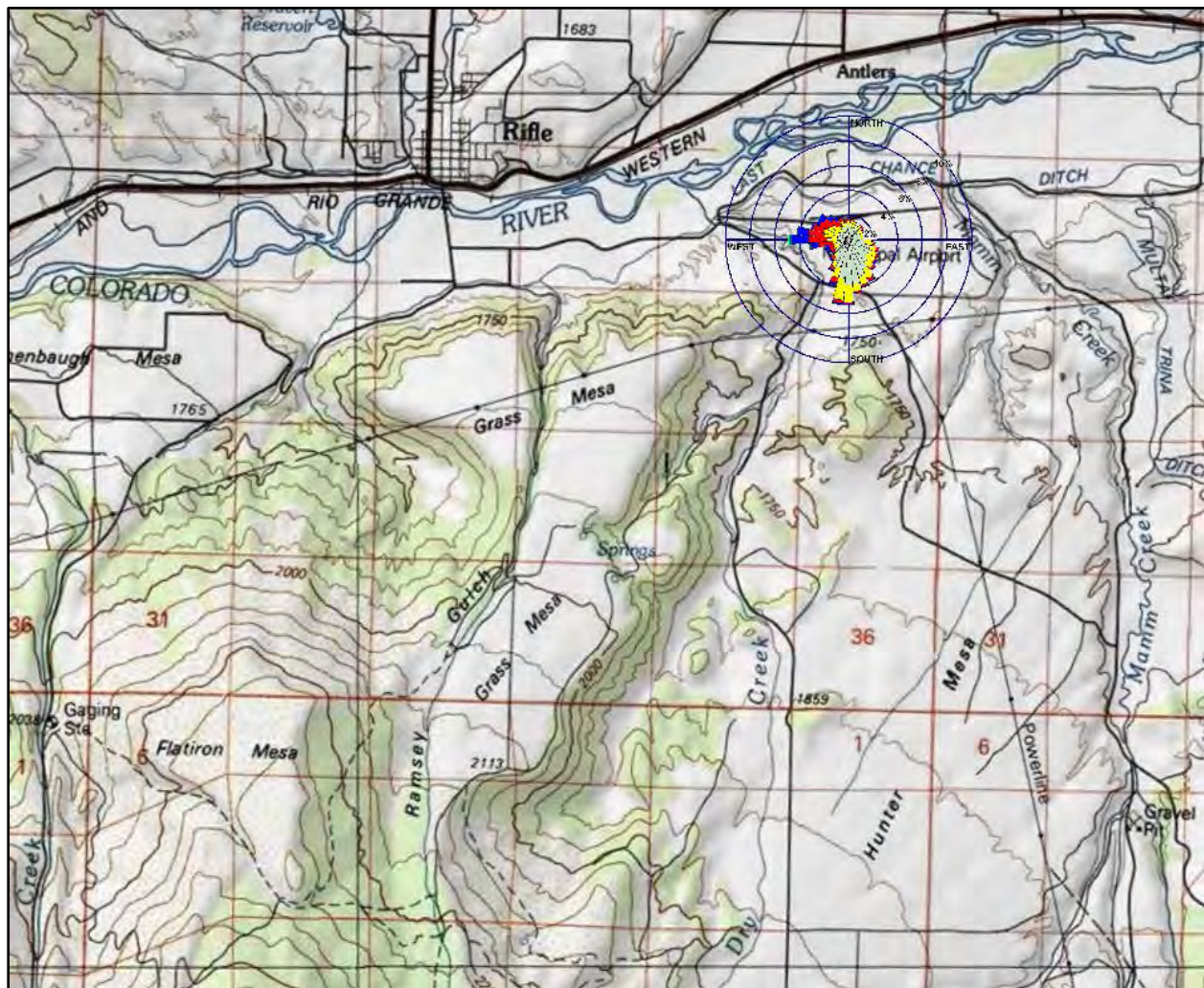
2.5.1. Garfield County

The area in Garfield County with O&G development is dominated by **plateaus and the Colorado River Valley**. In this complex terrain environment, local winds are generally caused by differential heating of the valley walls versus the valley floor. This causes **mountain/valley wind flows** in the absence of larger weather systems. In a mountain/valley wind system, air will move down-valley or -slope from near sunset to a few hours after sunrise. Once the sun has risen and heated the upper portions of the valley or slope, the air flow will reverse and go uphill. During the transition from one flow to the other, there can be a period of light and variable winds, typically lasting one or two hours.

The mountain/valley wind-flow circulation dominates most hours of the year with the exception of when large weather systems are moving through or on top of the plateaus/ridges at night. At these ridge-top locations during the night, a local-scale wind system develops, caused by a temperature inversion near the mountain top. This causes the higher mountains to the east of Garfield County to act as a dam, which causes a pressure gradient resulting in air flow from the south on the plateaus/ridge tops in Garfield County. Because the O&G development in Garfield County is occurring in both the valleys and on top of the plateaus/ridges, two meteorological data sets are needed to characterize the meteorology and dispersion.

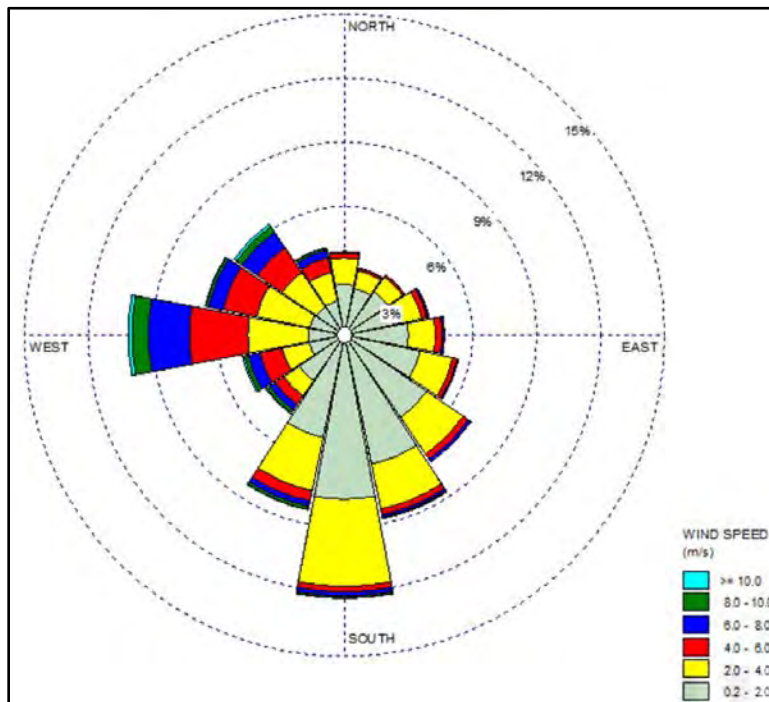
A review of the available data for the **valley locations** showed that the best available data set is the **Rifle Garfield County Airport** (Weather Bureau Army Navy identifier 03016) in the Colorado River Valley, operated by the NWS. The Rifle meteorological data set is strongly influenced by the Colorado River Valley, which is orientated east-west at Rifle, and two nearby valley creeks—Mamm Creek and Dry Creek. Both Dry and Mamm Creek Valleys are orientated south-north. The NWS meteorological tower at Rifle is located on the south side of the Colorado River Valley at this location, as shown in Figure 2-2 where the wind rose is placed at the tower location toward the top-right of the figure. The wind rose can be more easily seen in Figure 2-3, showing primarily southerly wind flows (winds from the south) and westerly flows, due to daytime upslope flow in the Colorado River Valley and due to nighttime drainage flow from Dry Creek and occasionally Mamm Creek. These wind-flow patterns are broadly representative of

the valley locations in Garfield County where O&G development have recently taken place and are anticipated to continue.



Notes: Plot made using WRPLOT View, by Lakes Environmental Software. Winds are shown as "blowing from".

Figure 2-2. Terrain Features near Rifle, Colorado (Garfield County Valley Site), with Annual Wind Rose (2005–2009) Placed at the Location of the National Weather Service Meteorological Tower

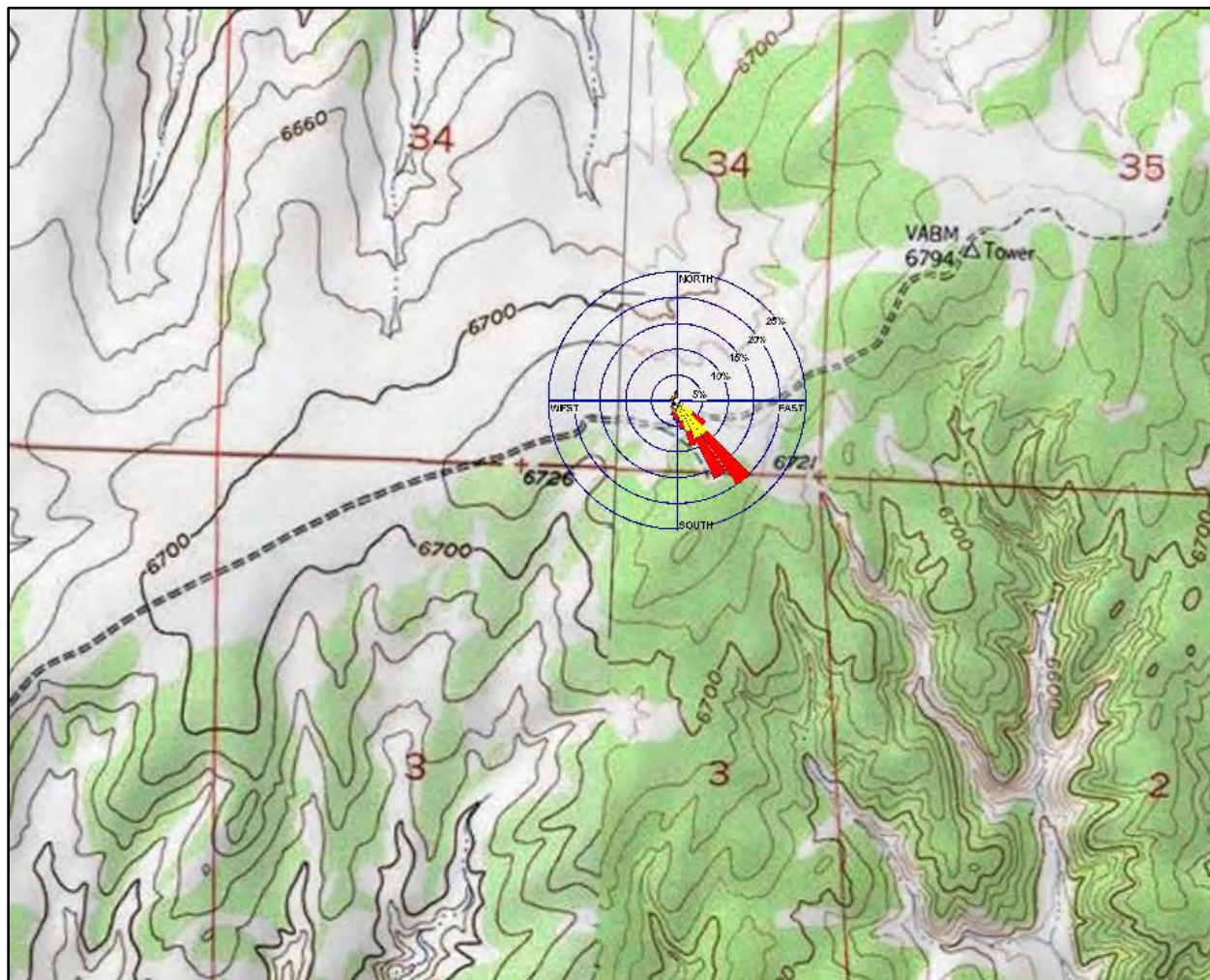


Notes: Plot made using WRPLOT View, by Lakes Environmental Software. Winds are shown as “blowing from”.

m/s = meters per second.

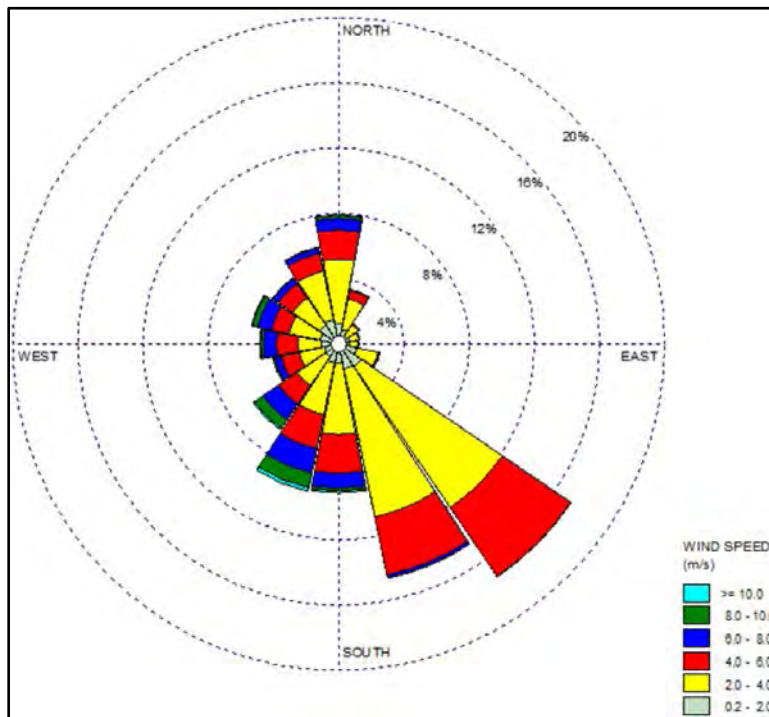
**Figure 2-3. Rifle, Colorado (Garfield County Valley Site)
Annual Wind Rose (2005–2009)**

There were no NWS, CDPHE, or private meteorological data for **ridge-top and plateau locations** in Garfield County. However, a private-industry data set was available, called **BarD**, located about 15 miles (about 24 km) to the north of Garfield County in adjacent Rio Blanco County. This station location is in a small saddle between slightly higher terrain to the northeast and southwest, as shown in Figure 2-4 where the nighttime wind rose is placed at the tower location toward the center of the figure. The winds at night are channeled by the higher terrain, causing the near-surface southerly wind to be southeasterly (from the southeast) at BarD. We show in Figure 2-5 the full (all hours of the day) annual wind rose, showing both the prominent effect of the nighttime southeasterly flow and also the influence of the daytime flow when the air moves along a more north or south direction. The differences should be small in the wind-flow pattern or dispersion characteristics at BarD versus those found on top of the plateaus/ridges in Garfield County.



Notes: Plot made using WRPLOT View, by Lakes Environmental Software. Winds are shown as “blowing from”.

Figure 2-4. Terrain Features near the BarD Meteorological Station (Garfield County Ridge-top Site), with Annual Nighttime-only Wind Rose (2002 and 2004) Placed at the Location of the Station



Notes: Plot made using WRPLOT View, by Lakes Environmental Software. Winds are shown as “blowing from”.

m/s = meters per second.

Figure 2-5. BarD (Garfield County Ridge-top Site) Annual Wind Rose (2002 and 2004)

2.5.2. Northern Front Range

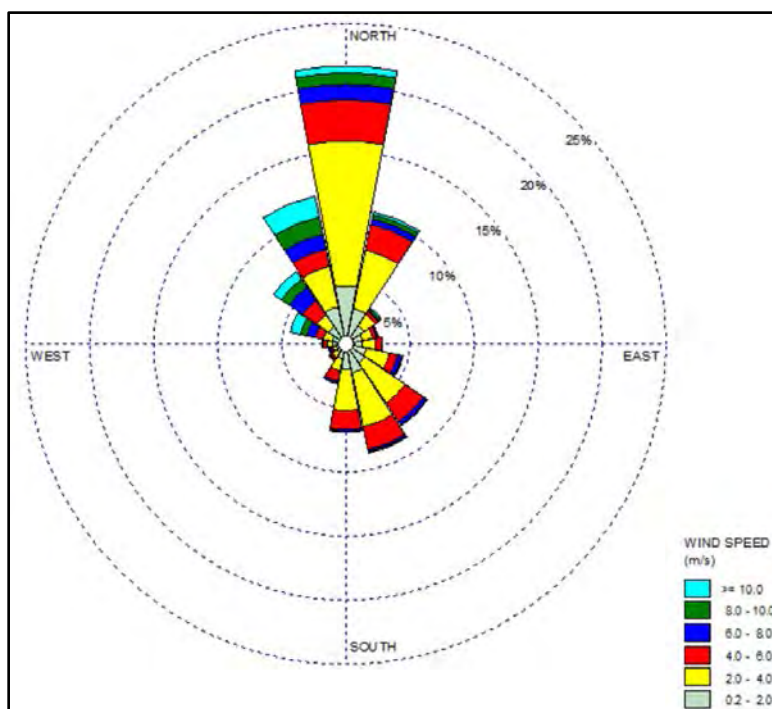
Much like in Garfield County, dispersion conditions in the NFR area are strongly influenced by the terrain. The terrain in the O&G development area of the NFR generally consists of **low rolling hills and the South Platte River Valley and its associated tributary valleys**. The **Cheyenne Ridge to the north** and the **Rocky Mountains to the west** of the NFR area also play a role in the wind-flow pattern in the study area. Winds flow out of Wyoming, resulting in a northerly wind component (from the north) as the air flows down the Cheyenne Ridge into the South Platte River Valley. Along the Front Range of the Rocky Mountains, these winds are northerly but further to the east, away from the Front Range, they become northwesterly. The winds are strongest and more prevalent near the Cheyenne Ridge, becoming weaker farther south and dissipating by the time they reach the South Platte River Valley. When the local-scale system does not set up and there is not a strong weather system in the area, the local winds are dominated by the **mountain/valley wind systems** in the valleys of the South Platte River, its tributaries, and on the slopes of the low rolling hills. As the NFR covers a considerable area, two meteorological stations were identified from the available archived meteorological data sets: the Anheuser-Busch and Ft. St. Vrain meteorological data sets, both of which are from private industry.

The **Anheuser-Busch site** is in the northwest portion of the NFR area. It experiences the northerly wind coming off the **Cheyenne Ridge** as well as the drainage downslope flowing down

the Cheyenne Ridge at night, as seen in the annual wind rose in Figure 2-6. The southerly winds in the annual wind rose reflect the daytime upslope flow of the mountain/valley wind flow.

Ft. St. Vrain, located 27 miles (43 km) to the south of the Anheuser-Busch site, is in the heart of the O&G development fields in the NFR. This site is located near the confluence of the St. Vrain Creek and the South Platte River. As seen in the annual wind rose in Figure 2-7, while the Ft. St. Vrain site does experience the northerly wind off the Cheyenne Ridge, it is dominated by the mountain/valley wind system in the valleys of **South Platte River and Ft. St. Vrain Creek**, which are oriented in a southwest-northeast direction.

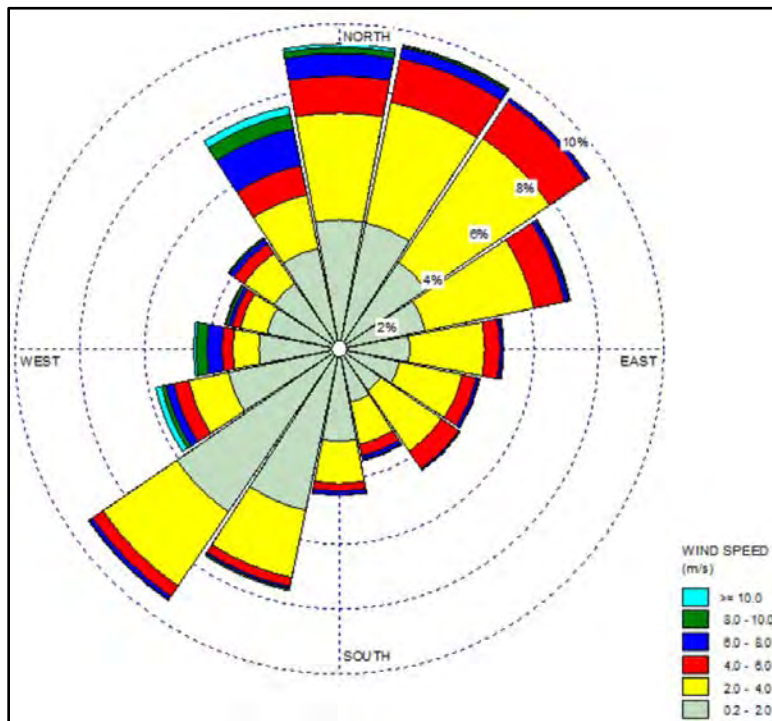
We do not present terrain figures near these two meteorological sites because the terrain in the immediate vicinity is relatively flat (the winds are dominated by more regional-scale terrain features). Because the NFR covers a fairly large geographical region, neither meteorological station fully characterizes the NFR region, but the combined set of the two stations provides an overall broad meteorological characterization for the O&G development fields in the NFR. We blended these two data sets as part of the Monte Carlo simulation of O&G development, as described in Section 2.7.2 (and, for O&G production, as part of the exposure simulations, as discussed in Section 2.9.2).



Notes: Plot made using WRPLOT View, by Lakes Environmental Software. Winds are shown as “blowing from”.

m/s = meters per second.

**Figure 2-6. Anheuser-Busch (a Northern Front Range Site)
Annual Wind Rose (1988)**



Notes: Plot made using WRPLOT View, by Lakes Environmental Software. Winds are shown as “blowing from”.

m/s = meters per second.

**Figure 2-7. Ft. St. Vrain (a Northern Front Range Site)
Annual Wind Rose (2009)**

2.5.3. Processing of Meteorological Data

In Table 2-7, we show a summary of the meteorological data sets as used in these HHRAs, along with additional information needed for processing the data for use in AERMOD.

Table 2-7. Characteristics of the Meteorological Data Sets

Broad Oil and Gas Area	Surface Station					Upper-air Station	Year(s) of Data	Number of Hours with Missing Data (percent)
	Name	Latitude (degrees)	Longitude (degrees)	Base Elevation (feet)	Frequency of Wind Data			
Northern Front Range	Anheuser-Busch	40.623	-105.008	5,025	Hourly	Denver	1988	474 (5%)
	Ft. St. Vrain	40.244	-104.873	4,793	15 minutes	Denver	2009	31 (<1%)
Garfield County	BarD	39.914	-108.374	6,743	15 minutes	Grand Junction	2002, 2004	118 (<1%)
	Rifle	39.524	-107.727	5,502	1 minute	Grand Junction	2005–2009 ^a	1,155 (3%)

^a January and February 2010 used in first two months of 2005 at Rifle.

Of the four stations, only **Rifle** is a NWS station, and all others are privately collected data. Data were not available for the first two months of 2005 at Rifle, so we substituted those times with

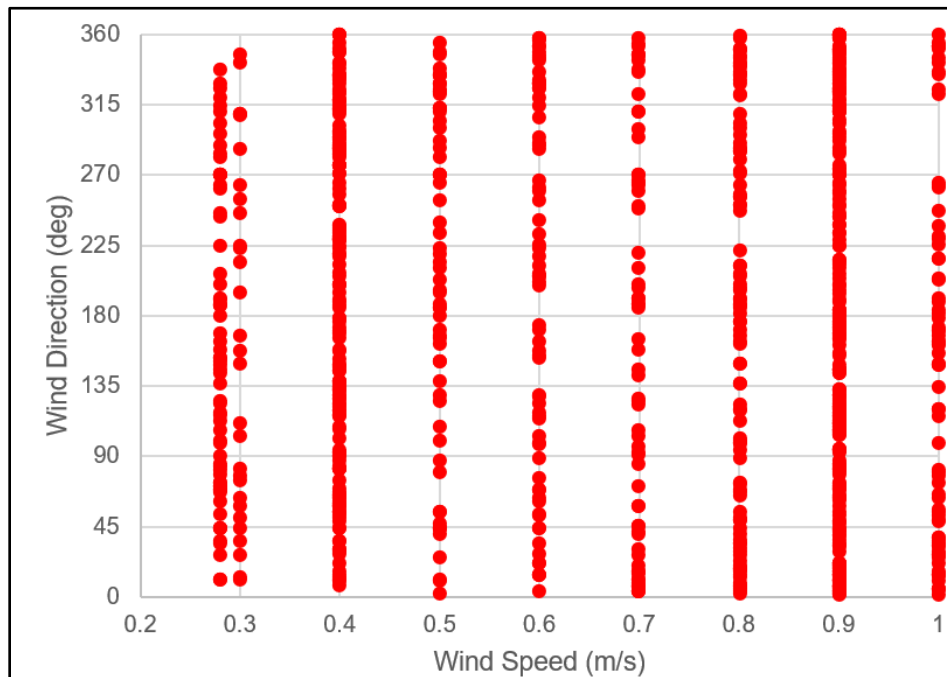
data from the first two months of 2010. The Rifle data include archived **1-minute wind records**, with the most recent time period available being March 3, 2005 through 2009. These 1-minute meteorological data were prepared for input to AERMOD using the AERMINUTE (version 15272) pre-processor, which processes the 1-minute wind data to generate hourly-average winds for input to AERMET (version 16216), which is then processed with the other surface and upper-air data for use in AERMOD.

The **other three sites** were all processed using AERMET with 15-minute average data for BarD and Ft. St. Vrain and hourly data for Anheuser-Busch. The Anheuser-Busch data set used cloud-cover observations from Stapleton Airfield as no on-site cloud cover or turbulence measurements were measured at Anheuser-Busch.

All data sets used a minimum threshold wind speed of 0.2 m/s. Since the Rifle, Ft. St. Vrain, and Anheuser-Busch data sets did not include turbulence measurements (e.g., standard deviation in wind direction), they were adjusted per EPA recommendation using EPA's **ADJ_U*** option in AERMET. This option addresses issues with AERMOD's tendency to overestimate air concentrations due to underestimating the surface friction velocity (u^*) during light-wind, stable conditions. The BarD dataset included turbulence measurements, so this low-wind adjustment was not necessary. We considered the three types of low-wind-speed processing options in AERMOD but did not utilize them. The most relevant option for these HHRAs was LOWWIND3, which increases the minimum sigma-v from 0.2 m/s (default) to 0.3 m/s and removes the upwind dispersion but then modifies the downwind dispersions to account for plume meander. However, (1) this option has shown a tendency to underestimate with increasing distance from the source, particularly in conjunction with the ADJ_U* option, (2) the well pads are modeled as volume sources, which by default incorporate plume meander at low wind speeds, and (3) including the ADJ_U* option addresses most of the bias issue for overestimating concentrations at low wind speeds.

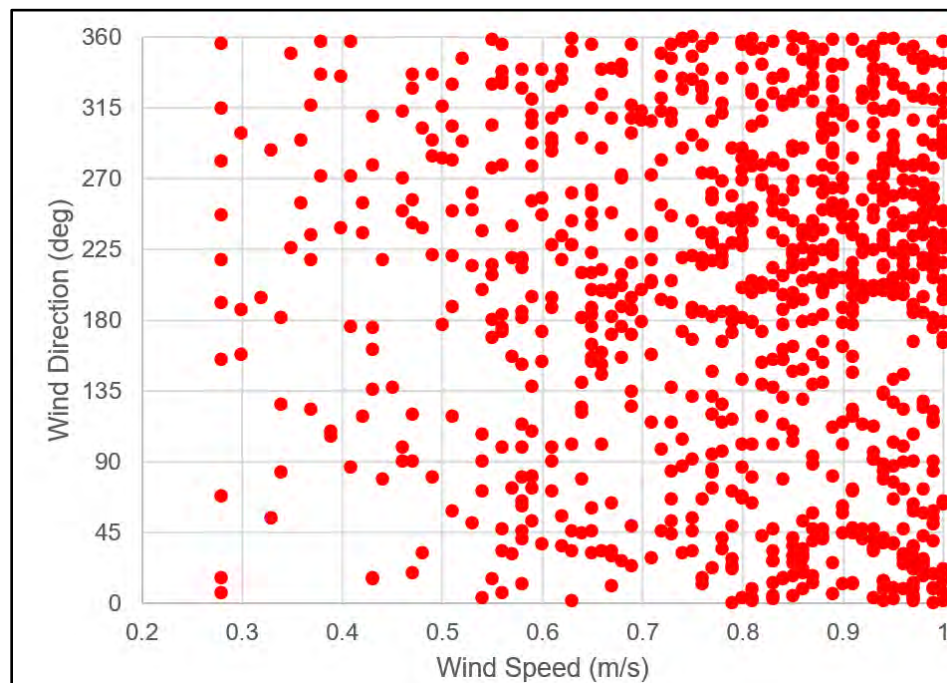
We carefully reviewed the data sets for the distribution and frequency of low wind speeds, since the concentrations estimated by AERMOD are inversely proportional to the wind speed and, as a result, the lowest wind speeds lead to the highest estimated concentrations for the near-ground-level releases in these HHRAs. In the bullets below, we discuss the frequencies of low-wind observations at the selected meteorological stations.

- For the Anheuser-Busch station (see Figure 2-8), the lowest wind speeds appear evenly distributed across all directions, and approximately 10 percent of all hours had wind speeds less than 1.0 m/s (with no missing wind data).
- The Ft. St. Vrain location (Figure 2-9) has a similar distribution with just under 10 percent of all hours reporting wind speeds less than 1.0 m/s and no missing wind data.
- The Rifle location (Figure 2-10) also had about 9 percent of all hours each year with wind speeds less than 1.0 m/s, but it had considerably more of these hours closer to 1.0 m/s than 0 m/s, compared to the stations already discussed. In addition, Rifle had 999 hours of calm wind speeds recorded over the five-year period, which were removed from the AERMOD outputs as these hours are flagged and reported as zero concentrations in the model.
- BarD had the lowest frequency of low wind speeds (Figure 2-11), with just 3 percent of the hours having winds less than 1.0 m/s, which is consistent with a more exposed ridge-top/plateau location. Two BarD hours had calm winds and these are also removed from the AERMOD outputs.



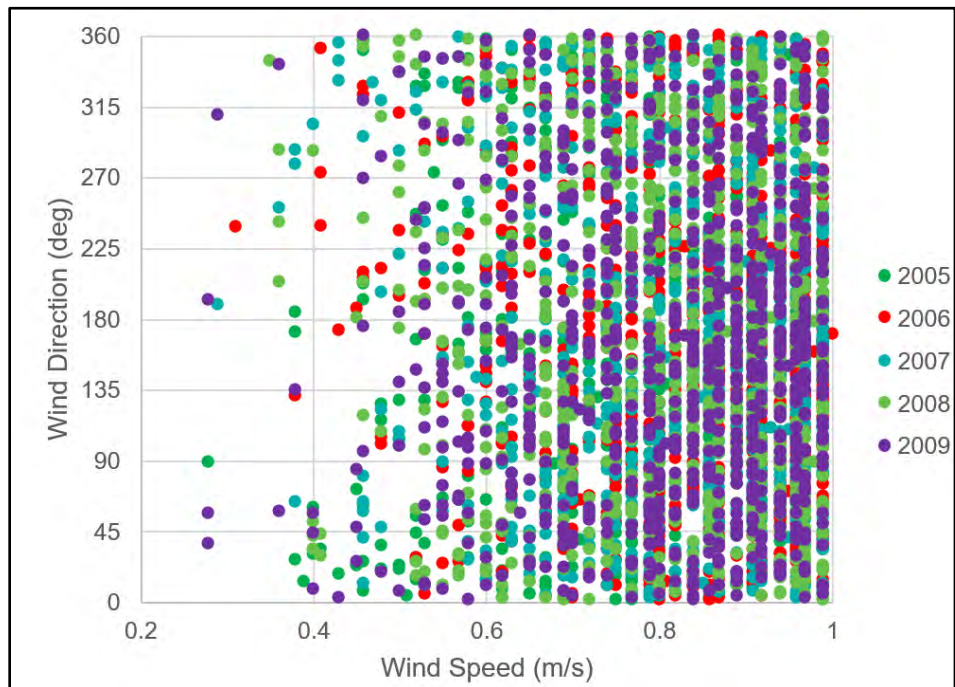
Notes: deg = degrees; m/s = meters per second.

Figure 2-8. Distribution of Low Wind Speed versus Direction at Anheuser-Busch (a Northern Front Range Site)



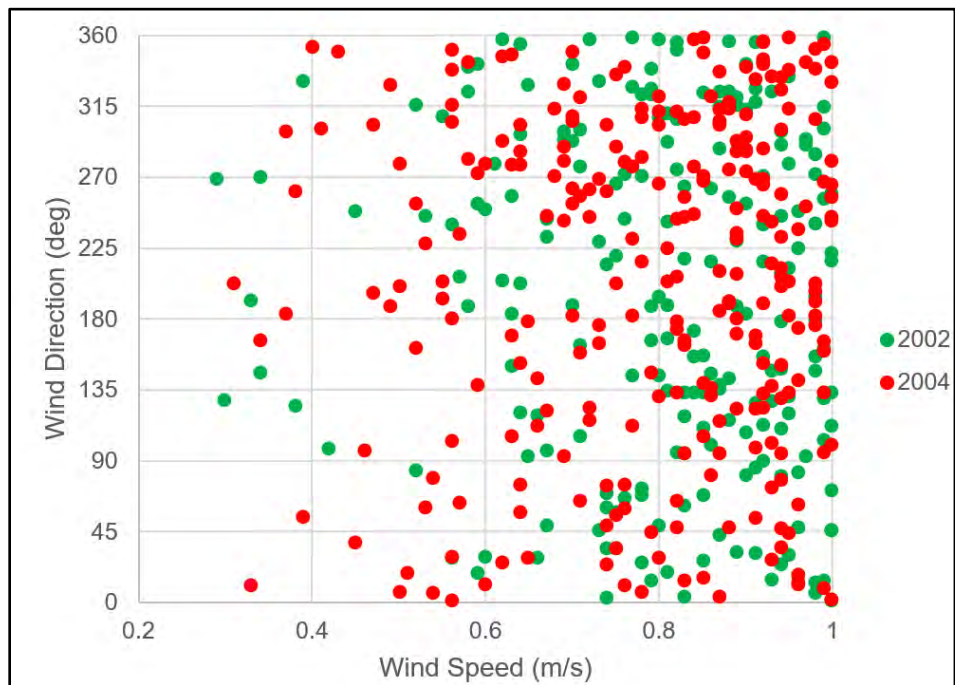
Notes: deg = degrees; m/s = meters per second.

Figure 2-9. Distribution of Low Wind Speed versus Direction at Ft. St. Vrain (a Northern Front Range Site)



Notes: deg = degrees; m/s = meters per second.

Figure 2-10. Distribution of Low Wind Speed versus Direction at Rifle (Garfield County Valley Site)



Notes: deg = degrees; m/s = meters per second.

Figure 2-11. Distribution of Low Wind Speed versus Direction at BarD (Garfield County Ridge-top Site)

2.5.3.1. Surface Characteristics

CDPHE has developed a program, called AERGIS, which uses the same requirements as the EPA's AERSURFACE land-cover preprocessor, the output of which is information on the **surface micrometeorological characteristics** of albedo, surface roughness length, and Bowen Ratio. This program facilitates the development of site-specific data by allowing CDPHE to enter moisture conditions by month and to use a more-recent National Land Cover Database (NLCD)⁴ than what is currently accepted by AERSURFACE. We show in Table 2-8 the NLCD versions used per meteorological site. CDPHE uses 12 30-degree sectors for land-cover analysis, consistent with the smallest sector size recommended in the AERMOD implementation guide (EPA, 2015), to determine the monthly Bowen Ratio, albedo, and surface-roughness values for each sector.

To characterize the surface moisture condition, relative to a climate normal, for use in determining the Bowen Ratio, CDPHE used the Climatology of the United States No. 20 Monthly Station Climate Summaries, 1971–2000 Colorado Issue, Date: February 2004. In Table 2-8, we show the data source for monthly precipitation for each site. The surface moisture condition is defined as wet, average, or dry relative to climatology precipitation probabilities in the climate summary. If the actual precipitation amount for the month is less than the 0.3 climatology probability level, it is considered dry, while values between the 0.3 and 0.7 levels are considered normal, and values above the 0.7 level are considered wet.

Table 2-8. Land-cover Data and Precipitation Stations used in Determining Surface Characteristics

Broad Oil and Gas Area	Surface Station Name	National Land-cover Database	Surface Moisture	
			Cooperative Observer Precipitation Station	Data Source
Northern Front Range	Anheuser-Busch	1992	Fort Collins	National Oceanic and Atmospheric Administration: https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-data-sets/cooperative-observer-network-coop
	Ft. St. Vrain	2001	Greeley	
Garfield County	BarD	2001	Altenbern	Western Regional Climate Center: https://wrcc.dri.edu/
	Rifle	2001	Rifle	

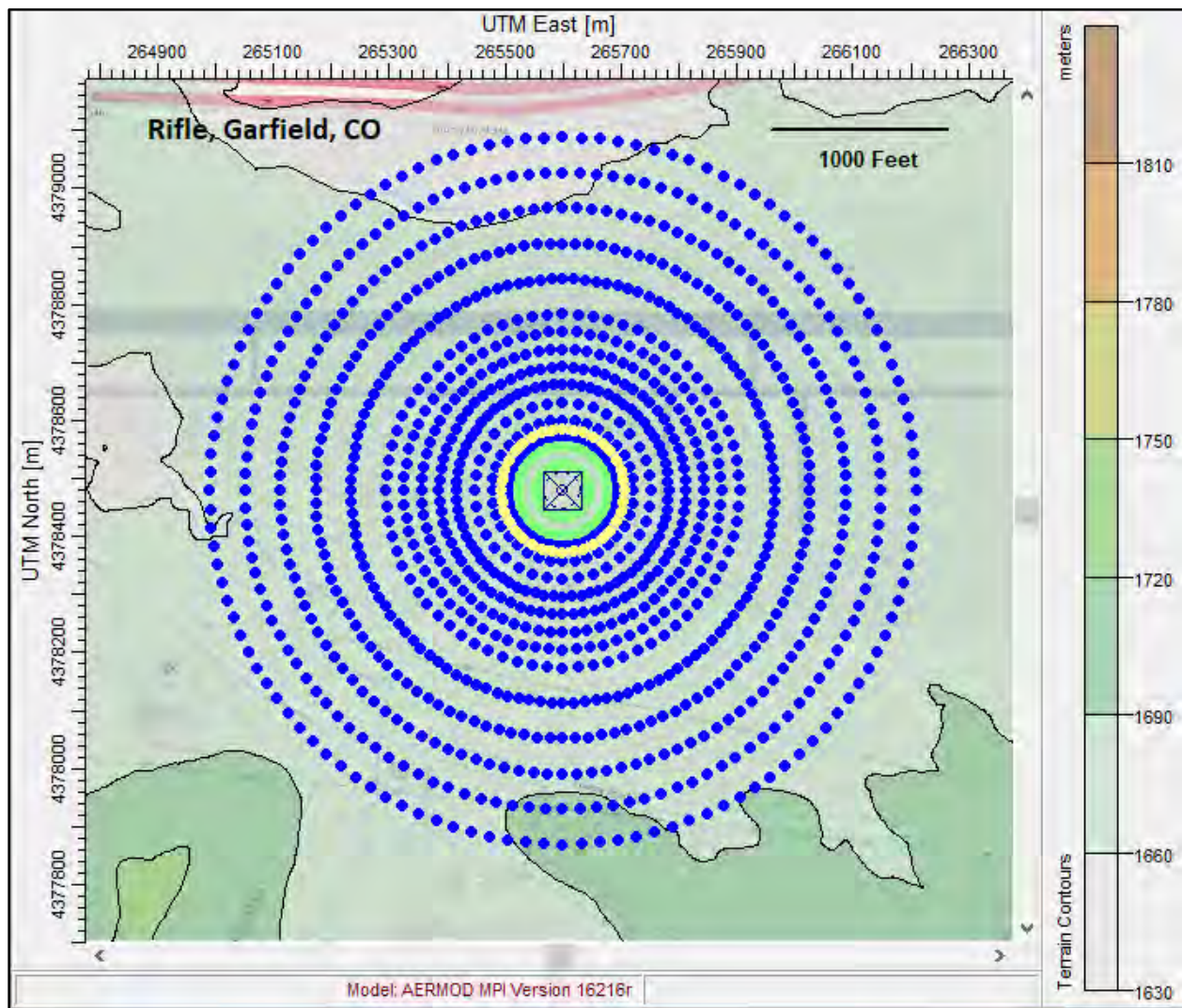
2.5.3.2. Terrain Characteristics

Terrain data are from the U.S. Geological Survey's Digital Topographical Database using the National Elevation Dataset⁵ files at a resolution of 1/3 arc second (approximate horizontal resolution of 10 m). We prepared the acquired data sets for use in AERMOD using the terrain pre-processor program AERMAP (version 11103).

The terrain at all four meteorological sites was **general flat with less than 30-m elevation change within 2,000 ft (610 m) of the station**. The largest change in topography is found at Rifle, as seen with the elevation contours in Figure 2-12. The figure also contains locations of modeling receptors at Rifle, which we discuss in Section 2.6.

⁴ National Land Cover Database: www.mrlc.gov

⁵ National Elevation Dataset: <https://lta.cr.usgs.gov/NED>



Notes: Green receptors are used for the oil and gas production phase only. Yellow receptors are at a 350-foot distance representing the current state setback for “outside activity areas”. Blue receptors are used for all risk-assessment modeling.

UTM = Universal Transverse Mercator; m = meters.

Figure 2-12. Terrain Contours and Receptor Locations at Rifle (Garfield County Valley Site)

2.6. Receptors

Receptors are locations where the model estimates air concentrations. For these HHRA, we chose a set of polar-coordinate receptors which are characterized as a set of **concentric circles** or rings. We chose concentric rings to facilitate summaries of HHRA output (estimates of air concentrations, exposure, and potential risk) at each distance from the well pad. The distances between rings are measured from the center of the well pad. As discussed in the bullets below, we used slightly different sets of receptors for well development versus well production (see also Table 2-9), each **extending out to 2,000 ft (610 m)** from the center of the well pad.

- Well development has 14 rings, beginning at 300 ft (91 m), then 350 ft, then at 100-ft spacing from 400 to 1,000 ft, and then at 200-ft spacing from 1,000 to 2,000 ft (610 m).
- Well production has 16 rings—the same 14 rings as well development, plus two inner rings (150 and 250 ft [46 and 76 m]).

These distances include the default setback distances listed under COGCC Rule 600 Series Safety Regulations. The 500-ft distance is of particular interest because it is COGCC's current Exception Zone Setback for well and production facilities relative to a building unit. The 350-ft ring represents the minimum "outside activity area" distance (outdoor venues or recreational areas owned or operated by local government). We included the additional, closer receptors for well production because some homes are closer than 500 ft from existing production areas. The number of receptors per ring increases with increasing distance from the well pad, as shown in Table 2-9, in order to maintain a spacing of approximately 100 ft or less between individual receptors along a ring. The receptor spacing is also illustrated in Figure 2-12. We placed all receptors at the "breathing" height of 1.8 m, meaning that we estimated air concentrations at 1.8 m off the ground.

Table 2-9. Receptor Layout and Spacing

Ring Number	Radial Distance from Center (feet)		Number of Receptors	Distance Between Receptors Along the Ring (feet)
	Development	Production		
1	None	150	36	26.2
2	None	250	36	43.6
3	300	Same as Development	36	52.4
4	350		36	61.1
5	400		36	69.8
6	500		36	87.3
7	600		72	52.4
8	700		72	61.1
9	800		72	69.8
10	900		72	78.5
11	1,000		72	87.3
12	1,200		120	62.8
13	1,400		120	73.3
14	1,600		120	83.8
15	1,800		120	94.2
16	2,000		120	104.7

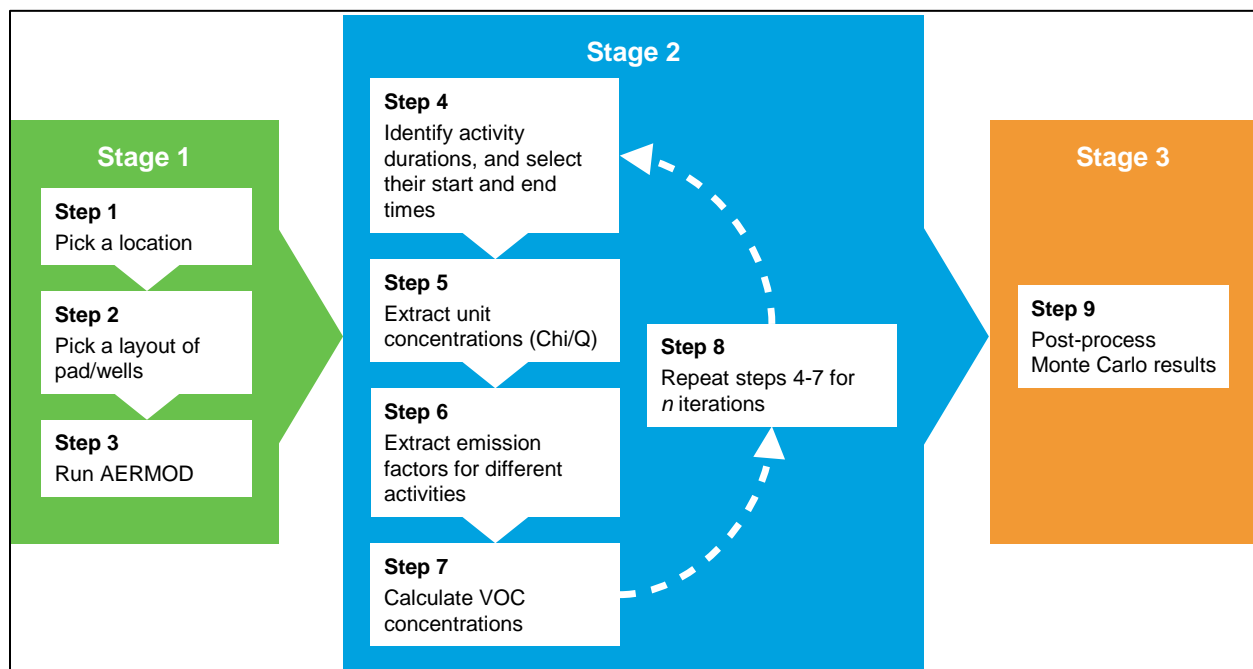
2.7. Monte Carlo Simulations with AERMOD (for Oil and Gas Development Activities)

As discussed below, we utilized Monte Carlo probabilistic-sampling techniques to create a wide variety of air-quality scenarios during O&G development activities, where individual development activities typically last days per well. This level of probabilistic sampling was not needed for O&G production activities, as discussed later in Section 2.8.

2.7.1. Monte Carlo Workflow

To better understand concentrations of VOCs generated from an O&G site during development activities, any “single-point” estimation is replaced by a statistical distribution using Monte Carlo sampling. This provides additional information about the uncertainty and variability around its central-tendency values. The Monte Carlo method is a statistical technique by which a quantity is calculated repeatedly across some number of iterations, using randomly sampled inputs, within the range of their variability. If the number of iterations is large enough, results will closely approximate the full range of possible outcomes and provide information on the likelihood of each outcome (EPA, 1994). **The Monte Carlo method creates a full range of possible outcomes for each of the 47 VOCs, as it includes the major variables in the inputs (meteorology, emissions, and activity duration) to determine VOC concentrations.** Because of the computational demands for running AERMOD repeatedly with varying emissions and meteorology, it is more efficient to run AERMOD using unit emissions (1 gram per second [g/s]) for all hours of meteorology, save those results, and then post-process the results with activity durations and actual emissions to obtain a full set of possible outcomes. We conducted these Monte Carlo calculations using the statistical software R (R Core Team, 2012).

We present in Figure 2-13 a workflow diagram for the Monte Carlo processing, which has three stages consisting of nine steps in total.



Notes: VOC = volatile organic compound; Chi/Q = concentration per unit emission.

Figure 2-13. Workflow of Monte Carlo Method (for Oil and Gas Development Activities)

- **Stage 1 is “pre-Monte Carlo stage”,** which selects the modeling scenario and runs the AERMOD model. Steps 1 and 2 decide the physical location (from among the four meteorological locations) and size of the well pad (1, 3, or 5 acres). Based on the selected location, Step 3 executes AERMOD using location-specific meteorology, unit emissions, and

all receptor locations. This results in outputs of unit-emission concentrations (concentrations reflecting unit emissions) for all hours of the period of the meteorology data.⁶

- **Stage 2 is the Monte Carlo simulation.** For each O&G activity and location, we first identify its duration based on prevalence (see Table 2-1) and a random beginning date (Step 4)—that is, a specific time period for the activity. Next (Step 5), we extract unit-emission concentrations at all receptors for the time period from the AERMOD output, which is followed by (Step 6) randomly picking a set of activity- and location-dependent emission rates (which we discuss in Section 2.3). In Step 7, we calculate VOC concentrations by multiplying unit-emission concentrations by the selected emission rates. Steps 4 through 7 are considered one Monte Carlo “iteration”. In order to fully develop the VOC distributions, Step 8 repeats the previous four steps for *n* iterations, with the output from each iteration saved to create the statistical distribution.
- **Stage 3 is the “post-Monte Carlo stage”** where we calculate various air-concentration metrics potentially useful for subsequent exposure and risk modeling (e.g., maximum, median, and various percentile values).

2.7.2. Monte Carlo Simulation

In constructing the Monte Carlo-based modeling approach for development activities, we make a key distinction between different types of input variables: decision variables or probabilistic variables. Each decision variable has a predetermined set of possible values and each value is equally likely to be selected.

In these HHRAs, the decision variables are

- the **sites of O&G operations** and
- the **sizes of well pads**.

Although two meteorological sites are included in the NFR, they are treated as one in the Monte Carlo simulation, as the meteorology is sampled randomly but in equal quantities between the two sites. Each unique combination of decision variables is referred to as a **scenario**, on which a Monte Carlo simulation is conducted. We constructed a total of nine Monte Carlo scenarios for development activities: three for O&G operation sites (one for NFR, two for Garfield County) by three well-pad sizes (1, 3, and 5 acres; Table 2-6).

We select the probabilistic variable’s value based on pre-defined probabilities, which includes the **duration** of the three development activities, the **beginning date and hour** of the activity, and the **emission rate**. We use probabilities to select the duration of the activities (see “prevalence” column in Table 2-1), and we use uniform probability distributions to select the emission rate and the beginning date and hour.

For a given scenario, we conduct a Monte Carlo simulation by calculating VOC concentrations using various combinations of probabilistic variables. Each independent calculation of VOC

⁶ AERMOD flags outputs when the wind speed is calm or missing, or when other key meteorological parameters are missing, and reports the concentrations as zero. We exclude these periods from the unit-emission concentrations.

concentrations from a set of inputs is known as a Monte Carlo **iteration**. For each iteration, we randomly sample a value for each input variable and then calculate the associated VOC concentrations. We conduct thousands of iterations until we reach convergence in the distribution of values from all iterations (see Section 2.7.4 on convergence testing).

In conducting a Monte Carlo simulation, we first sample the duration of the activity. We do this by generating a random number from a uniform distribution between 0 and 1, and then we compare against the empirical prevalence distribution listed in Table 2-1. For example, if the generated value is 0.6 and the site location is NFR, we would select a set of activities associated with horizontal 1.5-mile development. This is because 0.6 is greater than 0.52, the upper bound of the horizontal 1-mile activity set, but less than the upper bound of the horizontal 1.5-mile activity set (which is $0.52+0.3=0.82$). Thus, in this example, the durations of the drilling, fracking, and flowback activities would be 5, 3, and 7.5 days per well, respectively. However, if the site location is Garfield County, we would select a set of activities associated with vertical development, since 0.6 is greater than the upper bound of horizontal 2-mile activity set (which is $0.13+0.02=0.15$), and the activity durations would be 4, 1, and 13 days per well for drilling, fracking, and flowback, respectively.

Once we decide the activity durations, we generate two random numbers from a uniform distribution to represent the starting date and hour the activity. We use uniform random numbers with different ranges in selecting starting date since each site has different time windows of meteorology in the modeling: Rifle has a five-year window, BarD has two years, and Anheuser-Busch and Ft. St. Vrain each have one year. We assume that an activity can start at any hour of day and day of year.

For the NFR, note again that we use the Anheuser-Busch and Ft. St. Vrain meteorological data to produce only one (blended) set of VOC-concentration distributions, which means the algorithm needs to select a meteorological site first before choosing activity durations.

All of the procedures described above happen in Step 4 of Figure 2-13. In Step 5, we extract unit-emission concentrations from AERMOD outputs for a given simulated starting time and duration. In Step 6, we randomly select site-specific emission rates for each activity. For a given iteration of Step 6, the selected emission rate for each VOC comes from the same emission-sampling event in the CSU experiment data—that is, all emissions used in an iteration were observed simultaneously in the CSU experiments. We hold the emission rates constant over the duration of the iteration (the activity time period). As discussed in Section 2.3, due to data availability, the emission rates for drilling activities in NFR simulations come from the data collected in Garfield County. In addition, any sampled missing value for the drilling activity from the first two CSU experiments are re-sampled from the other nine samples³. We list in Table 2-2 (the “Events” rows) the number of emission rates associated with each site and activity. The last step within an iteration (Step 7) is to multiply the sampled unit-emission concentrations by the randomly selected emission values for each VOC to produce a set of VOC concentrations as a time series of values within the activity time period. In Step 8, we repeat Steps 4–7 thousands of times until we reach convergence in the distribution of values from all iterations (see Section 2.7.4 on convergence testing).

2.7.3. Post Processing

In Stage 3 (which is the final step, Step 9), we post-process the results of Monte Carlo simulations for development activities by **summarizing the statistical distributions of results from the thousands of iterations**. We describe below the detailed post-processing calculations. The first three bullets below allow us to identify the receptor along each distance ring that experiences the highest air concentrations on average, for each VOC, O&G location, and activity independently. The final bullet below is where we collect statistics describing the distributions of air concentrations at those selected receptors.

1. Calculate maximum concentrations per iteration: At a given receptor for a given VOC, O&G location, and activity, we have dozens to hundreds of estimated 1-hour-average air concentrations for each Monte Carlo iteration, depending on the activity duration used. In this calculation, we find the maximum 1-hour value from each iteration—that is, the single highest estimated 1-hour-average air concentration. This creates a set of iteration-maximum concentrations at each receptor for each VOC, O&G location, and activity. These iteration-maximum concentrations can be relatively low or relatively high, depending on the receptor location, the emission rate used for a VOC, and the meteorological conditions over the activity duration.
2. Calculate mean-maximum concentrations at each receptor: For each set of maximum values saved in Bullet 1 above, calculate the mean of all the maximum values—the mean-maximum 1-hour-average air concentration at each receptor for each VOC, O&G location, and activity.
3. Identify the “expected-maximum” receptor at each distance: From among all the receptors along a given distance ring (a given distance from the center of the well pad), identify the receptor with the largest mean-maximum 1-hour-average air concentration as calculated in Bullet 2 above. We do this at each distance ring for each VOC, O&G location, and activity. The highest mean-maximum value represents the **“expected-maximum” concentration** at that distance from the well pad. These expected-maximum concentrations can be viewed as the most likely worst-case concentrations and are a reflection of the meteorological conditions modeled at the O&G site.
4. Summarize concentrations at expected maximum receptors: For each expected-maximum receptor identified in Bullet 3 above, extract an array of values from each of the Monte Carlo iterations, including each iteration’s mean and maximum 1-hour-average air concentration as well as the 50th, 95th, 99th, and 99.9th percentiles of 1-hour-average air concentrations. We then use these values in the exposure assessment, as discussed in Section 3.

2.7.4. Convergence Testing of Monte Carlo Simulations

Monte Carlo is a useful approach to quantify model uncertainties (Frey and Patil, 2002), and its framework is conceptually straightforward. However, in order to assure that results fully characterize the distributions and minimize uncertainties, it is necessary to test and verify that the model results are converging with additional modeling iterations. **After a certain number of iterations, the distributions are sufficiently characterized and additional iterations add**

little value. Since Monte Carlo-based simulations do not have well-established convergence criteria, we adopted a qualitative method of convergence testing.

We derive the 47 VOCs' concentrations based on the same set of unit-emission concentrations estimated by AERMOD, so the burden of proving convergence is tied to the variability in the VOC emission rates. This means that all Monte Carlo simulation results will converge if it is shown that the concentrations converge for VOCs with relatively high variability in their emission rates. We selected the VOCs listed below because of their high variabilities in 3-minute-average emission rates.

- benzene for drilling (3-minute-average emission rates vary by 4+ orders of magnitude)
- t-2 butene for fracking (3-minute-average emission rates vary by 5+ orders of magnitude) and
- n-butane for flowback (3-minute-average emission rates vary by 5+ orders of magnitude)⁷

Note that we conducted this convergence testing prior to the derivation of 1-hour-average emission rates. However, the VOCs listed above still have among the highest variabilities in emission rates when using the 1-hour-average rates (though the variabilities are lower overall: 1.5 orders of magnitude variation for benzene from drilling, 3.8 orders of magnitude for t-2 butene from fracking, and 2.1 orders of magnitude for n-butane from flowback). The lower variabilities when using 1-hour-average emission rates should lead to a more rapid convergence of the modeling results than when using 3-minute-average rates. Therefore, this convergence testing is still applicable and robust when utilizing 1-hour-average emission rates.

We also expect that VOC concentrations in the outer rings contain more variability than in the inner rings due to added uncertainty during dispersion. Thus, we focused the convergence testing on the outer-most ring. We describe below each step in the convergence testing.

1. Run the Monte Carlo simulation 10,000 times on the outer-most ring of receptors (2,000 ft from the center of the well pad) for each selected VOC and each O&G development activity and O&G location.
2. For each of the 10,000 iterations, identify the maximum 1-hour-average air concentration at each receptor (for each selected VOC and each O&G activity and location).
3. From the collection of maximum 1-hour-average concentrations at each receptor (for each selected VOC and each O&G activity and location), calculate the mean and standard deviation ($\overline{VOC_{max,n,k}}$ and $S_{VOC,n,k}$, Eq. 2-11 and 2-12) (Ballio and Guadagnini, 2004).

$$\overline{VOC_{max,n,k}} = \frac{1}{n} \sum_{i=1}^n VOC_{i,k} \quad \text{Eq. 2-11}$$

$$S_{VOC,n,k} = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (VOC_{i,k} - \overline{VOC_{max,n,k}})^2} \quad \text{Eq. 2-12}$$

where

⁷ Toluene is also included as a VOC of interest to see if convergence occurs more rapidly for this VOC, as it tends to have less variability in each activity and generally higher emission rates.

k represents the k^{th} modeled VOC
 i represents the i^{th} Monte Carlo iteration
 n represents total number of Monte Carlo iterations.

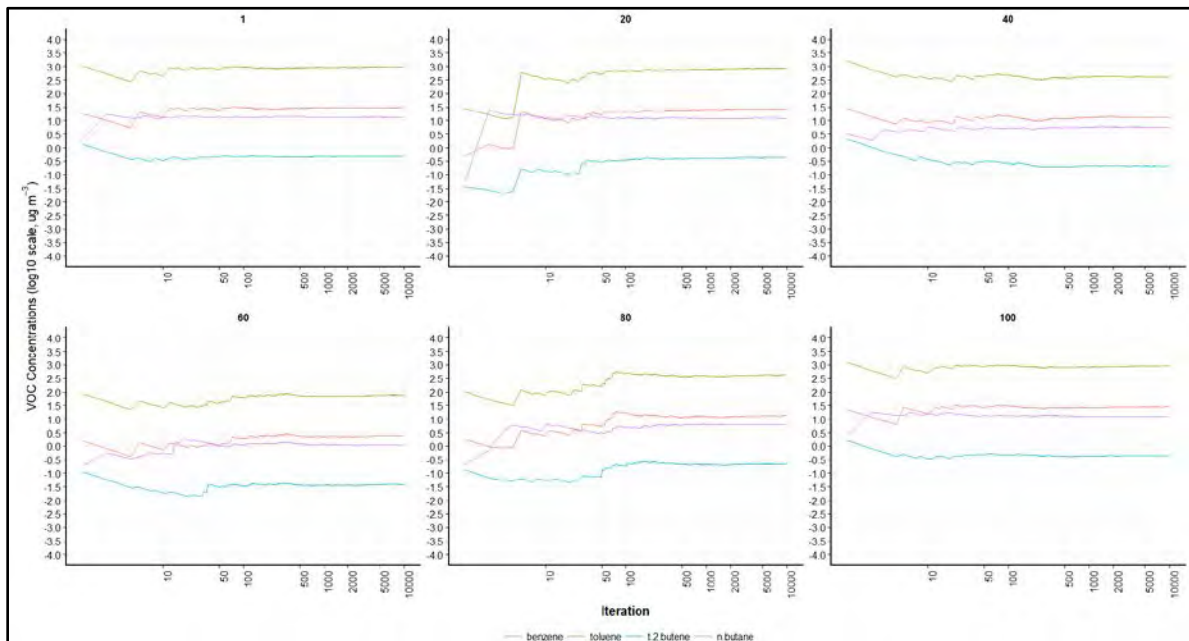
4. Select several receptors to visualize the trends in $\overline{VOC_{max,n,k}}$, and $S_{VOC,n,k}$ as the number of iterations increases towards 10,000. If the variation in concentration becomes small (converges) with increasing number of iterations, then we consider the results to be stable and converging.

Table 2-10 contains the results of this convergence testing: the approximate number of iterations needed to reach convergence based on the steps outlined above. We estimated that we need **2,000 Monte Carlo iterations** for distributions of air concentrations to reach convergence.

Figure 2-14 through Figure 2-17 help illustrate how we determined these numbers of iterations. Figure 2-14 and Figure 2-15 respectively contain the trends in mean-maximum concentrations and standard deviations of concentrations (log transformed) sampled from receptors on the 2,000-ft ring at Rifle during drilling. The selected receptors are separated by 60-degree intervals to illustrate that convergence has been reached in all directions. The figures show that the mean reached convergence after about 200 iterations while the standard deviation reached convergence by about 500 iterations, although the speed of convergence varied among receptors due to the effects of meteorology. Figure 2-16 and Figure 2-17 respectively contain the trends in mean-maximum concentrations and standard deviations of concentrations (log transformed) for the three O&G development activities at the three O&G sites for the slowest-converging receptor (the so-called receptor number 80). Both plots show that the speed to reach convergence is location- and activity-dependent. For example, it appears that more iterations are needed to reach convergence at Rifle than at the other two locations, which is likely due to the longer meteorological data periods available for Rifle (five years) than at the two other locations (one or two years). Across activities, drilling takes less than 1,000 iterations to converge, flowback needs up to 1,500 iterations, and fracking needs up to 2,000 iterations. In general, the mean converges faster than the standard deviation. We used 2,000 iterations in our post-processing so that the distribution sizes are the same size regardless of O&G location or activity.

Table 2-10. Iterations Required to Reach Convergence, by Well-development Site and Activity

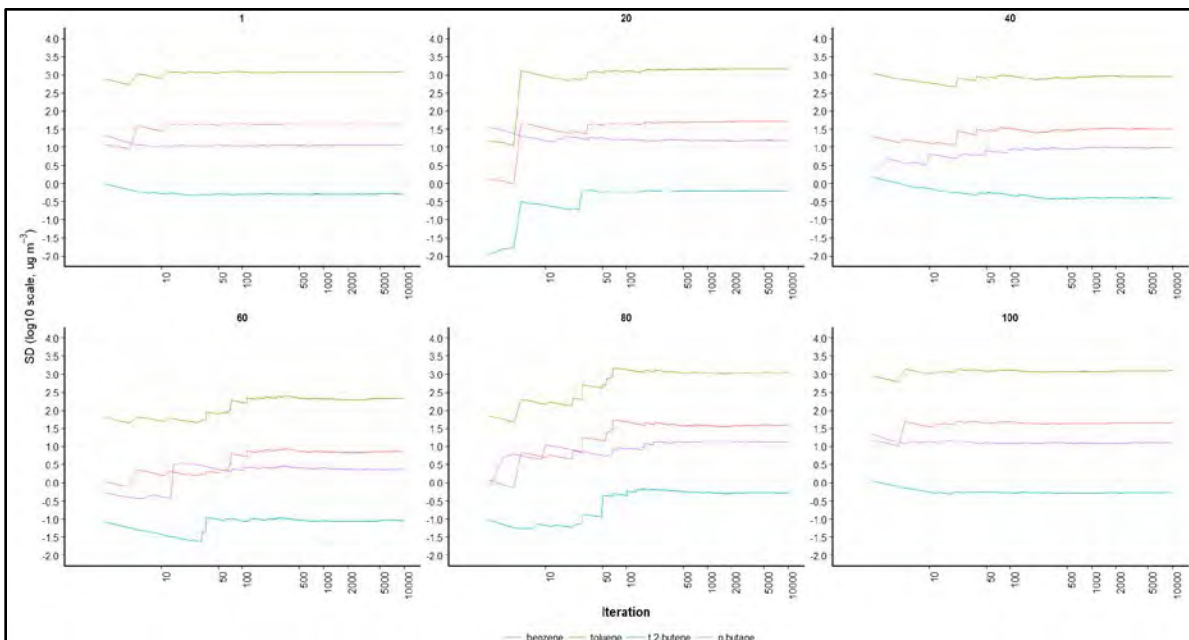
Broad Oil and Gas Area	Site	Drilling	Fracking	Flowback	Overall
Garfield County	Rifle	1,000	2,000	1,000	2,000
	BarD	1,000	2,000	1,000	2,000
Northern Front Range	Anheuser-Busch / Ft. St. Vrain	1,000	2,000	1,500	2,000



Notes: The numbers at the top of each plot indicate the receptor number. Receptor number 1 is approximately due north of the well pad, while the other receptors are equally spaced clockwise around the receptor ring.

VOC = volatile organic compound; ug m^{-3} = micrograms per cubic meter; \log_{10} = logarithm base 10.

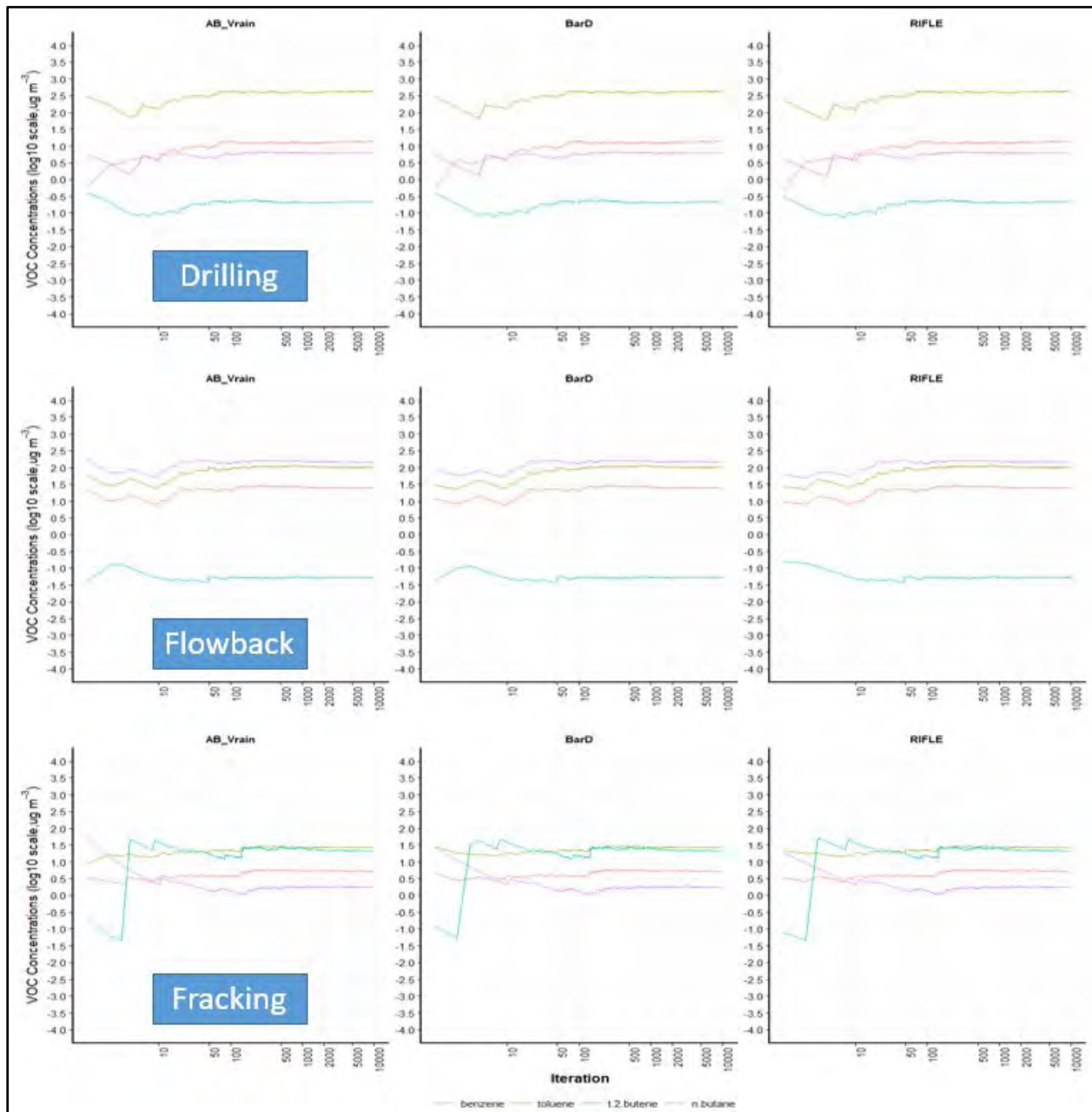
Figure 2-14. Cumulative Plot of Mean-maximum Hourly Concentration at Selected Receptors: Drilling Activity, 2,000-foot Ring, Rifle Location, 1-acre Well Pad



Notes: The numbers at the top of each plot indicate the receptor number. Receptor number 1 is approximately due north of the well pad, while the other receptors are equally spaced clockwise around the receptor ring.

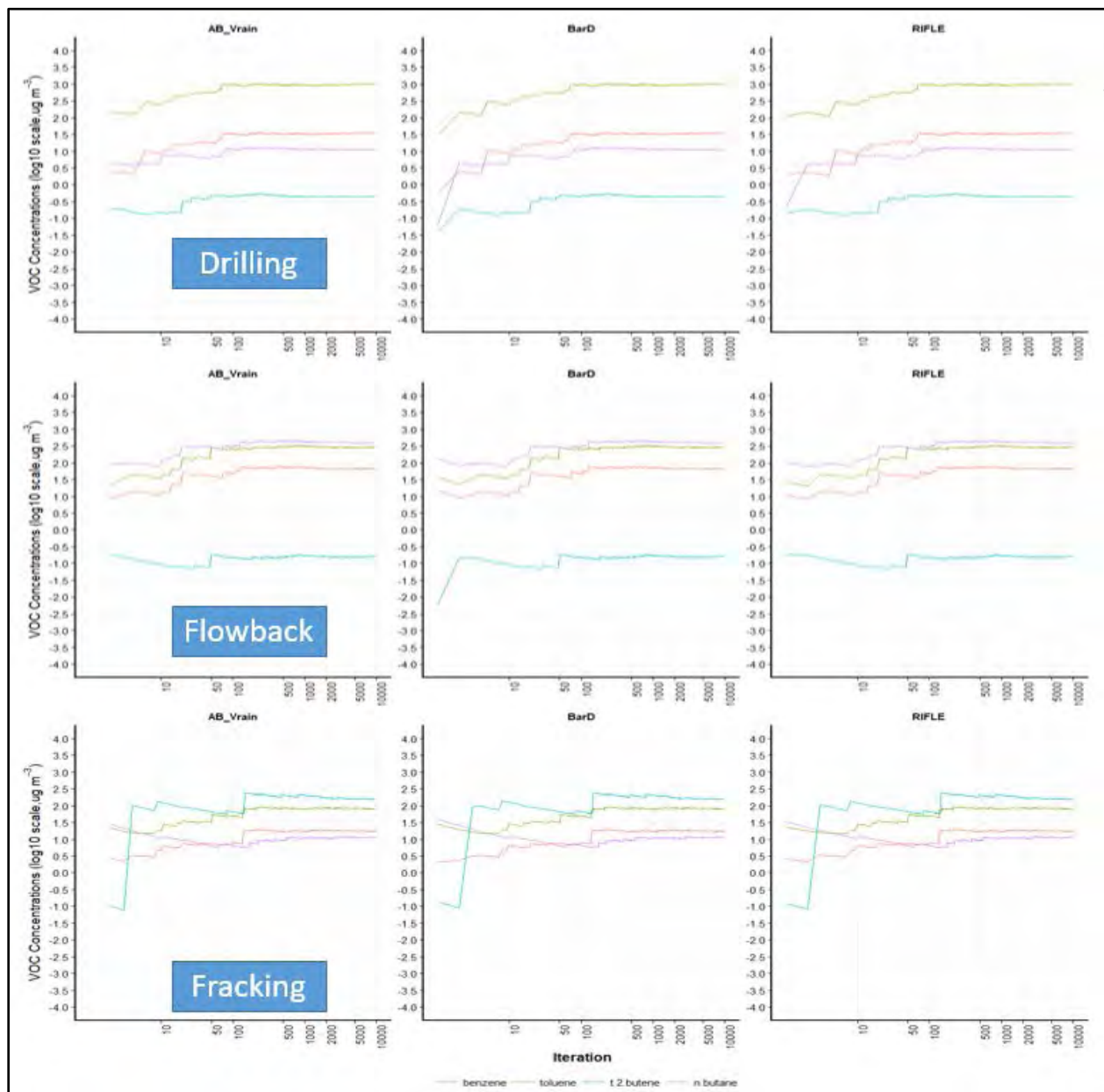
SD = standard deviation; ug m^{-3} = micrograms per cubic meter; \log_{10} = logarithm base 10.

Figure 2-15. Cumulative Plot of Standard Deviation of Maximum Hourly Concentration at Selected Receptors: Drilling Activity, 2,000-foot Ring, Rifle Location, 1-acre Well Pad



Notes: AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; ug m^{-3} = micrograms per cubic meter; \log_{10} = logarithm base 10.

Figure 2-16. Cumulative Plot of the Mean-maximum Hourly Concentrations: All Activities, Selected Receptor (Number 80) on the 2,000-foot Ring, 1-acre Well Pad



Notes: AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; ug m^{-3} = micrograms per cubic meter; \log_{10} = logarithm base 10.

Figure 2-17. Cumulative Plot of Standard Deviation of Maximum Hourly Concentrations: All Activities, Selected Receptor (Number 80) on the 2,000-foot Ring, 1-acre Well Pad

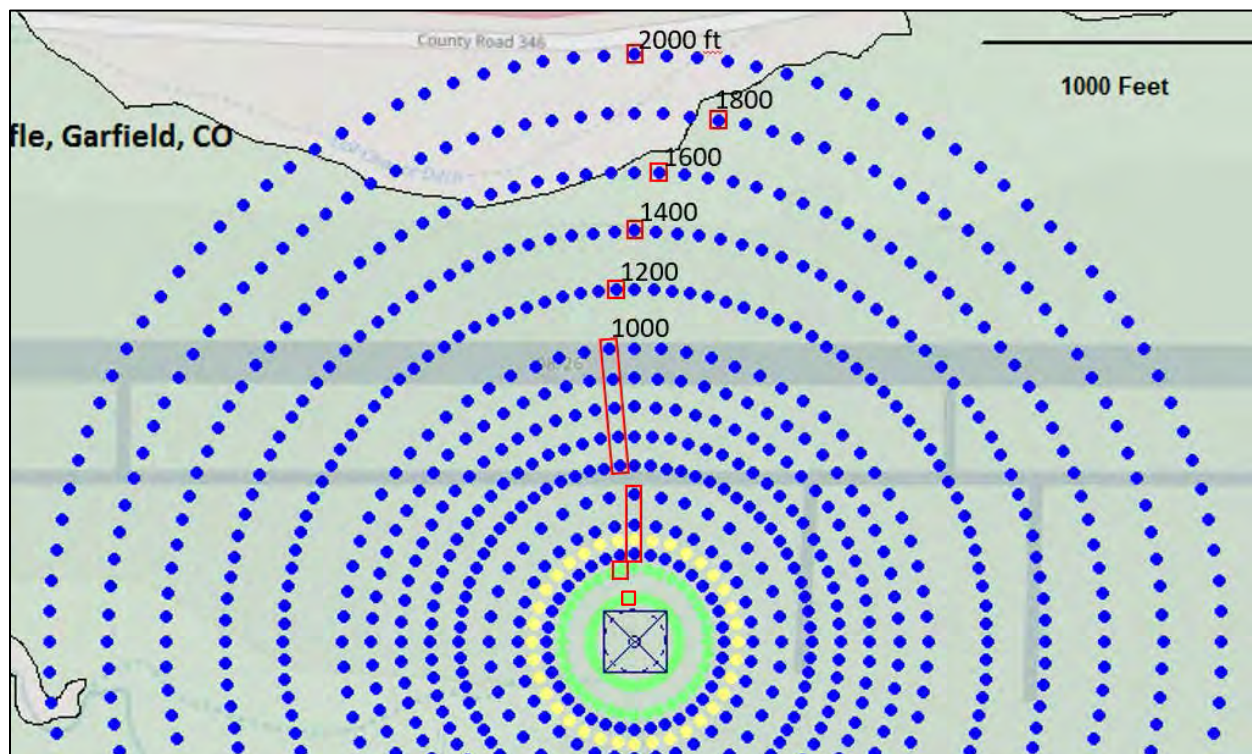
2.8. Processing Steps for Oil and Gas Production

The discussion in Section 2.7 pertains to O&G development activities, since the embedded uncertainties in the estimated VOC concentrations related to development activities are best characterized through Monte Carlo simulations (we provide further discussion on uncertainty in

Section 2.10.2). Production from the O&G wells occurs over many years (chronic exposures) rather than the variable short time periods for the development stage. This **simplification for the production stage** allows us to use AERMOD directly to generate all possible hourly values of unit-emission concentrations (i.e., all possible meteorological-driven dispersion conditions), with no need for Monte Carlo probabilistic sampling of activity durations and start times.

We used AERMOD to generate a full year of 1-hour-average air concentrations at every receptor using unit emissions (1 g/s), for each full year of meteorological data: five years for Rifle, 2 years for BarD, and 1 year each for Anheuser-Busch and Ft. St. Vrain. For each O&G location, we distill the data into a single year of values at a single receptor per ring (a single year of values per distance from the center of the well pad), as we describe in the bullets below.

1. For each year of AERMOD outputs at an O&G location, calculate the site-wide annual-average unit-emission concentration. Use all hourly values from all receptors to do this calculation. This results in a single overall average unit-emission concentration per O&G location per year.
2. For each O&G location, identify the year with the highest average value as calculated in Bullet 1 above. That is, the year that overall had the worst unit-emission air concentrations, which is a reflection of the meteorological conditions in that year. The Anheuser-Busch and Ft. St. Vrain meteorological data sets were only one year each, so this year-selection step only applies to the Rifle and BarD data sets.
3. For the year selected in Bullet 2 above, identify the receptor with highest annual-average average for each ring. That is, the receptor that overall had the worst unit-emission air concentrations at that distance. As an example, see Figure 2-18 where we illustrate the receptors selected for production assessment at the Rifle location in Garfield County.
4. For each receptor identified in Bullet 3 above, and for the year identified in Bullet 2 above, **extract the full year of hourly unit-emission air concentrations** for that location. Later in the exposure assessment (as discussed in Section 3), we combine these values with the derived 1-hour-average emission rates during O&G production operations, resulting in hourly estimates of air concentrations during O&G production.



Notes: Dots are all receptors initially modeled in the dispersion assessment. The green rings of receptors are only used for production activities, while the yellow ring is a special 350-foot distance included in all modeling. Red rectangles indicate the selected receptors for this scenario.

ft = feet.

Figure 2-18. Example of Selected Receptor Locations Based on High Annual-average Air Concentrations, for Production Activities at the Garfield County Valley Site (Rifle)

2.9. AERMOD Modeling Results

In this section, we present a sample of the AERMOD modeling results created primarily for quality assurance. These samples are generally representative of a larger set of plots and figures which we reviewed but do not present here. The box-and-whisker plot is a standardized way of displaying the distribution of data using five metrics: minimum (lower whisker), one standard deviation below mean (lower bound of the box), median (bar in the box), one standard deviation above mean (upper bound of the box), and maximum (upper whisker).

2.9.1. Well Development

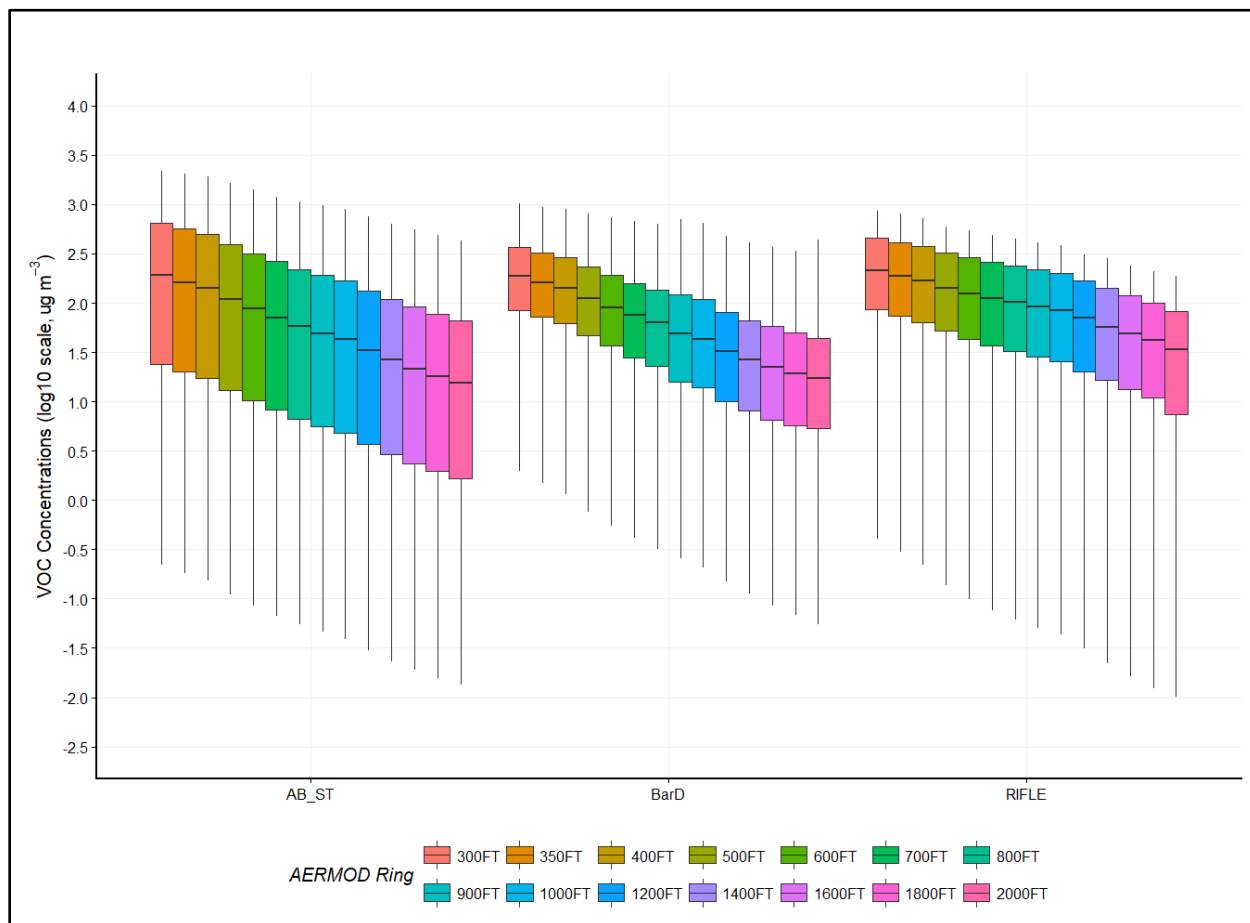
In the subsections below, we present a variety of analyses into the variations of modeled VOC concentrations—by distance from the center of the well pad, by O&G activity, by receptor, and by size of well pad.

2.9.1.1. Variation in Chemical Concentration by Distance

Figure 2-19 contains box-and-whisker plots of the collection (across the three development activity types) of maximum 1-hour-average benzene concentrations from each iteration, at

distances 300–2,000 ft, for each of the three O&G sites. That is, each box-and-whisker item contains 6,000 data points, which are the maximum 1-hour-average concentrations from each of the 2,000 iterations of drilling modeling, the 2,000 iterations of fracking modeling, and the 2,000 iterations of the flowback modeling. These sets of maximum values come from the data collected in Step 4 in Section 2.7.3, at each VOC’s “expected-maximum” receptor at each distance. These maximum values per iteration will be used in the acute exposure assessments (see Section 3.3.1), for each development type separately (see Section 2.9.1.2 for maximum concentrations separated by development activity).

As expected, **concentrations decline with distance from the well pad and there is a substantial range of values at each distance.** The large ranges of values are a reflection both of the range of benzene emission values and the range of meteorological conditions experienced at the selected receptors across all the iterations. The NFR data set (AB_ST) shows the largest ranges of benzene values, due to a larger range of benzene emission values used in the NFR modeling as compared to the Garfield County modeling, and also potentially due to the merged nature of the data set (we randomly merged concentrations utilizing Anheuser-Busch meteorology data with those utilizing Ft. St. Vrain meteorology). While maximum concentrations in some iterations are quite low (e.g., less than 1 microgram per cubic meter at the 300-ft distance at AB_ST and Rifle), they are well below one standard deviation from the mean of the concentrations (well outside the box). In contrast, the highest maximum concentrations in the data sets tend to be much closer to the medians (much closer to the box).

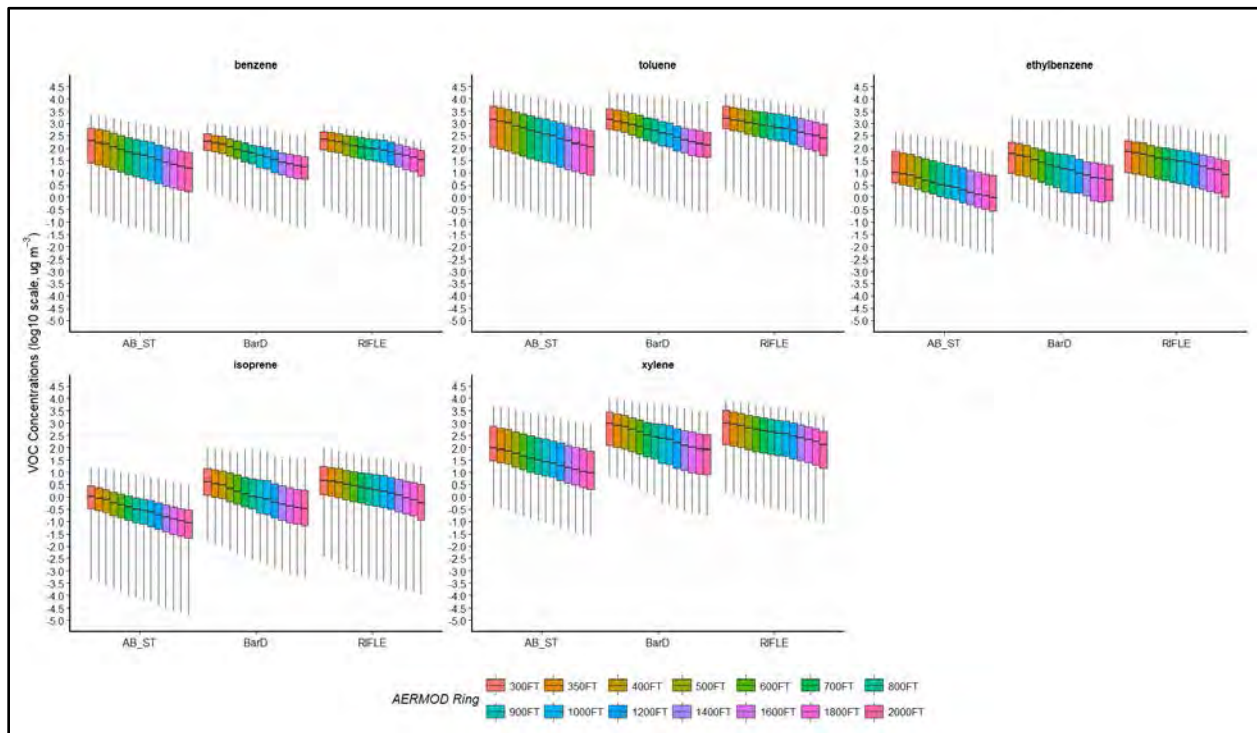


Notes: Values have been transformed via logarithm base 10. Each box-whisker plot indicates maximum and minimum (top and bottom whiskers), mean \pm 1 standard deviation (top and bottom of box), and median (bar inside box).

AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; $\mu\text{g m}^{-3}$ = micrograms per cubic meter; \log_{10} = logarithm base 10; ft = feet.

Figure 2-19. Distribution of Maximum 1-hour-average Benzene Concentrations by Distance and Well-development Location (1-acre Well Pad Only), Across All Development Activity Types

Figure 2-20 presents the same benzene plots as in Figure 2-19 but also includes isoprene and the other BTEX compounds. These plots all show the same expected trend: general decreases in concentrations by several factors from 300 ft to 2,000 ft away from the well pad. The extent of the boxes and the whiskers depends on the ranges of emission rates and meteorological conditions sampled across the iterations, by chemical and site.



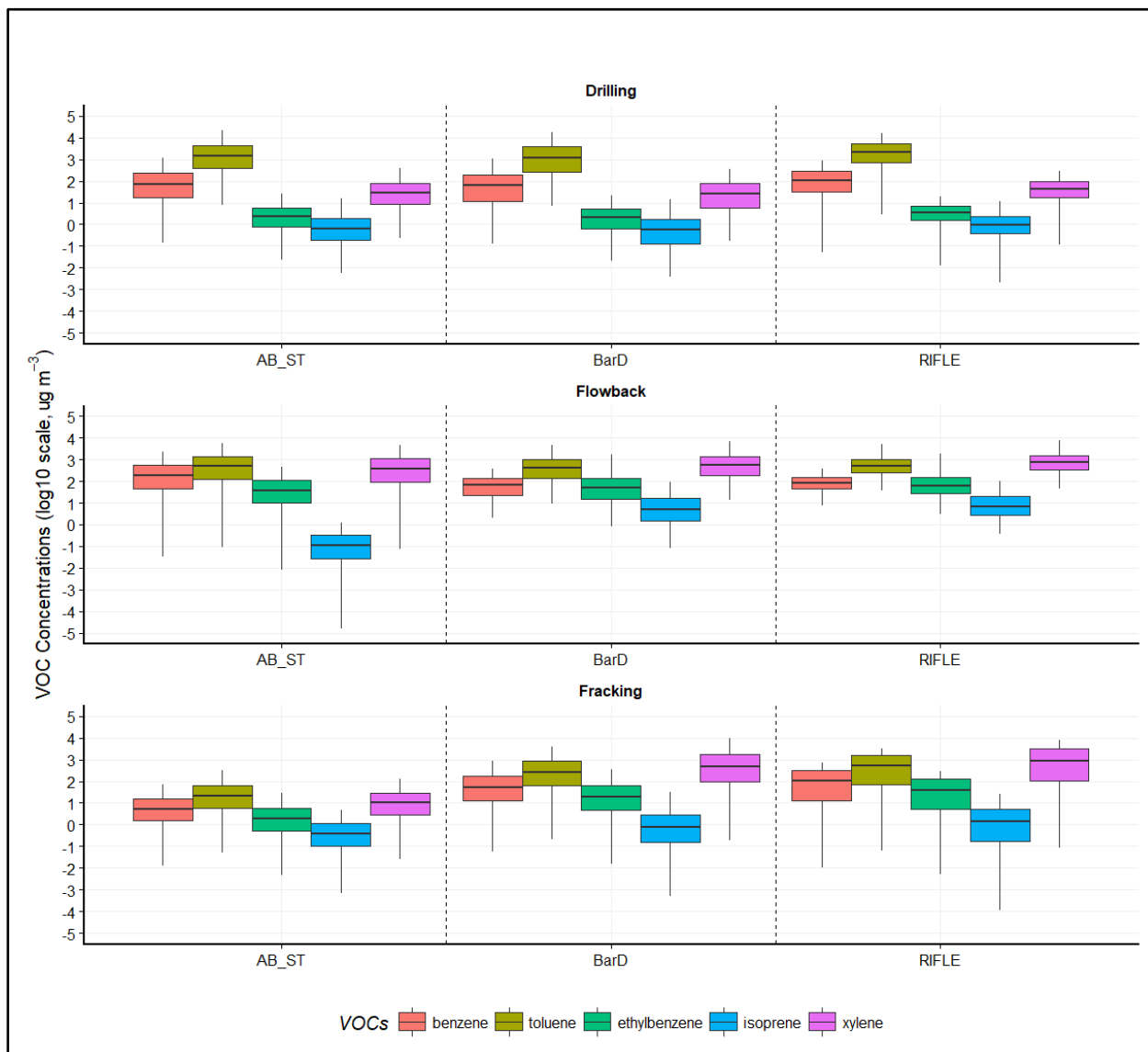
Notes: Values have been transformed via logarithm base 10. Each box-whisker plot indicates maximum and minimum (top and bottom whiskers), mean \pm 1 standard deviation (top and bottom of box), and median (bar inside box).

AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; ug m^{-3} = micrograms per cubic meter; \log_{10} = logarithm base 10; ft = feet.

Figure 2-20. Distribution of Maximum 1-hour-average Concentrations for Selected Chemicals by Distance and Development Location (1-acre Well Pad Only), Across All Development Activity Types

2.9.1.2. Variation in Chemical Concentration by Activity

Utilizing the same sets of data as in Figure 2-20 for BTEX and isoprene, Figure 2-21 contains plots of concentrations disaggregated by development activity, for each location and across all distances from the well pad. That is, the plots show the full range of iteration-maximum 1-hour-average concentrations for each development activity. These maximum values per iteration will be used in the acute exposure assessments (see Section 3.3.1). Among these selected VOCs, concentrations of toluene and xylenes are higher across most of the activities and locations, while concentrations of isoprene are lowest. There is some tendency for the BTEX and isoprene boxes and whiskers for fracking activities to be longer (wider range of values) for the Garfield County modeling, and for flowback activities to be longer for the NFR modeling; this is **consistent with the variations in the emissions data**. Fracking shows substantially higher median-maximum concentrations (by an order of magnitude or more) for the BTEX pollutants in the Garfield County modeling relative to the NFR modeling. This is due to the much higher fracking emission rates measured for BTEX pollutants in Garfield County relative to the NFR.



Notes: Values have been transformed via logarithm base 10. Each box-whisker plot indicates maximum and minimum (top and bottom whiskers), mean ± 1 standard deviation (top and bottom of box), and median (bar inside box).

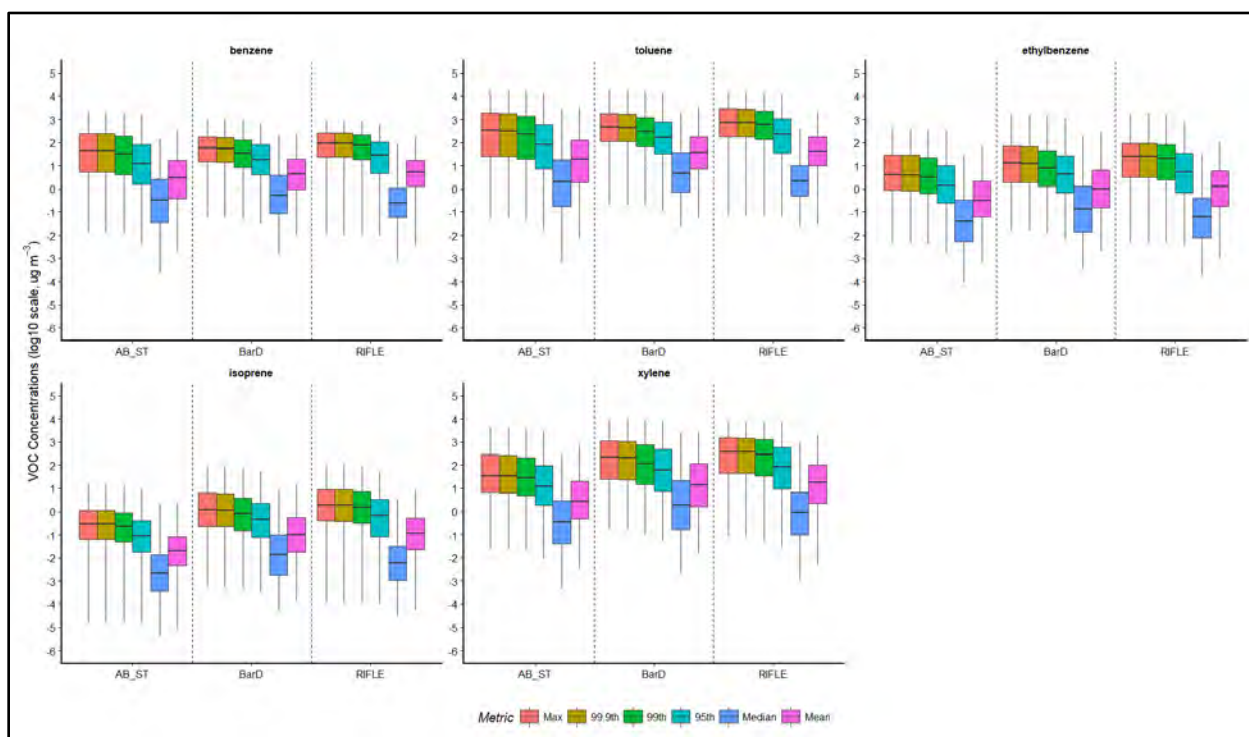
AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; $\mu\text{g m}^{-3}$ = micrograms per cubic meter; log10 = logarithm base 10.

Figure 2-21. Distribution of Maximum 1-hour-average Concentrations for Selected Chemicals by Development Activity and Well-development Location (1-acre Well Pad Only), Across All Distances

2.9.1.3. Other Statistical Measures of Chemical Concentration

Figures in the previous two subsections are based on the iteration-maximum 1-hour-average VOC concentrations, which are the highest modeled concentrations from each Monte Carlo iteration, which represent **upper bounds of short-term air concentrations** dependent upon

the emission rates and meteorological conditions. In this subsection, we explore concentrations for a broader range of statistical measures or metrics. Figure 2-22 contains distributions of VOC concentrations using the same maximum values as the previous figures, but it also includes five other metrics: mean, median, and the 99.9th, 99th, and 95th percentiles from each Monte Carlo iteration. These metrics are across all distances, at the selected “expected-maximum” receptor at each distance. In comparison to the maximum 1-hour-average concentrations, the 99.9th- and 99th-percentile values are slightly smaller, while the typical 95th-percentile values are less than an order of magnitude lower, and the typical means and medians are about one and two orders of magnitude lower, respectively. These last two metrics, the median and mean, represent a **lower bound on the typical short-term concentrations**. We utilize iteration-mean concentrations in the subchronic and chronic exposure assessments (see Section 3.3.1).



Notes: Values have been transformed via logarithm base 10. Each box-whisker plot indicates maximum and minimum (top and bottom whiskers), mean \pm 1 standard deviation (top and bottom of box), and median (bar inside box).

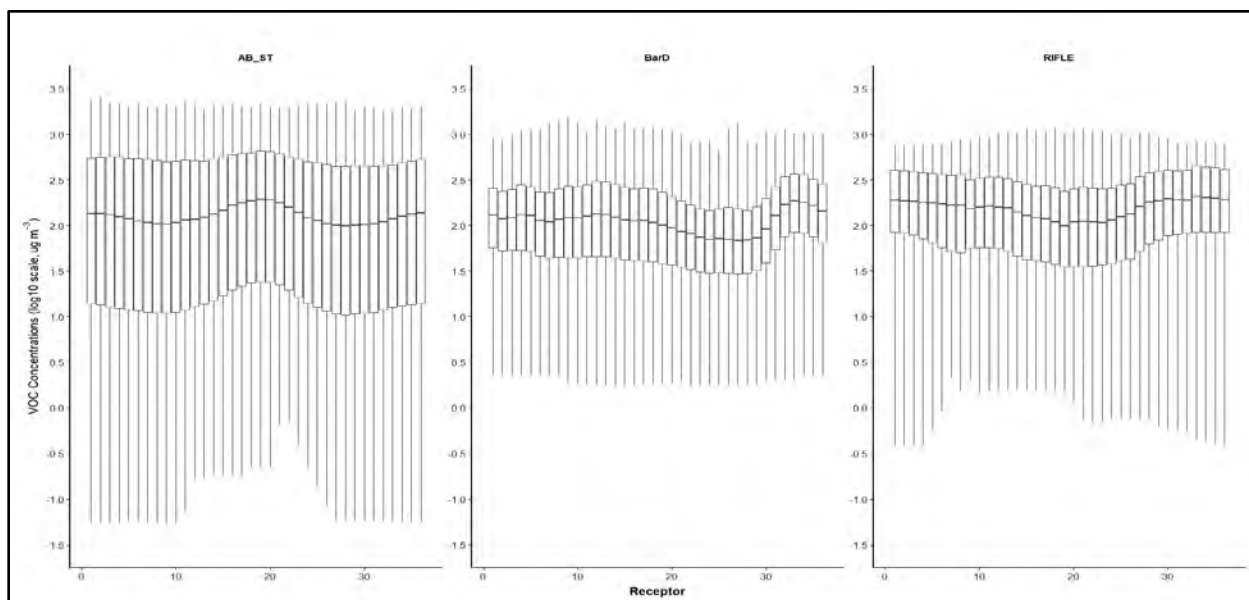
AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; ug m^{-3} = micrograms per cubic meter; \log_{10} = logarithm base 10.

Figure 2-22. Distribution of 1-hour-average Concentrations for Selected Chemicals by Metric and Well-development Location (1-acre Well Pad Only), Across All Development Activity Types and All Distances

2.9.1.4. Variation in Chemical Concentration by Receptor

Since there are dozens of receptors located in all directions covering 300–2,000 ft around each O&G location, we examine how VOC concentrations vary with changes in wind direction. Figure 2-23 contains distributions of maximum 1-hour-average concentrations of benzene across all 36

receptors on Ring 3 (300 ft from the center of the well pad) for each location. The “wave” shape of the VOC concentrations across directions is **primarily a function of the prevailing meteorology** (primarily wind speed and atmospheric stability) associated with different wind directions, leading to peak median concentrations for southern receptors (near receptor 20) at the merged Anheuser-Busch/Ft. St. Vrain location and for receptors near the north-northwest at the Garfield County locations.



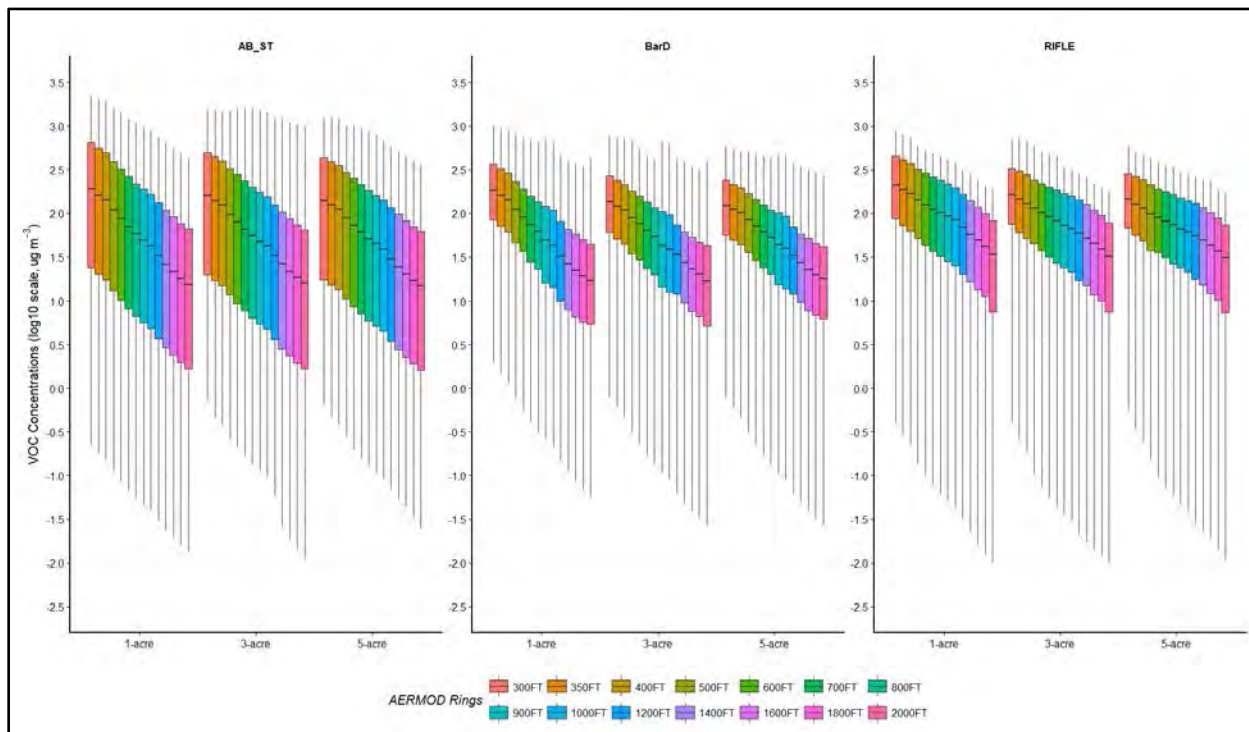
Notes: Values have been transformed via logarithm base 10. Each box-whisker plot indicates maximum and minimum (top and bottom whiskers), mean \pm 1 standard deviation (top and bottom of box), and median (bar inside box).

AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; ug m^{-3} = micrograms per cubic meter; log10 = logarithm base 10.

Figure 2-23. Distribution of the Maximum 1-hour-average Benzene Concentrations at 10-degree Intervals at 300-foot Distance, by Well-development Location (1-acre Well Pad Only), Across All Development Activity Types

2.9.1.5. Variation in Chemical Concentration by Size of Well Pad

Figure 2-24 is similar to Figure 2-19 except that it also shows the distributions of benzene concentrations at the other two modeled well-pad sizes: 3 and 5 acres. These distributions show how the typical (median) **modeled concentrations from emissions from larger well pads tend to be about the same or less than those from emissions from smaller well pads (if only a single well is developed on each pad)**. Decreases in median and maximum concentration with increases in well-pad size are more apparent at receptors closer to the well pad (within the first 500 ft or so). As you go out farther in distance from the well pad, the impact on concentrations from changes in well-pad size typically becomes smaller. When emission rates are held constant, increasing the size of the emission source (the size of the well pad) leads to more initial diffusion of the emissions, creating lower air concentrations at the well pad and, in turn, at most of the nearby receptors. That initial diffusion has less impact at farther receptors, where atmospheric dispersion has further diffused the emissions.



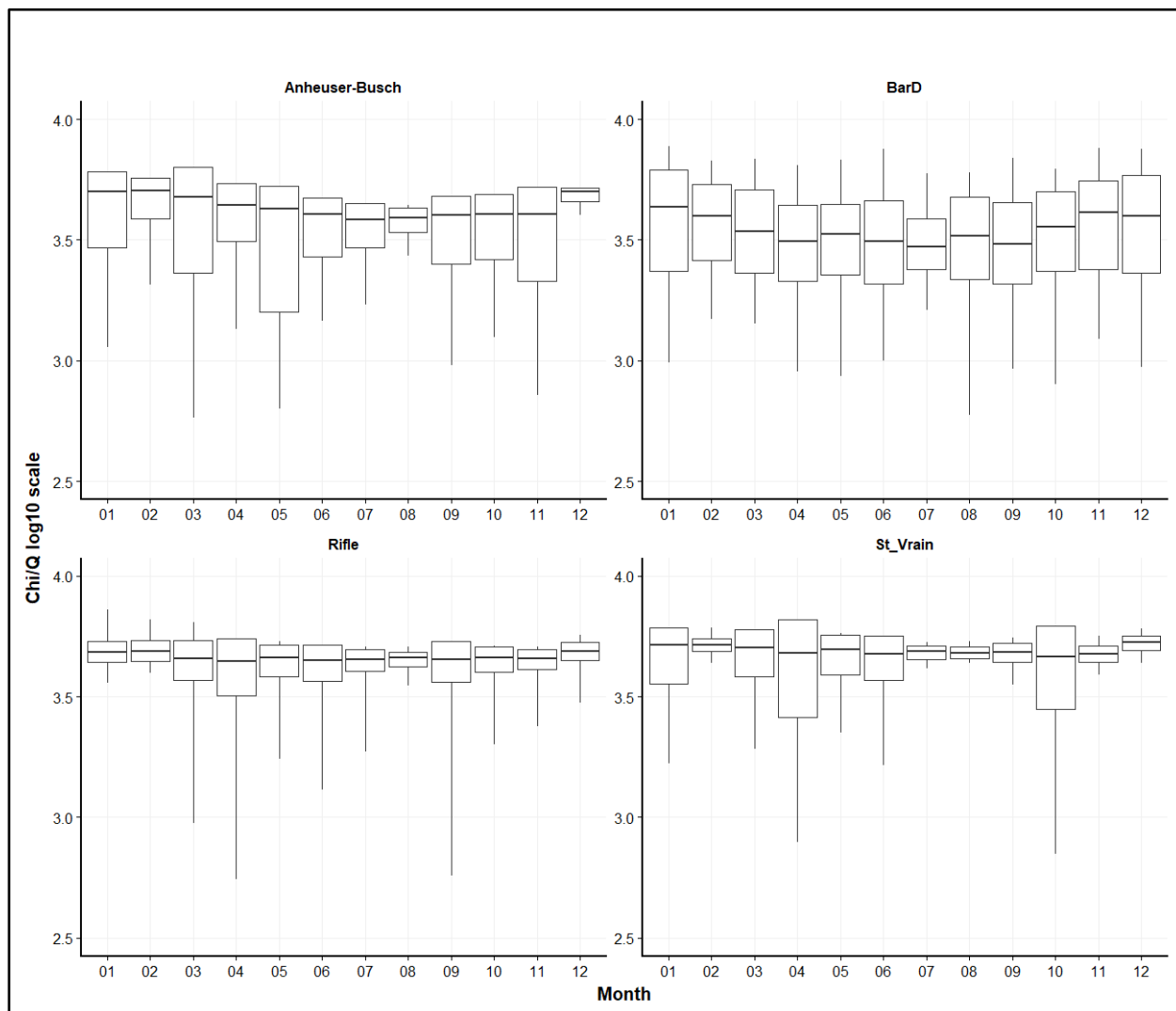
Notes: Values have been transformed via logarithm base 10. Each box-whisker plot indicates maximum and minimum (top and bottom whiskers), mean \pm 1 standard deviation (top and bottom of box), and median (bar inside box).

AB_ST = the Northern Front Range Anheuser-Busch/Ft. St. Vrain sites; BarD and Rifle = the Garfield County ridge-top and valley sites; VOC = volatile organic compound; ug m^{-3} = micrograms per cubic meter; \log_{10} = logarithm base 10; ft = feet.

Figure 2-24. Maximum Benzene Concentrations by Distance and Well-pad Size, Across All Development Activity Types

2.9.2. Well Production

For O&G production, the air-dispersion assessment only produced unit-emission air concentrations, since the variation in the emission source strength is handled within the subsequent exposure assessment where longer-term averages are of greater interest. Figure 2-25 shows the monthly trend for daily-maximum 1-hour-average unit-emission air concentrations, which suggests **some seasonal variation** in unit-emission concentrations for BarD and Anheuser-Busch, possibly due to lower wind speeds during the winter months. All locations except BarD tend show the **largest variability during transitional months** (spring and fall) for unit-emission air concentrations. Table 2-11 presents the annual-average unit-emission concentrations for the four meteorological locations. For each site, we pass to the exposure assessment the full time series of 1-hour-average unit-emission concentrations for the “worst-case” year—the year with the highest annual average. The Anheuser-Busch and Ft. St. Vrain meteorological data sets were only one year each, so we passed both of those years of data to the exposure assessment, and the exposure modeling will evaluate both sets in combination as a merged exposure scenario (as discussed in a Section 3.3.1).



Notes: Values have been transformed via logarithm base 10. Each box-whisker plot indicates maximum and minimum (top and bottom whiskers), mean \pm 1 standard deviation (top and bottom of box), and median (bar inside box).

St_Vrain = the Northern Front Range Ft. St. Vrain site; Anheuser-Busch = the Northern Front Range Anheuser-Busch site; BarD and Rifle = the Garfield County ridge-top and valley sites; Chi/Q = concentration per unit emission; log10 = logarithm base 10.

Figure 2-25. Distribution of Daily-maximum 1-hour-average Unit-emission Concentration by Month and Meteorological Location

Table 2-11. Maximum Annual-average Unit-emission Concentration by Meteorological Location

Broad Oil and Gas Area	Name of Meteorological Station	Year	Annual-average Unit-emission Air Concentration ($\mu\text{g}/\text{m}^3$)
Garfield County	Rifle	2005	4,415
		2006	4,607
		2007	4,612
		2008	4,703
		2009	4,539
	BarD	2002	3,535
Northern Front Range	Ft. St. Vrain	2004	3,675
		2009	4,802
	Anheuser-Busch	1988	3,868

Notes: Bolded years are the ones whose data were passed to the exposure assessment.
 $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

2.9.3. Comparison to Monitored Values

The modeled air concentrations from these HHRAs cannot be properly compared to the observed, monitored concentrations in the CSU field experiments. We did not design the HHRA modeling to reproduce the conditions during the experiments. Though the emissions used in these HHRAs are based on those CSU experiments, there are several key differences between the experiments and the HHRA modeling that prevent meaningful monitor-to-model comparison. We list these differences below.

1. The observed concentrations in the CSU experiments correspond to 3-minute averages.
2. The modeled concentrations in the HHRA correspond to 1-hour averages, based on a conversion of 3-minute-average emissions to 1-hour-average emissions.
3. The concentrations are highly variable: while any 3-minute measured value may be representative of the 1-hour average at that time, it may also be representative of a peak or minimum concentration relative to the 1-hour average.
4. The meteorological conditions during the CSU experiments were from specific times in the 2013–2016 time frame, and they were specific to the locations of the monitored O&G sites.
5. The meteorological conditions used in the HHRA correspond to thousands of hours from various years up until 2010, and they are specific to the Rifle, BarD, Anheuser-Busch, and Ft. St. Vrain station sites.
6. Air concentrations are highly sensitive to meteorological conditions, which can fluctuate on a minute-by-minute basis, and which can be quite different just miles apart.
7. The measurement distances relative to the tracer-gas release in the CSU experiments were variable between tens to hundreds of meters, with a median distance near 100 m or so (340 ft or so).
8. The modeled distances relative to the centers of the well pads in the HHRA were fixed at several distances from 300 to 2,000 ft (also including 150 and 250 ft for production activities).

-
9. Air concentrations, whether measured or modeled, can be quite sensitive on the scale of tens of meters when the source of emissions is nearby.
 10. The monitored values were observed generally within the emission plume, near the centerline when possible, where concentrations are largest.
 11. The modeled values in the HHRA that were saved and passed to the exposure and risk assessments were not necessarily within the plume or near the plume centerline. We predetermined the receptor (location) at each distance where we saved summary air-concentration statistics from each AERMOD Monte Carlo iteration. Those statistics were means, maxima, medians, and various higher percentiles of the hourly concentrations during each iteration. During a given iteration, the maximum 1-hour-average modeled air concentration may have been from a location near the plume centerline (from when the winds were blowing directly toward that receptor), but it may also have been far outside the centerline (from when winds were blowing in a different direction).

In their reports (CSU, 2016a, 2016b), CSU conducted AERMOD modeling utilizing the acetylene tracer-gas emission rates that they derived from the monitored values and also utilizing on-site meteorology (observed during the times of their monitoring) where possible. They observed that more than 90 percent of the modeled values were within one order of magnitude of their corresponding observed values. They note, as we note above, that air concentrations are very sensitive to location relative to the centerline of the plume, the temporal representation of the emissions, and meteorological fluctuations.

2.9.4. Results Passed to the Exposure Assessment

As shown in Table 2-12, for each O&G development activity, we pass to the exposure assessment various air-concentration metrics (means, medians, and percentiles of the 1-hour-average concentrations) from each Monte Carlo iteration, for all VOCs and locations, at the selected maximum receptor on each distance ring. For the production stage, we pass to the exposure assessment a full year of 1-hour-average unit-emission concentrations, for the year with the maximum annual-average concentration, for all sites and at the selected maximum receptor on each distance ring.

Table 2-12. Results Passed to the Exposure Assessment

Variable	Development Stage	Production Stage
Locations	3 (Anheuser-Busch and Ft. St. Vrain are merged; BarD; Rifle)	4 locations (Anheuser-Busch and Ft. St. Vrain are treated separately and merged later in the exposure assessment; BarD; Rifle)
Well-pad sizes	3 sizes (1, 3, and 5 acres)	1 size (1 acre)
Data type	Metrics of 1-hour-average concentrations, for each chemical and each Monte Carlo iteration	1-hour-average unit-emission concentrations
Durations	Data from each Monte Carlo iteration represent a randomly selected activity duration	One year of 1-hour-average concentrations
Metrics	6: maximum, 99.5th, 99th, & 95th percentiles, median, and mean	1-hour-average values
Number of receptors per distance ring	14 rings with one receptor per ring, selected based on highest mean-maximum hourly concentration across all iterations. Selection made independently for each chemical, activity, and location.	16 rings (the same 14 as development, plus 2 closer in) with one receptor per ring based on the highest annual-average concentration. Selection made independently for each site.

2.10. Characterization of Data Gaps, Uncertainties, Variabilities, and Sensitivities

In this section, we qualitatively discuss known gaps, uncertainties, and variabilities in the air-dispersion input data (Section 2.10.1), which include

- data gaps in meteorology data,
- model uncertainty with respect to wind-speed measurements flagged as calm,
- uncertainty in the modeling approach with respect to the selected meteorological data sets' representativeness of Garfield County and the NFR,
- uncertainty in the modeling approach with respect to representativeness of local terrain relative to the larger regions,
- uncertainties related to the instruments used to sample and analyze the air concentrations and the methods used to derive emission rates from those samples, and
- the high variability in the emissions data and those data's representativeness of other sites and times that were not sampled.

We also discuss specific checks we conducted primarily on the model inputs but also on a summary of the model outputs to ensure that we were correctly using the data and the model (Section 2.10.2). We also qualitatively discuss uncertainties in our dispersion-modeling approach (Section 2.10.3), with a focus on a known bias in AERMOD as well as on our selections of source configuration. Additionally, we conducted some brief analyses to evaluate the sensitivity of the estimated air concentration results to some inputs/assumptions in the APEX modeling, as we discuss in detail in Section 2.10.4.

2.10.1. Gaps, Uncertainties, and Variabilities in Data

2.10.1.1. Meteorology Data

Meteorological data used for dispersion modeling often have some hours where key parameters are missing. During these times, AERMOD will not calculate any dispersion and will not output any air concentrations (or the concentrations will be 0). We first ensured that the frequency of hours with **missing key data or calm winds** (“bad hours”) was small—5 percent or less of the selected meteorology data were “bad hours.” We did not use any of these hours in the Monte Carlo iterations as AERMOD is unable to determine concentrations.

The BarD and Ft. St. Vrain meteorological data sets had relatively few hours with no wind speed data or missing key data. The Anheuser-Busch data set had a series of entire days of “bad hours” in parts of July and August, which may mean that summertime dispersion characteristics at this site are not as well represented in the air-concentration data passed to the exposure assessment as compared to other seasons, more so for the longer-duration flowback activities than the shorter drilling and fracking activities (though most days in June, late July, and late August are free of “bad hours”). The frequency of “bad hours” diminished at Rifle from 2005 to 2010, but we discarded some of the Monte Carlo iterations that took place in 2005 because about half the days in 2005 contained at least one “bad hour.” Many of the “bad hours” at Rifle in 2005 were due to calm winds reported by the station during hours when one-minute wind data were not available; without those high-frequency wind reports, we must rely on the hour-averaged wind data reported by the station, where hourly wind speeds below about 1.5 m/s are flagged as calm. The number of hours when one-minute data were not available at Rifle generally diminished over time, leading to reduced instances of calm winds in later years. The other meteorological data sets (BarD, Ft. St. Vrain, and Anheuser-Busch) were private-industry data sets that did not use the same calm cutoff and had relatively few reports of calm winds.

Terrain, vegetative and hydrological features, and man-made features can all affect dispersion processes and, therefore, mixing of air contaminants across relatively short distances. No set of meteorological data from one site will completely match conditions at another site, but we worked with CDPHE to identify several sites with meteorological data that, taken together, reflect some of the **variability in weather conditions across Garfield County and across the NFR**. Terrain (and hydrological features) varied between these selected sites, and so the terrain elevations used for these sites in the HHRA dispersion modeling reflected some of the terrain variability across Garfield County and the NFR. (However, elevation changes were generally less than 30 m across the 2,000-ft domain radii used in these HHRA's).

2.10.1.2. Emission Rate Data

The CSU data on O&G emissions technically only reflect the O&G sites they visited and the specific activities going on during the sample collection periods. We must **assume that the collected data are generally representative of O&G sites and operations in Garfield County and the NFR**, and, as discussed in Section 2.3, that assumption is supported by CSU's consultation with industry and state partners to select representative sites as well as CSU's efforts to collect data at a variety of times. Still, CSU did not and could not capture all possible sites, operators, and on-site hour-by-hour or minute-by-minute activities that can affect emission rates, and so uncertainty remains about the full distribution of O&G emissions data in these areas of Colorado. CSU also did not sample emissions from drilling activities at the NFR or

production activities in Garfield County, and so **we must assume that drilling emissions from Garfield County are representative of drilling emissions in the NFR, and that production emissions from the NFR are representative of production emissions in Garfield County.** While this is a reasonable assumption for this analysis and based on the best data available, we acknowledge that different practices for drilling may result in different VOC emissions (e.g., use of bentonite clay versus petroleum-based drilling lubricant), and different formations and O&G composition may yield varying emissions of VOCs between production sites (e.g., wet gas versus dry gas). This adds uncertainty to our analysis, but can be addressed by future measurements of emission rates of VOCs from drilling from the NFR and production from Garfield County.

As discussed in Section 2.3, the **non-continuous nature of CSU's air sampling** leads to uncertainties about how O&G emission rates vary hour-by-hour or within the hour. However, CSU collected samples across several sites and seasons, and at some sites they collected several samples in a day or within an hour. From these non-continuous samples, it is clear that **O&G emissions are highly variable.** This variability existed across different VOCs and across the different sites where CSU conducted the experiments, and it also existed across different samples taken at the same site. We did not explicitly treat any of these emission rates as outliers or unacceptable data, though our derivation of 1-hour-average emission rates (see Section 2.3.1) resulted in a smaller variance in the rates used in the modeling. As we will discuss in subsequent reports for these HHRAs, acute exposure calculations use the higher (peak) air concentrations and are not particularly affected by the high variability in emission rates, while chronic exposure calculations tend to reflect the mean of the emission rates and in that sense are also not particularly affected by the emission variability. Uncertainties in the representativeness of these emissions data could be reduced in the future with continuous air monitoring for key VOC's at a variety of O&G sites.

CSU conducted several controlled-release experiments prior to the Garfield County and NFR measurements, where acetylene and methane were collocated and released at known emission rates to calculate **TRM uncertainties.** Wells (2015) provides a detailed description of these experiments. The TRM uncertainty in the controlled-release experiments was characterized to have an accuracy (mean bias) of +22.6 percent and a precision (relative standard deviation) of ± 16.7 percent. CSU used replicate canisters, collected during the studies, to evaluate the precision of TRM for individual VOC emission rates. Precision (pooled relative standard deviation) varied between approximately 1 and 55 percent for individual VOCs, with most values less than 20 percent. The uncertainties of the TRM were much lower than the variabilities in emission rates observed.

CSU analyzed VOCs following procedures similar to EPA's TO-12 method. They cryogenically pre-concentrated the canister sample analytes before being directed to GC-FID systems. They calibrated the system using dilutions of a 1 parts per million Linde Gas certified high pressure standard. They analyzed six clean canisters, filled with ultra-high purity nitrogen, to calculate the **limit of detection (LOD)** of the system. The results of calibration tests and LODs for the all GC-FID systems used as part of the Garfield County and NFR projects were reported by CSU (CSU, 2016a, 2016b). In some instances, concentrations were below the calculated LODs, in which case the measured value was replaced with half the LOD value (LOD/2) for the corresponding VOC. In most cases, this resulted in zero emission rates when the background concentration of VOC was subtracted from the LOD/2 value. About 80 percent of the VOCs collected had values above the LOD. The exceptions to this were for four VOCs: isoprene, 1-

pentene, 1-butene, and trans-2-butene. In Garfield County, isoprene, 1-pentene, 1-butene, and trans-2-butene had 75, 82, 60, and 80 percent of the values below LOD, respectively. For the NFR, isoprene, 1-pentene, 1-butene, and trans-2-butene were below LOD 92, 90, 93, and 53 percent of the time, respectively. Our estimates of hazards and risks (see Section 5) indicated that exposures to these four chemicals, based on the emissions derived from these canister measurements, were always far below health-based criteria, indicating little potential for adverse health effects from these exposures.

2.10.2. Quality Control of Model Inputs, Quality Assurance of Outputs

To assure the integrity of the modeling results, we conducted a number of quality checks to confirm that the data used as input to AERMOD were of highest quality and properly prepared for the model. We briefly discuss those checks here and indicate if changes were needed as a result.

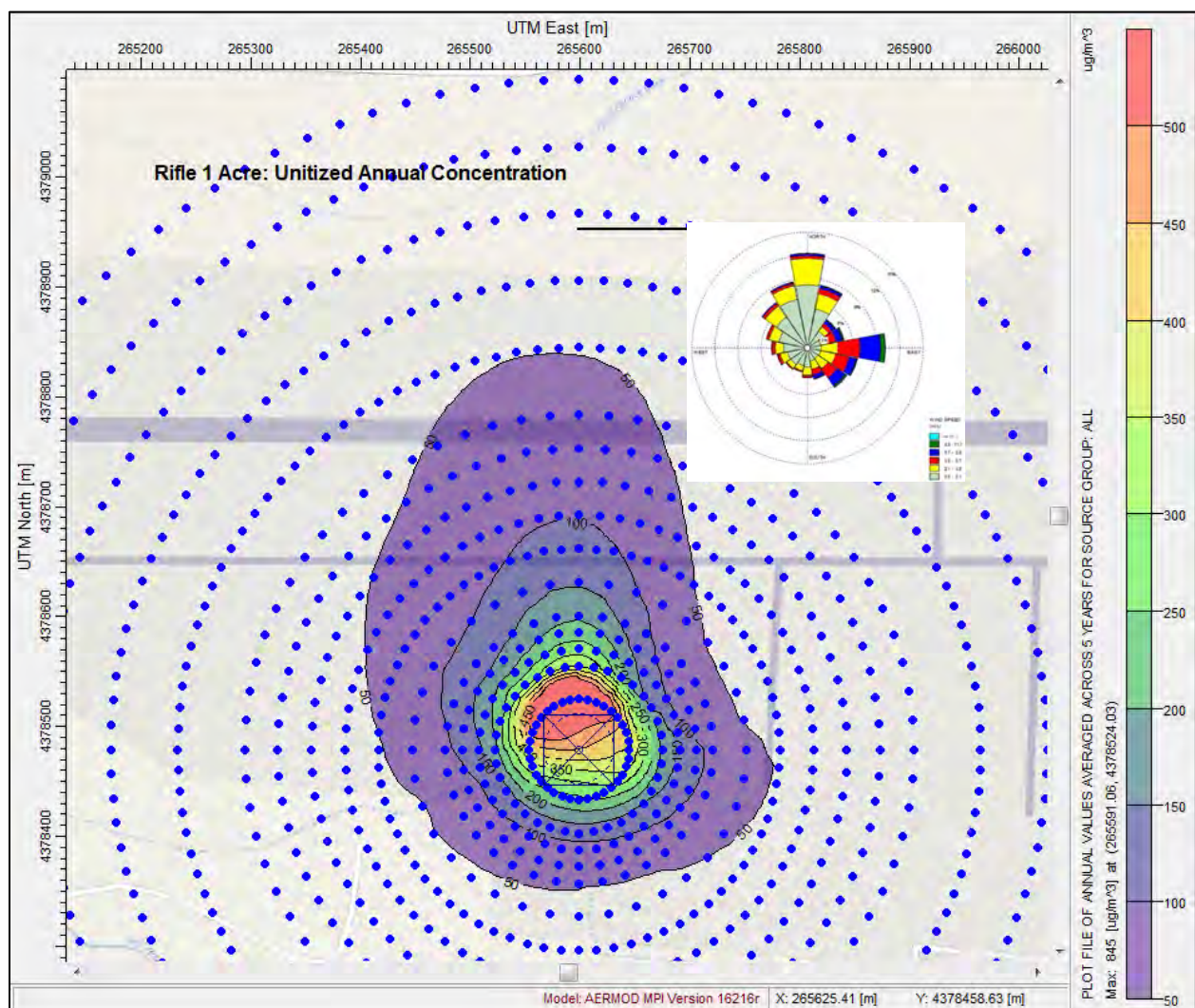
As discussed in Section 2.5.3, three of the meteorological sites had 9–10 percent of the hours with **wind speeds less than 1.0 m/s**—these are the periods which will likely yield the highest air concentrations. The fourth site (BarD) showed a much lower frequency of these lower wind speeds, which is consistent with what might be expected for the more exposed ridgetop site for BarD. This check required no changes to the methodology.

We checked **ranges in the meteorological variables against historical ranges**. We found that the Anheuser-Busch temperature data were biased high, with the lowest temperature for the year at just -12 °C (10 °F). This prompted a more thorough review of the raw data set used in the AERMET processing, where we discovered that the raw measurements were in degrees Fahrenheit (not Celsius as expected) and the wind speeds were in miles per hour (not m/s as expected), and these data were being improperly converted as a result. CDPHE reprocessed the data in AERMET with the correct units, producing a new AERMOD-ready meteorological data set for the modeling.

While the emission rates are highly variable, we conducted a simple quality check by examining the **variability between the largest and smallest measurement across all VOCs** to identify if any extreme outliers may be present. This assumes the inherent variability in the emissions data is limited to within same range across all VOCs. We used the original 3-minute-average rates calculated by CSU. The review showed that the range in emissions typically spanned about three orders of magnitude. Drilling, fracking, and flowback had maximum spans of 4.8, 5.3, and 5.2 orders of magnitude, respectively. Production the highest maximum span at 6.5 orders of magnitude, which was expected given that the production samples ranged from recently completed wells to wells more than seven years old. This check required no changes to the methodology.

To bring additional confidence that we accurately completed the dispersion modeling, we compared the **spatial patterns of modeled annual-average concentrations** at unit emission rates with the corresponding annual wind rose plots. We show these spatial patterns of concentrations along with insets of the wind roses in Figure 2-26 (1-acre well pad at Rifle), Figure 2-27 (1-acre well pad at BarD), Figure 2-28 (1-acre well pad at Anheuser-Busch), and Figure 2-29 (1-acre well pad at Ft. St Vrain). We have reversed the inset wind roses here as compared to those in Section 2.5, so that the ones shown here indicate where winds are

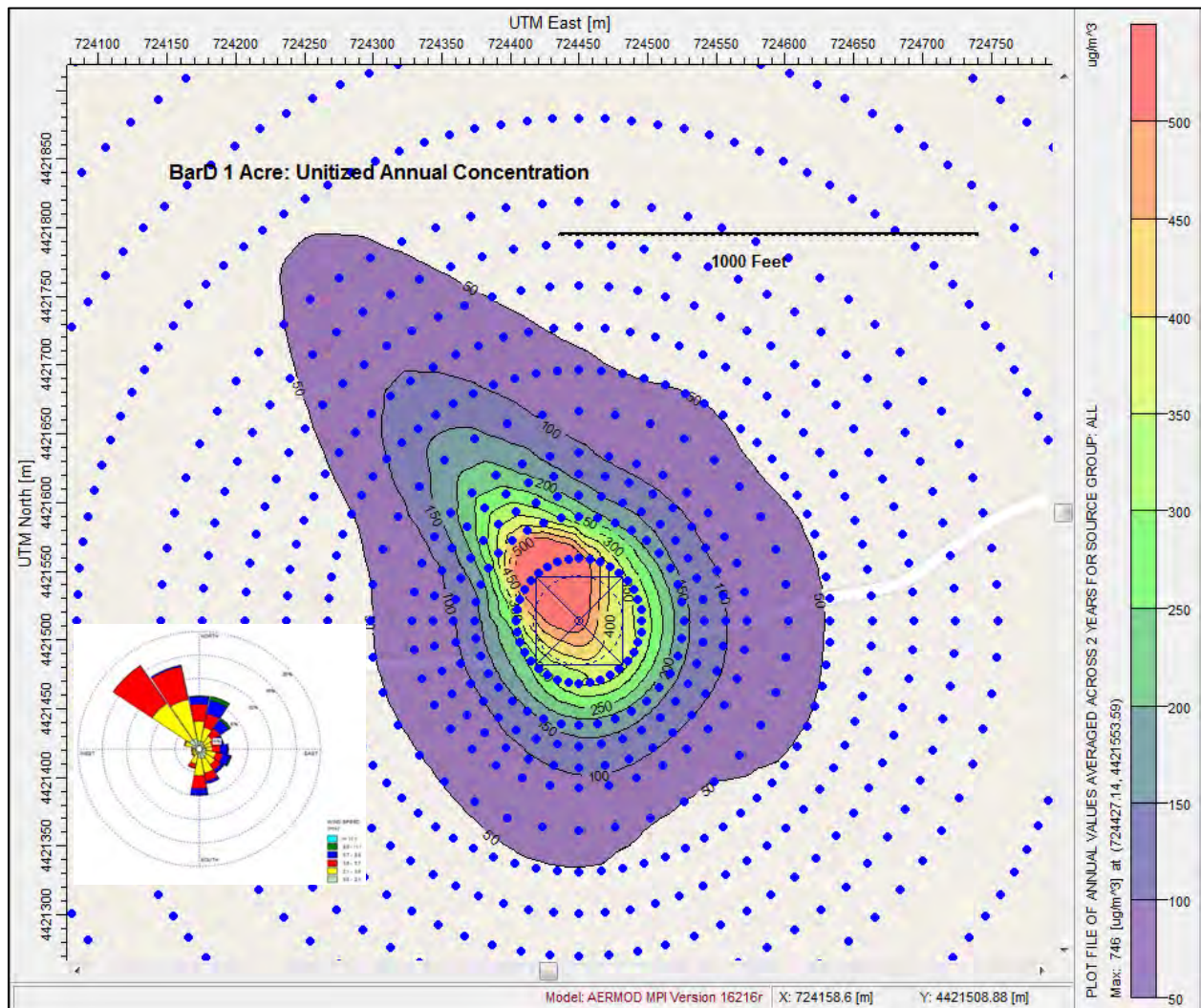
blowing to rather than blowing from, to more easily indicate the direction of emission transport. The wind rose and the concentration plot should show similar patterns, although if a particular direction has considerably higher wind speeds than another then the higher-wind-speed direction should have lower concentrations, owing to the inverse relationship between wind speed and concentration. At Rifle, this explains why concentration contours to the east are not as elongated as those to the north, but overall the wind-flow pattern and concentration pattern show good agreement. There is good agreement also at BarD, with the concentration contours and the wind rose both having a prevailing northwestern direction. Similarly, the Anheuser-Busch concentration contours and wind rose show the prevailing flow to the south, and the Ft. St. Vrain plots show strong agreement with a narrow elongation to the northeast and a broad area of elongation to the southwest. This check required no changes to the methodology.



Notes: Wind rose made using WRPLOT View, by Lakes Environmental Software. Wind rose shows winds as "blowing toward". Concentration values inside of 150 feet from the center are not representative of the concentration, as the closest receptor to the source begins at 150 feet.

UTM = Universal Transverse Mercator; m = meters; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter; m/s = meters per second.

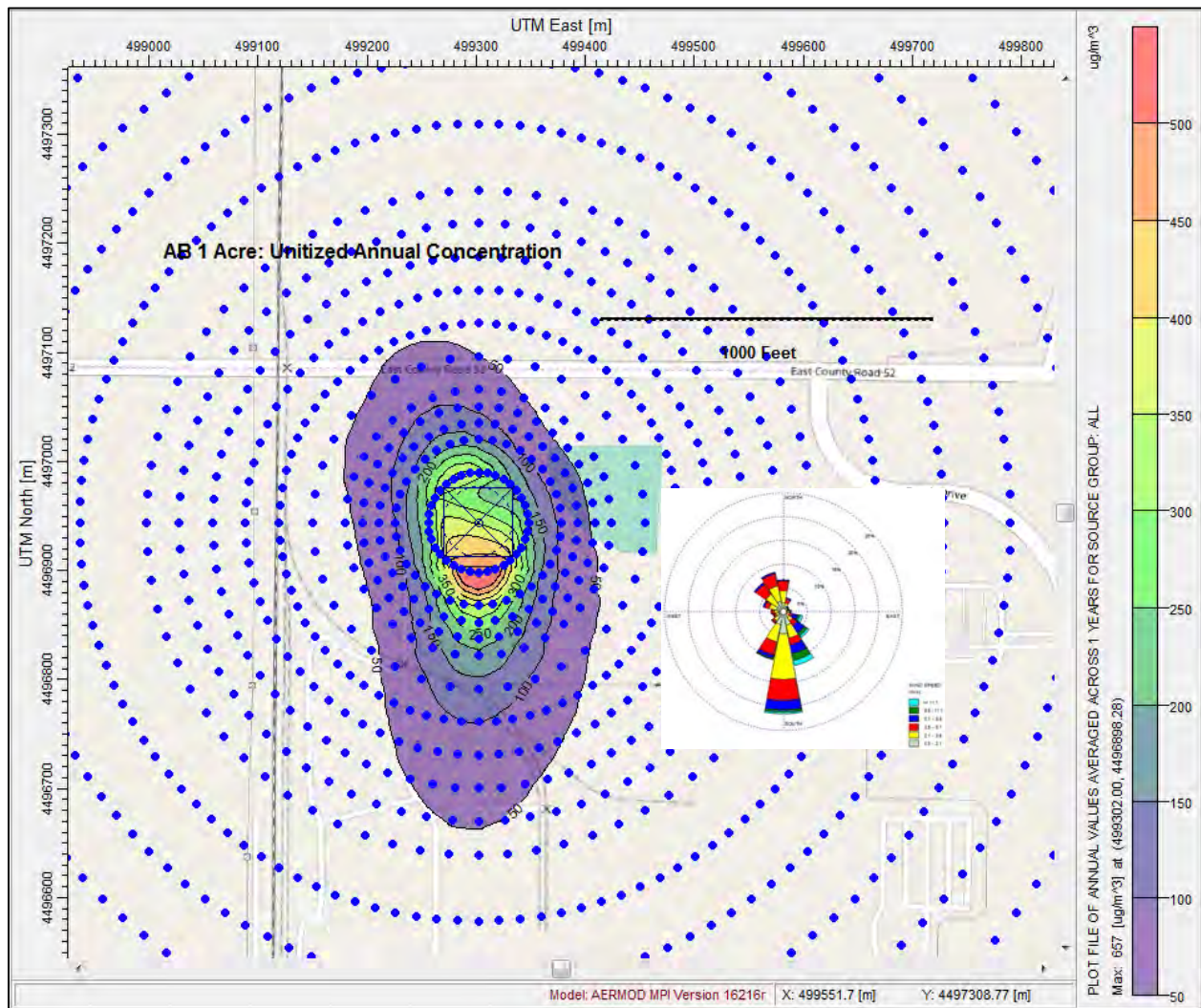
Figure 2-26. Rifle (Garfield County Valley Site) Annual-average Unit-emission Air Concentrations for 1-acre Well Pad, With Annual-average Wind Rose Insert



Notes: Wind rose made using WRPLOT View, by Lakes Environmental Software. Wind rose shows winds as "blowing toward". Concentration values inside of 150 feet from the center are not representative of the concentration, as the closest receptor to the source begins at 150 feet.

UTM = Universal Transverse Mercator; m = meters; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter; m/s = meters per second.

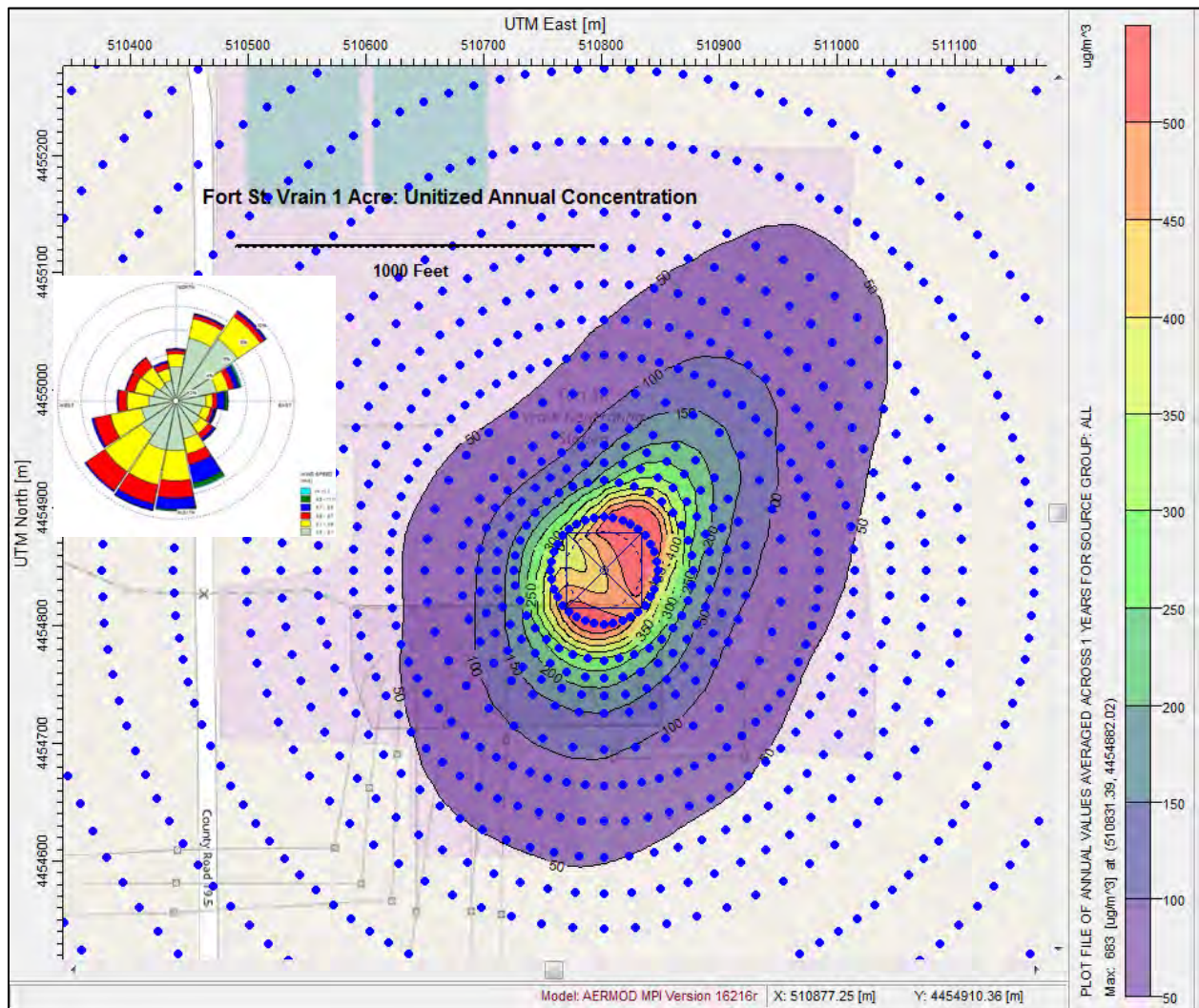
Figure 2-27. BarD (Garfield County Ridge-top Site) Annual-average Unit-emission Air Concentrations for 1-acre Well Pad, With Annual-average Wind Rose Insert



Notes: Wind rose made using WRPLOT View, by Lakes Environmental Software. Wind rose shows winds as "blowing toward". Concentration values inside of 150 feet from the center are not representative of the concentration, as the closest receptor to the source begins at 150 feet.

UTM = Universal Transverse Mercator; m = meters; ug/m³ = micrograms per cubic meter; m/s = meters per second.

Figure 2-28. Anheuser-Busch (a Northern Front Range Site) Annual-average Unit-emission Air Concentrations for 1-acre Well Pad, With Annual-average Wind Rose Insert



Notes: Wind rose made using WRPLOT View, by Lakes Environmental Software. Wind rose shows winds as "blowing toward". Concentration values inside of 150 feet from the center are not representative of the concentration, as the closest receptor to the source begins at 150 feet.

UTM = Universal Transverse Mercator; m = meters; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter; m/s = meters per second.

Figure 2-29. Ft. St. Vrain (a Northern Front Range Site) Annual-average Unit-emission Air Concentrations for 1-acre Well Pad, With Annual-average Wind Rose Insert

2.10.3. Uncertainties and Variabilities in Modeling Approach

Uncertainties inherent in the AERMOD model should generally be smaller than the uncertainties in the model input data pertaining to emissions and meteorology. Like many models, AERMOD will usually be most accurate over longer averaging periods and across larger areas, compared to short averaging periods and specific point locations.

Still, AERMOD has a well-known tendency to underestimate dispersion (and, therefore, overestimate concentrations) during times of low wind speeds and stable conditions. As noted in Section 2.1, the number of model validation studies of AERMOD for near-ground-level sources

is very limited. It is likely the AERMOD will have a tendency to overestimate given the difficulties of parameterizing low wind speed conditions in a Gaussian-formulated model. Additional low-wind-speed data sets are available (e.g., Sagendorf and Dickson, 1974; Wilson et al., 1976). EPA developed the **ADJ_U*** option in AERMOD to help adjust surface friction velocities (which is the u^* parameter) to reduce these low-wind biases. This is a default feature of AERMOD when the meteorological data do not contain information on turbulence and vertical profiles of temperature. Except for the BarD station, the meteorological data used in these HHRAs do not have such information, so we utilized this ADJ_U* feature for the processing of Rifle, Ft. St. Vrain, and Anheuser-Busch meteorological data in these HHRAs. AERMOD contains several other features for adjustments to the model during low-wind conditions, but we elected to not use them due to their non-default (beta) status and due to uncertainties with their effects on modeled air concentrations without monitored air concentrations to compare against.

We also vary the **sizes of well pads** in the modeling, in an effort to reflect that **O&G site configurations** are highly variable depending on the type of drilling, the site operator, the stage of operations, the number of wells, etc. The precise locations where emissions originate on the well pad are equally variable. So as to not bias the air modeling toward one configuration or another, we assumed that emissions from the well pad come equally from all parts of the pad. At any given time at any real O&G site, emissions may come from only one corner of the pad, putting those emissions closer to anyone living or recreating near that corner (and farther away from people living/recreating near the opposite corner); our modeling will not capture those kinds of scenarios, which leads to some uncertainties in the subsequent exposure and risk assessments, especially for acute exposures. Instead, in our modeling, emissions from places on the well pad become immediately diffused across the modeled size of the well pad, and then the meteorology helps disperse that emission plume away from the pad. The size of the pad affects that initial plume diffusion—emissions from a larger pad are diffused across a larger area before being dispersed by meteorology. For simplicity, we modeled three sizes of well pad for development activities, determined by CDPHE to reasonably represent many current O&G sites in the state based on professional judgment and recent permits submitted to COGCC. However, some O&G sites will have smaller or larger layouts than what we have modeled, leading to reduced or enhanced initial diffusion of emissions, leading to different spatial patterns of air concentrations and exposure.

2.10.4.Sensitivity Analyses

Air dispersion models require many different elements in order to estimate ambient air concentrations. Here we describe qualitatively, and in some cases quantitatively, the sensitivity of AERMOD modeled concentrations to the elements listed below.

1. emissions
2. wind speed
3. surface roughness length
4. urbanization
5. seasonality
6. recirculation and terrain

Among these elements, **modeled air concentrations are probably most sensitive to inputs of emissions and wind speed. However, in these HHRA the emissions and meteorology are considered “given”** in that they corresponded to site measurements. **Among the other elements, surface roughness length is perhaps the most influential**, indicating that air concentrations could be substantially lower for O&G activities in heavily forested areas, although we make no judgments about the likelihood of O&G activities in such areas. Urbanization also can substantially affect acute exposures, but chronic exposures are much less affected. Though air concentrations can vary by season, we already capture those variations in our HHRA methodology. We include reasonable terrain variations across about a 2,000-ft radius around a well pad, though more dramatic terrain features could have additional impacts not modeled here. Recirculation effects should be relatively minor. In the below subsections, we discuss these elements in more detail.

2.10.4.1. Emissions

One of the most important inputs to the dispersion model is specification of the emission source strength. **Air concentrations estimated by AERMOD are directly and proportionally sensitive to inputs of emission rate.** If emissions are doubled then the modeled concentrations are similarly doubled, and if emissions are reduced by half the concentrations are reduced by half. Across different samples and locations, CSU observed a wide range of 3-minute-average emission values for a given chemical (CSU, 2016a, 2016b), sometimes much more than one order of magnitude. For example, as discussed in Section 2.3, benzene emissions during drilling had a range of about 4.7 orders of magnitude (5th and 95th percentiles over 2.5 orders of magnitude apart), while toluene during Garfield County fracking had a range around 2.1 orders of magnitude (5th and 95th percentiles over 1.8 orders of magnitude apart), and isoprene during NFR flowback had a range around 1.9 orders of magnitude (5th and 95th percentiles 1.8 orders of magnitude apart). These emissions data were a “given” in these HHRA, rather than a choice to be made in terms of assessment assumptions or model settings.

Regarding our derivations of 1-hour-average emission rates from the 3-minute-average samples, which we discuss in Section 2.3.1, we made the reasonable assumptions that emission rates are log-normally distributed and that 1-hour rates would have smaller ranges than 3-minute rates. For example, the ranges of rates for benzene during drilling, toluene during fracking in Garfield County, and isoprene during NFR flowback dropped to 1.5, 0.5, and 0.6 orders of magnitude, respectively, with the 1-hour-average rates relative to the 3-minute-average rates. These are the emission rates we used in the HHRA modeling, and these wide ranges in emission values lead to wide ranges in corresponding estimates of chemical air concentrations. Due to the small sample sizes of the 3-minute observations, the resulting means of the 1-hour distributions were sometimes noticeably different (by more than about 10 percent) than those of the 3-minute distributions. This should have the effect in these cases of proportionally changing the longer-term average air concentrations (by more than 10 percent) when utilizing 1-hour values instead of 3-minute values. Our modeling also does not capture the scenario of the highest 3-minute rates being sustained for an entire hour, nor does it capture the scenario of the lowest 3-minute rates being sustained; these scenarios would lead to higher peak acute exposures and lower minimum acute exposures, but we have no confidence in the probability of these scenarios.

2.10.4.2. Wind Speed

AERMOD modeled air concentrations are also particularly sensitive to inputs of wind speed, and as with emissions the relationship is simple: because AERMOD is a Gaussian-formulated dispersion model, the **concentration is inversely proportional to the wind speed**. That is, if the wind speed is reduced by half then the concentration is doubled, and similarly if the wind speed is doubled the concentration is reduced by half. These relationships are more influential for acute estimates of exposure, whereas differences in long-term averages of wind speed would be smaller and lead to smaller differences in chronic estimates of exposure. As with emissions data, these meteorology data were a “given” in these HHRAs, and they are quality controlled, consist of many months of observed data across several sites, and were selected to reflect many real meteorological patterns across the Garfield County and NFR regions.

2.10.4.3. Land Cover

Other elements that affect the modeled concentrations, such as **surface roughness** and **urbanization**, are not simple proportional adjustments. These require running the model for a given set of conditions and then varying only one element. In BAAQMD (2004), two source types that the authors studied were somewhat similar to the source types found at O&G operations in Colorado: a diesel generator modeled as a point source, and a typical gas dispensing facility modeled as a volume source. Differences in model sensitivity between the two source types were relatively small, but the gas dispensing facility exhibited slightly higher sensitivity, which may be particularly relevant to these HHRAs given that we modeled the O&G operations as a volume source and we would expect similar model sensitivities.

In Table 2-13, we show the AERMOD sensitivities found in BAAQMD (2004) for a gas-dispensing volume source. The table shows the maximum percent changes in concentration. **In their study, changing surface roughness by four-fold had up to an 85-percent effect on modeled annual-average concentrations**, with an inverse relationship. Surface roughness values can vary by land cover, which itself can vary by season, with the lowest roughness values associated with snow cover or water bodies (around 0.2 centimeters [cm]), as compared to values of 10 cm over grasslands, 50 cm for communities of single-family homes, and 130 cm for evergreen forests. The next most sensitive element is the urban population, which is used in the modeling of urban areas, which can be defined as having a population density greater than 750 people per square kilometer. **In their study, changing the urban population by 1.75-fold had up to a 19-percent effect on the peak modeled 1-hour concentration**, with an inverse relationship. Modeled air concentrations showed very little sensitivity to changes in the other three elements they studied (albedo, air temperature, and Bowen ratio).

Table 2-13. AERMOD Sensitivity to Input Parameters from a Typical Gas-dispensing Facility

Element	Variation	Maximum Change	Averaging Period
Surface roughness	0.25 x base case	+85 %	Annual
	4 x base case	-67 %	Annual
Urban population	-75 %	+19 %	1 hour
	+75%	-7 %	1 hour
Albedo	0.25 x base case	+1 %	1 hour
	4 x base case	+6 %	24 hour
Ambient temperature	-6 °C	-1 %	1 hour
	+6 °C	+0.6 %	24 hour
Bowen ratio	0.5 x base case	+0.7 %	24 hour
	2 x base case	-0.5 %	24 hour

Source: Table 4 of BAAQMD (2004).

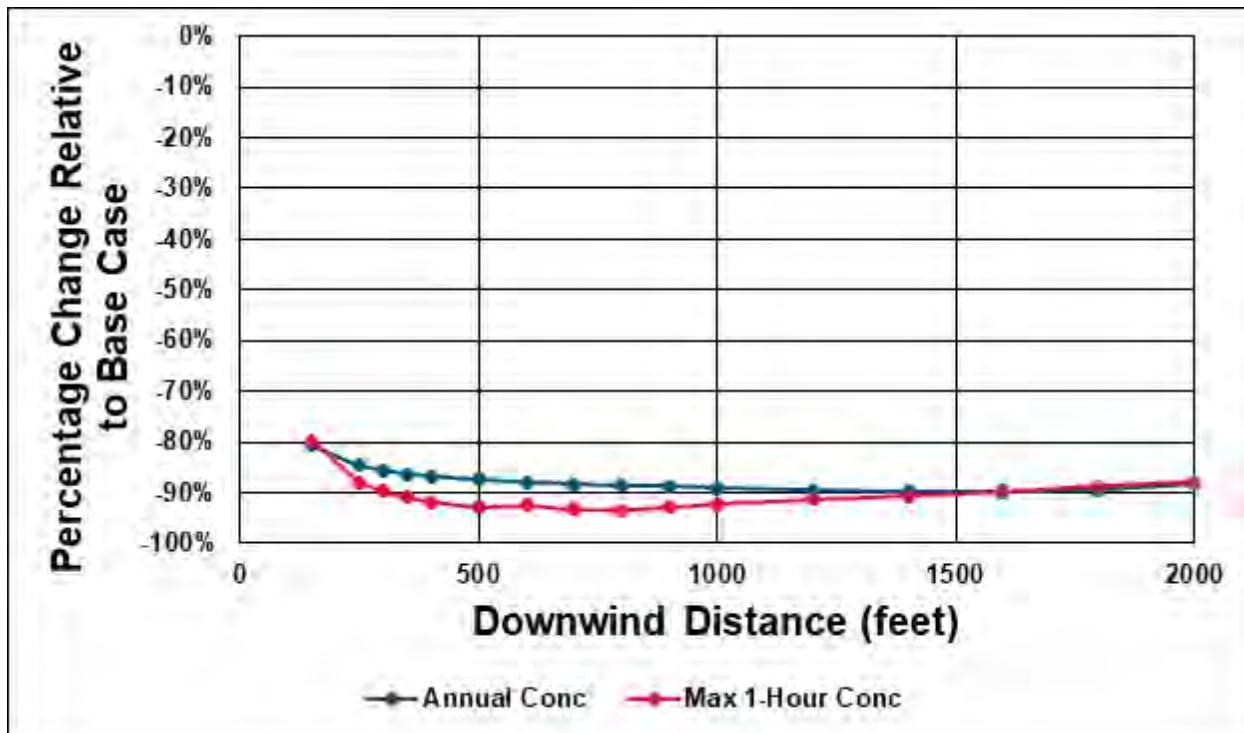
Note: °C = degrees Celsius

Because the surface roughness length exhibited such a strong sensitivity in the BAAQMD (2004) study, we conducted Colorado-specific model sensitivity runs for the Rifle site in Garfield County. In addition, BAAQMD (2004) did not evaluate the sensitivity of modeled air concentrations to whether or not the urban setting is used in AERMOD (a setting which affects estimates of pollutant mixing), so here we also conducted a site-specific analysis for the Anheuser-Busch meteorology but in an urban setting rather than the rural selection made in the HHRAs.

New Modeling of Sensitivity to Surface Roughness

In Garfield County, the site-specific surface roughness length near the Rifle site varies between 5 and 33 cm depending on season and location, with an average of 23 cm (base case). If this same site were located in forested area of evergreen trees, the surface roughness length would be 130 cm—a 5.7-fold increase. Since AERMOD's meteorological preprocessor (AERMET) uses the surface roughness length in determining atmospheric stability, it was necessary to re-run AERMET (Stage 2 and 3) to provide new meteorological input files to AERMOD. We then ran AERMOD to determine how the change in surface roughness length (a 5.7-fold increase from 23 cm to 130 cm) impacted modeled concentrations as a function of distance relative to the base case for each distance ring away from the O&G well pad for both the annual-average and the peak 1-hour concentration.

In Figure 2-30, we show the relative decrease at each receptor ring in the maximum 1-hour and maximum annual average associated with the increase surface roughness length. Both averages show similar **reductions in concentrations from increased surface roughness length, at nearly an 80-percent decrease at 150 ft followed by additional decreases, leveling off at about 90 percent by 500 ft.** The closer receptor rings show less relative decrease in concentration as the initial dispersion parameters of the volume source (the same in both simulations) are still important contributors to the near-field concentration. These are larger decreases in average concentration than were observed by BAAQMD (2004), likely due to utilizing a larger increase here in surface roughness length—about 5.7 x base case here, versus 4 x base case in BAAQMD (2004).



Notes: Conc = concentration; Max = maximum.

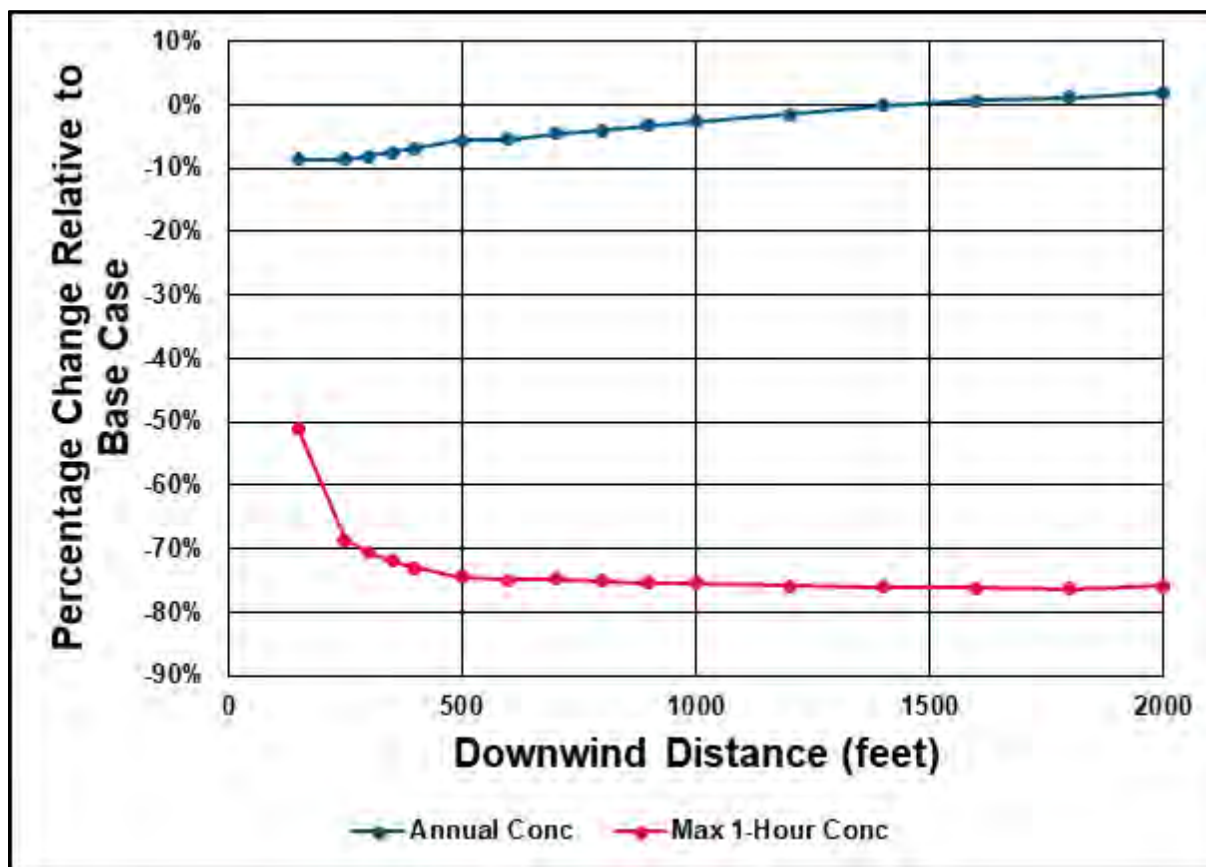
Figure 2-30. Percentage Change in Average Air Concentrations by Distance, Forested Case (Surface Roughness Length=130 centimeters) Relative to Base Case (Surface Roughness Length=23 centimeters)

New Modeling of Sensitivity to Urban versus Rural Dispersion

In all of the modeling for these HHRAs, we used the rural dispersion modeling option, as we assumed O&G development was not taking place in urbanized areas. However, the possibility exists that some O&G development may happen in fairly close proximity to a mostly urban setting. The Anheuser-Busch site, while relatively rural, is not far from the Ft. Collins metropolitan statistical area (MSA). We used this site to evaluate the impact on air concentrations utilizing the same base meteorology data but using the urban turbulent mixing dispersion coefficients that AERMOD estimates with the urban setting. To do so, we provided AERMOD with the population of the Ft. Collins MSA (about 340,000) and then ran AERMOD to identify the impact of this urban setting on annual-average and peak 1-hour concentrations by distance from the well pad.

In Figure 2-31, we show the relative increase or decrease in the maximum 1-hour and maximum annual-average concentrations for each receptor ring. **The maximum 1-hour concentration with the urban option is 50-percent lower than without the urban option at the first receptor ring (150 ft) and the difference grows to 75 percent at 500 ft where it remains fairly constant for the remaining distances.** The closer rings show less relative decrease in concentration because the initial dispersion of the O&G volume source is important in the near-field dilution. However, at 500 ft the initial dispersion becomes less important and the dilution is almost entirely due to the urban-rural dispersion parameters. **The annual average shows in the near-field that the urban setting results in slightly lower concentrations out to about**

1,400 ft, beyond which the annual concentrations are slightly higher with the urban setting than without the urban setting. This is a result of initial plume lateral and vertical mixing with the urban setting causing decreases in concentrations closer to the source, whereas this becomes less important at distances farther downwind where the urban setting causes slightly higher concentrations overall on average.



Notes: Conc = concentration; Max = maximum.

Figure 2-31. Percentage Change in Average Air Concentrations by Distance, Urbanized Case (Population=340,000) Relative to Base Case (Rural Setting)

2.10.4.4. Seasonality

Seasonal variation in the maximum short-term air concentrations could be of potential concern given changes in human activity levels and locations across seasons. Figure 2-25 shows month-by-month variation in the concentration distribution for all four meteorological sites utilized in these HHRAs. The figure shows that for Rifle and Ft. St. Vrain there is almost no seasonal variation in the average of maximum daily 1-hour concentrations. However, **both the Anheuser-Busch and BarD sites show about a 20-percent decrease in the summer (July–August) average daily-maximum 1-hour concentrations relative to the winter period.** Our HHRa modeling captures air concentrations during all seasons.

2.10.4.5. Recirculation and Terrain

Under stagnation conditions that occur most frequently during the fall and winter months, air may be trapped within an air basin and recirculated, leading to the accumulation of air pollutants. This meteorological phenomenon was not included in these HHRAs as AERMOD cannot simulate this type of airflow condition given its steady-state formulation. That is, every hour modeled is independent of the previous hour, so **we did not consider stagnation conditions or flow reversals in these HHRAs. Such conditions should not have a substantial impact for a single well pad as modeled in these HHRAs**—for a given well pad, the concentrations from a given hour's emissions will be larger relative to that due to recirculation from previous hours' emissions. These conditions would be far more important if we were assessing the cumulative impact of O&G well development and production across a region, as the recirculation occurs on those spatial scales.

Additionally, **we did not include sites that are strongly influenced by localized terrain affects** (e.g., slot canyons, narrow valleys, deep bowls) across the short distances utilized in these HHRAs.

3. Modeling of Inhalation Exposure

We conducted the inhalation exposure modeling using U.S. EPA's **Air Pollutants Exposure Model (APEX)**, which EPA uses primarily for inhalation exposure assessment for the criteria air pollutants (carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, and particulate matter). APEX is not proprietary and is highly customizable, so it may be used without restriction by anyone inside or outside EPA and configured for a variety of exposure scenarios. Staff currently at ICF have been closely involved with APEX since its inception in 1999, including writing nearly all of the APEX code and conducting many of the practical applications, including customized scenarios.

APEX does not determine the outdoor (ambient) air quality. It must be given time series of ambient air quality data, most commonly at hourly time steps, for the duration of the simulation period (typically one year). APEX is a microenvironmental model in which each location with distinctive air quality is called a microenvironment (micro for short), with its own relationship to the ambient air.

We list below the main features of APEX.

- Stochastic sampling to characterize population variability
- Customizable micros
- Uses databases of human time-activity data to determine time spent in each micro
- Uses either of two methods—mass balance or linear regression—for estimating air concentrations of chemicals in each micro
- Produces detailed time series of exposure for each simulated individual

-
- Estimates time averages of exposure concentration

3.1. Overview of Approach

APEX is a **stochastic exposure model**⁸ used by EPA since 2002 for assessments of criteria air pollutants and other airborne chemical-exposure scenarios. APEX assesses exposure by combining data on population, air quality, human activity, ambient temperature, and micros. APEX generates a set of modeled individuals, which collectively describe the population variability in exposure. Typically, each modeled individual has his/her exposure characterized hourly over the course of a year.

APEX is typically used to model specific geographical locations and the people living and working in the vicinity. For that purpose, it has default databases derived from the 2010 U.S. Census of home and work populations by census tract for the entire US. However, the current application is unusual in that it refers to the exposures of hypothetical individuals living at various distances from hypothetical O&G sites. Therefore, for these HHRAs we **customized several of the APEX input files and key parameters**, although no changes to the APEX code were required. We provide in Section 3.2 details on the inputs files, which we briefly summarize in the remainder of this section. We also provide in Section 3.1.1 a condensed list of key assumptions for the exposure modeling.

We replaced the census population data with a set of **hypothetical individuals whose houses are located at directions where our dispersion modeling estimated higher average air concentrations (and, therefore, higher average exposures) relative to other directions, indicating they are directly downwind from the hypothetical O&G sites relatively frequently**. For O&G development activities, these locations correspond to the direction with the largest mean-maximum 1-hour-average air concentrations at each modeled distance from the well pad, as modeled in the dispersion assessment (see Section 2.7.3). For O&G production activities, these locations correspond to the direction with the largest annual-average air concentration modeled with unit emissions at each distance from the well pad (see Section 2.8). These locations can change by modeled site, O&G activity, and, for development activities, emitted VOC. In our modeling for these HHRAs, APEX uses **stochastic sampling from U.S. data sets to assign physiological characteristics to the hypothetical individuals** living at these locations.

We customized the human activity data by selecting **activity diaries for adults surveyed from the Mountain West region of the US** (due to data limitations, for youth and older adults we selected activity diaries from the full U.S. survey data set). We selected three micros where these activities take place (**indoors, outdoors, and in-vehicle**), and, with no modeled indoor sources of pollution, the estimated VOC air concentrations in these micros are directly related to the outdoor ambient air at all times. We also do not include background pollution sources—the goal was to estimate population-level exposures to VOCs emitted by the O&G activities currently being evaluated.

⁸ APEX is a stochastic (probabilistic) model because it samples from probability distributions for a variety of model inputs. Sampling from these distributions—for inputs such as the physiological and demographic characteristics of the simulated individuals and the manner in which outdoor air penetrates into buildings and vehicles—creates a variety of potential exposure scenarios across the simulated population and environments.

We utilized unit air concentrations ($1 \mu\text{g}/\text{m}^3$) for the APEX runs, and then we utilized custom post-processing algorithms to tailor the air quality (and, ultimately, the exposure) to the VOC air concentrations output from the dispersion assessment for each O&G site, O&G activity, distance from the well pad, and VOC. This tailoring in post-processing is possible because **the O&G activities modeled in the dispersion assessment are assumed to be the only sources of the modeled VOCs included in these HHRAs**, therefore making the APEX-modeled exposures directly proportional to the modeled air concentrations (a 50-percent increase in outdoor ambient air concentration causes a 50-percent increase in modeled exposure on that hour).

The result of the APEX modeling is an hourly time series (for one year) of exposure concentrations for each hypothetical individual exposed to $1 \mu\text{g}/\text{m}^3$ of a generic airborne chemical. These output exposure concentrations can be interpreted as the hourly exposure concentration per unit air concentration. **Exposure concentrations are time-averaged air concentrations that the hypothetical individual experiences. They take into account time spent in various micros across a period of time (as dictated by stochastic sampling of activity diaries) and the estimated air concentrations in those micros (as estimated through stochastic sampling of penetration factors [PENs] of outdoor air moving into the micros).**

Though most development activities on a well pad will last less than one year, we ran APEX for one year so that we could **generate many different hypothetical one-hour and multi-day exposure scenarios** that we could sample from across the year. A one-year model run allowed us to capture any seasonal differences in the activities individuals undertake in their daily lives, and through randomized sampling of many modeled air concentrations it also allowed us to generate many possible short- and longer-term sequences of air concentrations.

Because of the stochastic sampling involved in an APEX run, enough hypothetical individuals must be included to ensure convergence in the results (i.e., that the variability in modeled exposures across those individuals reasonably reflects the variability expected across a larger population). While about 500 individuals appeared to be sufficient based on our convergence testing, we have chosen to run **1,000 hypothetical individuals per age group** in each APEX run, which ensures convergence with a cushion to account for unique scenarios with higher variability (see Section 3.4.3 for details). We defined **broad age groups for youth (ages 0–17 years), adults (ages 18–59 years), and older adults (ages 60 years and above)**. With 8,760 hours per year⁹, this results in 8.76 million hourly exposure values per age group per APEX run, which we post-process to obtain VOC- and location-specific exposures.

The post-processing initially creates **estimates of hourly exposures to each of 47 VOCs emitted by each modeled O&G activity from each hypothetical O&G site, for thousands of hypothetical individuals located across many distances from the sites**. This produces terabytes of data which must be summarized more succinctly to be manageable in a risk assessment. We condensed the hourly exposure data into daily averages and daily maxima for each hypothetical individual, and we utilized these distributions of daily exposures to estimate risks, as described in Sections 4 and 5.

⁹ Throughout this report, we may refer to 365 days or 8,760 hours in a year. Correspondingly, we may also refer to how many days or hours we have across 1,000 modeled individuals (equaling 365,000 days or 8.76 million hours). In some cases, a leap year is also possible, but for simplicity of discussion in this report we refer to counts of days and hours for non-leap years.

3.1.1. Key Modeling Settings and Assumptions

In this section, we present a condensed list of the key settings and assumptions used in the exposure modeling in these HHRAs. We discuss these in more detail throughout Section 3.

- Inhalation was the only exposure pathway considered
- We simulated 1,000 hypothetical individuals in each of three distinct age groups at each modeled distance from the well pad
- We used modeled outdoor air concentrations from AERMOD (Section 2) as ambient outdoor concentrations at hypothetical residences. For development activities, on an hour-by-hour basis, we sampled from the database of maximum modeled concentrations (for acute exposure) or mean modeled concentrations (for subchronic and chronic exposure) from the Monte Carlo iterations used in the dispersion assessment. For production activities, we employed time series of concentrations derived from unit emissions mapped to randomly-sampled emission rates.
- The chemical concentration in air at the time of exposure depended on the outdoor (ambient) air concentration at the simulated individual's residential location, which of three micros the individual was in (outdoor, indoor, or in-vehicle), and how fully the chemical penetrated from outdoors into the micro (with PENs derived from literature sources and assigned to groups of the modeled VOCs)
- A simulated individual's micro location at a given time was assigned based on a national database of activity diaries (assigned probabilistically based on age and gender). For working-age adults, the diaries were specific to the Mountain West states.
- Simulated individuals remained at the same distance and cardinal direction from the source (well pad) at all times—even when assigned activities such as working or traveling—so the ambient outdoor concentrations were always sampled from that specific location
- Acute exposures occurred across one hour, while subchronic and chronic exposures occurred across some number of days as dictated by the assumed average O&G activity duration

3.2. APEX Modeling Inputs

In this section, we describe the various inputs required for APEX modeling and how we handle them (assumptions, settings, data sources, etc.) in these HHRAs. With the inputs, assumptions, and settings described below, we conducted a total of 18 APEX runs (with 1,000 simulated individuals each) using unit outdoor ambient air concentrations ($1 \mu\text{g}/\text{m}^3$) for each combination of groups of VOCs (grouped by PEN; $n=2$), O&G site ($n=3$), and age group ($n=3$). We then post-processed the results of these model runs as described in Section 3.3 to yield specific simulated exposure results for 1,000 hypothetical individuals for each combination of age group ($n=3$), distance from well pad ($n=14$ for development and 16 for production), O&G activity ($n=3$ for development and 1 for production), and size of well pad ($n=3$ for development and 1 for production).

3.2.1. Simulated Population Demographics

Typical APEX runs use actual population data (from the U.S. Census Bureau) in various census tracts. However, these are geographically large units (often many miles across for places outside cities), which would not provide the necessary level of detail in terms of distance from the well pad. Also, though we use real meteorology data from real sites in Garfield County and the NFR, **the simulated O&G sites and the hypothetical individuals living near them are intended to be generic (rather than real, specific sites and actual nearby neighborhoods).** Therefore, for these APEX runs we consider hypothetical individuals at residences located at specific distances from the hypothetical well pad, at radial directions determined in the dispersion assessment to experience the highest average air concentrations as described earlier in Section 3.1 (customized by O&G site, O&G activity, and, for development activities, emitted VOC). Figure 2-18 in Section 2.8 depicts the selected receptors for the production activity at the modeled Rifle site in Garfield County. APEX considers the ambient air to be co-located with each residence (that is, the air concentrations from AERMOD modeling are assumed to reflect air directly outside the residences at these receptors and available to penetrate into the different micros as discussed below).

The population is divided into the three broad age groups listed below, with hypothetical heights and weights assigned from distributions of survey data collected nationally.

- **youth** (below 18 years old)
- **adults** (18–59 years old)
- **older adults** (age 60 years and above)

Ages have some relevance because people spend different amounts of time in the various micros at different life stages, therefore receiving different exposures. For example, we would expect a typical 30-year-old individual to be involved in more outdoor activities than a typical 75-year-old individual. Since the available toxicity criteria values (discussed in Section 4) were developed by the agencies to be protective of the general population including sensitive subgroups such as children and senior citizens, there was no practical need to evaluate exposures and risks for each year of age separately (which would have been computationally very intensive).

We did not model young children (say, ages 0–6 years) separately from older children for several reasons, including: the limited number of available activity diaries, the lack of separate health criteria, and the fact that such children are almost always accompanied by an adult. Two persons of different ages who are always at the same place at the same time will experience the same air concentrations. Therefore, young children will have the same exposures as the adults who are with them, and the adults are captured in the other age groups.

Convergence testing (described in Section 3.4.3) showed that a minimum of about 500 hypothetical individuals in each age group (at each modeled location) should be sufficient to capture most of the variability in exposure across the simulated population (variability related to stochastic sampling of the physiological characteristics and activities of modeled individuals). We chose to model **1,000 hypothetical individuals in each age group (at each modeled**

location) to provide a buffer for potential unique cases of higher variability that may cause exposure results to converge more slowly.

3.2.2. Activity Diaries

APEX uses activity data to estimate how much time modeled individuals spend in various micros. Different patterns of activities are expected between youth, adults, and older adults, and some differences may also be seen by geographic location (differences in activity patterns between locations of the country may lead to noticeable differences in exposure estimates).

The human activity data used in these APEX runs come from **EPA's Consolidated Human Activity Database** (CHAD; EPA, 2016a). CHAD is a collection of data from more than 20 different studies, with subjects located throughout the US. Many subjects supplied one diary day (24 hours of activities) to CHAD, but some supplied more. APEX treats each 24-hour diary from CHAD as separate. APEX **stochastically assigns CHAD diaries to a modeled individual based on several criteria: similarity of modeled demographics (age, sex, employment, etc.), matching each day by the weekend-weekday distinction, and matching the temperature bin based on the corresponding input meteorology (the temperature bins being maximum ambient temperature below 55, 55–83, and 84 °F or warmer)**. The geographic locations of diaries are not considered in the diary-selection process in APEX, but the overall diary data set may be restricted to certain geographic areas to focus on activity patterns that may be unique to those areas.

For this application, we analyzed CHAD by the state of residence for each diary day. For youth, it is important to match the age of the simulated individual closely to the age of the diary subject, which limits the number of CHAD diaries available to be matched to a given simulated youth. Therefore, it was not possible to restrict CHAD geographically to Colorado or a region around Colorado (for youth) without unduly constraining the number of available diaries. Therefore, we used **diaries from youth across the US. For adults, diaries were sampled from the Mountain West states**, as the number of diaries from Colorado alone was too constraining, but the number of diaries from the Mountain West states (namely: Colorado, Arizona, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming) was sufficiently large for robust stochastic sampling. **For older adults, as with youth, we utilized the full U.S. set of CHAD diaries, due to the insufficient number of diaries available for this age group from Mountain West states alone.** Since the various age groups are co-located (at preset distances from the source), the only difference in activities between the age groups is the allocation of their time among the micros, based on their diary activities. We discuss the potential impacts of these diary assignments in Section 3.6.3.2.

3.2.2.1. Commuting

If “real” individuals were being modeled (that is, the set of people living in a particular census tract), then real commuting data may also be used in an APEX run. Commuting data would describe the distribution of work census tracts for each home census tract (where a person lives). APEX would then stochastically select one of the work locations for a simulated

employed individual and account for exposure in that specific location for the hours in the activity diary that correspond to work.

However, our population and locations are hypothetical, so no workplace data exist for them. We therefore made the **conservative assumption that all the employed individuals essentially work at home in our simulations, and therefore they remain close to the well pad all day long**. During times when the activity diary indicated that the simulated individual was traveling in a vehicle (whether to/from work or other vehicle trips), we allowed the individual to be in the **in-vehicle micro**, which affects exposure during those times through PEN values unique to vehicles. However, the vehicle is simulated such that it never leaves the home location, so that the corresponding outdoor ambient air concentrations are always that of the home location. We discuss the potential impacts of these commuting assumptions in Section 3.6.3.1.

We did not utilize any site-specific employment-probability data in our modeling. Simulated individuals engaged in work-related activities (commuting to and from work, being at the office, etc.) based solely on their assigned activity diaries. Therefore, the probability of engaging in these activities is equal to the probability of being assigned an employed person's diary (i.e., the fraction of employed individuals represented in CHAD) rather than the geographically representative employment probability in the modeled regions of Colorado.

3.2.3. Microenvironments and Penetration Factors

Micros are locations in the modeled region with distinct air concentrations of modeled chemicals. APEX simulates the movement of individuals through time and space (based on activity diaries) to estimate their exposure to a modeled pollutant in a set of user-defined micros. We selected the three micros listed below.

- indoors
- outdoors
- in-vehicle

We selected the APEX “factors” (or linear-regression) method to characterize the penetration of chemicals in the outdoor ambient air into each micro. In this method, each micro's chemical air concentration has a linear relationship to the outdoor ambient air concentration at the same point in time and space. The regression intercept reflects the air concentration in the micro in the absence of any external source, which reflects the contribution only of sources within that micro. In this project, we set the intercepts to zero because we want to evaluate the exposure to VOCs from the O&G operations alone. The regression slope reflects the combined effects of two terms: proximity and PEN.

Proximity in APEX refers to any relationship between a modeled location of exposure and the location where outdoor ambient air concentrations were estimated. In these HHRAs, we have explicitly modeled this relationship using AERMOD—we place hypothetical populations at the locations where we estimated air concentrations in the dispersion assessment—so we set the proximity factor in APEX to 1.

The PENs are different for each micro and they vary between chemicals. PEN, or penetration factor, for any micro refers to the ratio of a chemical's concentration in the micro to the chemical's outdoor concentration. PEN is always set to 1 for the outdoor micro (micro air concentrations equal outdoor ambient air concentrations). For the indoor and in-vehicle micros, we conducted a **detailed literature analysis of PENs for the modeled VOCs**, as discussed in Section 3.2.3.1.

3.2.3.1. Penetration Factors for Indoor and In-vehicle Microenvironments

After APEX is given an hourly time series of outdoor ambient air concentrations, it chooses a PEN for each simulated individual and micro, and it estimates the air concentrations in the micros by multiplying the outdoor concentrations by the PENs (and by proximity factors, which we set to 1). Running APEX separately with different PENs for each of the 47 VOCs would be very computationally intensive and lead to data-management issues. Therefore, similar to the modeling of age groups, we reduced the number of APEX runs by grouping VOCs and running APEX at the VOC-group level. As a starting point, we grouped the 47 modeled VOCs into four initial groups (two final groups as discussed further below) based on vapor pressure (V_p), which is a measure of chemical volatility, and other chemical properties related to volatility (boiling point and octanol-to-air partition coefficient). Higher- V_p (more-volatile) chemicals are more likely to penetrate more fully into all typical micros. We used K-means, a commonly used clustering algorithm in the R programming language, for grouping VOCs by these chemical properties into the four initial groups listed below and shown in Table 3-1. The clusters corresponded well to ranges of $\log_{10}(V_p)$ values, so here and in the table we define them by $\log_{10}(V_p)$ values even though the clustering algorithm also considered boiling point and octanol-to-air partition coefficient.

- a) benzene/toluene with functional groups, and very large alkanes: $\log_{10}(V_p)$ around 0 to 5
- b) benzene group: $\log_{10}(V_p)$ around 6 to 9
- c) large alkanes and alkenes (butane, pentane, butene, pentene): $\log_{10}(V_p)$ around 5 to 12
- d) smaller alkanes and alkenes: $\log_{10}(V_p)$ greater than 12.5

Table 3-1. Selected Indoor Penetration Factors (Indoor-to-outdoor Ratios) for Modeled Chemical Groups

Final Group	Initial Group	Chemical Description	Modeled Range of PENs	Data Availability in Literature (number of studies with PEN data for at least 1 chemical within the chemical group)
1	a	benzene/toluene with functional groups and very large alkanes: $\log_{10}(V_p)=0-5$	0.1-1	yes (12)
	b	benzene group: $\log_{10}(V_p)=6-9$	0.1-1	yes (18)
2	c	large alkanes and alkenes-butane, pentane, butene, pentene: $\log_{10}(V_p)=5-12$	0.9-1	only one point value for pentane (0.9)
	d	smaller alkanes and alkenes: $\log_{10}(V_p)>12.5$	0.9-1	no

Notes: \log_{10} = logarithm base 10; V_p = vapor pressure; PEN = penetration factor.

To understand the distributions of PENs in each of the four VOC groups listed above, we conducted a search for literature with data on PENs for each of the 47 VOCs modeled in these HHRAs. The field studies captured by the search were conducted in various microsites, such as residences, schools, offices, libraries, public buildings, non-smoking cafes and pubs, and industrial areas, among others. The studies together covered the four seasons, and seasonal variability seen in the PENs were potentially due to variations in building or vehicle ventilation rates, usage of heating systems in winter, increased volatilization/availability of VOCs in the warmer months, etc. A PEN less than 1 is correlated with mostly outdoor sources of the chemical, and a PEN greater than 1 is correlated with potential indoor sources. Since one of our chief assumptions in these HHRAs is that there are no indoor sources or background sources of the 47 VOCs, we restricted our search to only those studies which had results of measured/modeled PENs less than 1.

The differences between the PEN groups lie mainly in the lower limits of the distributions, which apply to “tight” houses. In all cases, a house with a very high air-exchange rate (due to open windows or doors) will have PENs close to 1.0 for all chemicals. We made the health-protective assumption that all chemicals could have these high PENs, although the groups with smaller lower limits (down to $PEN=0.1$) also have lower means.

For VOC groups a and b, numerous PENs were available in the literature. We identified the minimum-maximum range of PENs among all the VOCs in the group (see Table 3-1) and let APEX sample a value from the range at random for each modeled individual. For groups a and b, we expected some lower PEN values due to the lower V_p values of the constituent VOCs; indeed, the resulting ranges of PENs were 0.1–0.95 for group a and 0.1–1 for group b. In order to be computationally efficient, we combined the two groups of VOCs into **VOC group 1, assigning it a common indoor PEN range of 0.1–1** for the APEX runs. For group c (a group of VOCs with high V_p values), we would expect high PENs. We were able to find one point value of 0.9 for pentane that excludes indoor and background sources, so we conservatively assigned a PEN range of 0.9–1 for the VOCs in this group. For group d (VOCs with very high V_p values), due to a dearth of literature data where indoor and background sources were excluded, we conservatively assigned a range of high PENs from 0.9 to 1, assuming that due to their high volatility they will penetrate indoors quite easily. For computational efficiency, we combined VOC groups c and d into **VOC group 2, assigning it a common indoor PEN range of 0.9–1**. We show in Table 3-2 the chemicals modeled in penetration group 1 and penetration group 2.

Table 3-2. List of Modeled Chemicals by Final Indoor Penetration Group

Penetration Group 1 (Values 0.1–1)		Penetration Group 2 (Values 0.9–1)
1,2,3-trimethylbenzene	benzene	1-butene
1,2,4-trimethylbenzene	cyclohexane	1-pentene
1,3,5-trimethylbenzene	cyclopentane	2,3-dimethylpentane
1,3-diethylbenzene	ethylbenzene	cis-2-butene
1,4-diethylbenzene	isopropylbenzene	cis-2-pentene
2,2,4-trimethylpentane	m+p-xylene	ethane
2,3,4-trimethylpentane	methylcyclohexane	ethene
2,4 dimethylpentane	n-decane	isobutane
2-ethyltoluene	n-heptane	isopentane
2-methylheptane	n-hexane	isoprene
2-methylhexane	n-nonane	n-butane
3-ethyltoluene	n-octane	n-pentane
3-methylheptane	n-propylbenzene	propane
3-methylhexane	o-xylene	propene
4-ethyltoluene	styrene	trans-2-butene
	toluene	trans-2-pentene

With respect to the in-vehicle micro, our literature search typically suggested a high PEN, usually greater than 1 (owing to in-vehicle emissions/accumulation over time). We found a few cases of in-vehicle PENs between 0.9 and 1. Keeping in mind our assumption of no in-vehicle/background sources of VOCs, we chose an **in-vehicle PEN range of 0.9–1** for all VOCs.

We list in Appendix A the literature which we found relevant in our review of PENs. We discuss the potential impacts of PEN selections in Section 3.6.3.3.

3.2.4. Outdoor Ambient Air Concentrations

The APEX runs used constant unit air concentrations ($1 \mu\text{g}/\text{m}^3$) as inputs for all hours of a year and at all locations, resulting in ratios of microenvironmental exposures to a $1\text{-}\mu\text{g}/\text{m}^3$ outdoor ambient air concentration for each modeled hour, which later in post-processing is converted to actual estimates of VOC exposure (as discussed in Section 3.3.2). We do this to reduce the computational complexity and the required number of model runs while increasing our flexibility to create many exposure scenarios in post-processing.

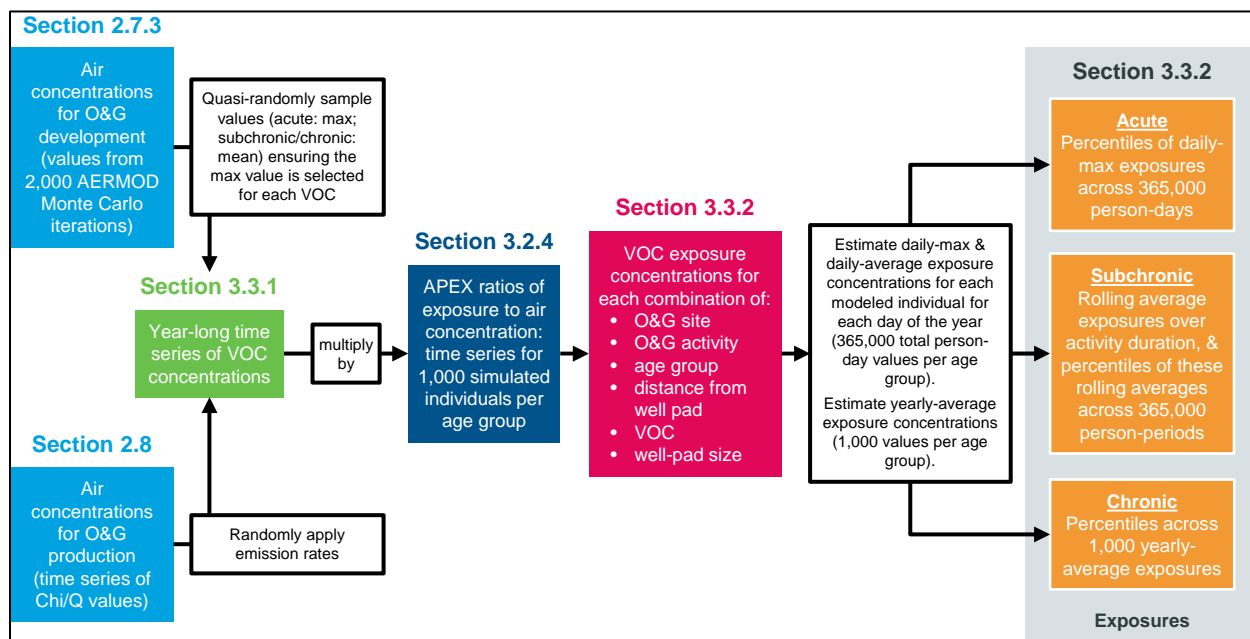
3.3. Generation of Exposure Outputs

In this section, we describe how we post-process the APEX outputs in order to produce estimates of exposure stratified by O&G site, well-pad size, O&G activity, VOC, distance from well pad, and individuals in each of the three age groups. Throughout this section, we refer to Figure 3-1, where we briefly illustrate the post-processing steps.

We list below the time frames of exposure that are relevant to these HHRAs. We discuss the health-protective toxicity criteria values, used to compare against exposure outputs, in Section 4.

- **Acute:** 1-hour-average exposures are compared to acute toxicity criteria values

- **Subchronic:** 24-hour- to 365-day-average exposures are compared to subchronic toxicity criteria values
- **Chronic:** exposures lasting more than 365 days are averaged and compared to chronic toxicity criteria values



Notes: Section numbers refer to this report.

O&G = oil and gas; Chi/Q = air concentration per unit emission; VOC = volatile organic compound; APEX = U.S. EPA Air Pollutants Exposure Model; max = maximum.

Figure 3-1. Overview of Steps for Post-processing APEX Outputs

3.3.1. Generation of Time Series of Outdoor Ambient Air Concentrations

The generation of scenario-specific exposure outputs involves multiplying the APEX outputs (year-long time series of modeled ratios of exposure to a 1- $\mu\text{g}/\text{m}^3$ outdoor ambient air concentration) with hourly estimated outdoor ambient air concentrations for each combination of O&G site, O&G activity, distance from the well pad, well-pad size, and VOC. We followed different steps to construct the time series of air concentrations for development activities versus production activities, as we explain below and as we illustrate in the left two sets of boxes in Figure 3-1.

3.3.1.1. Development

In the case of the three modeled O&G development activities, for each modeled VOC the dispersion assessment yielded summary values of air concentrations for 2,000 simulations (iterations) at the expected-maximum modeled receptor at each distance ring (as described in Section 2.7). For potential use in exposure modeling, the summary values saved from those iterations were the maximum, mean, median, and several percentiles of air concentrations

calculated across the hours of each iteration (the number of hours in an iteration depended on the O&G site and the duration of the O&G development activity).

For the acute and subchronic/chronic estimates of exposure, we used different statistics from these iterations to create year-long time series of air concentrations for each exposure scenario, as we describe below.

- **Acute:** For each hour of the year-long time series of APEX air concentrations, randomly choose one of the 2,000 dispersion iterations and use its **maximum 1-hour-average VOC air concentrations**, specific to each distance from the well pad, using the same hour-to-iteration mapping at each distance ring. Ensure that each VOC's highest value from among the 2,000 maximum iteration values is included in the selections (these highest values being determined at the first distance ring).
- **Subchronic/chronic:** For each hour of the year-long time series of APEX air concentrations, randomly choose one of the 2,000 dispersion iterations and use its **mean VOC air concentrations**, specific to each distance from the well pad, using the same hour-to-iteration mapping at each distance ring. Ensure that each VOC's highest value from among the 2,000 mean iteration values is included in the selections (these highest values being determined at the first distance ring)..

3.3.1.2. Production

In the case of O&G production, as discussed in Section 2.8, the dispersion assessment yielded hourly Chi/Q values (values of concentrations per unit emissions) for one year at the receptor per distance where the annual-average Chi/Q was largest (where meteorological conditions on average lead to the highest air concentrations, if emissions are held constant). A total of 55 different hourly emission rates were available for each chemical derived from the 3-minute CSU measurements (55 different experiments). For each hour of the year, we **multiplied the Chi/Q value (specific to each distance from the well pad) by the hourly VOC emission rates from a randomly selected CSU experiment**, to arrive at a year-long air-concentration time series for each exposure scenario and VOC (employing emission rates derived from the same CSU experiment for all VOCs on a given hour).

For the hypothetical O&G sites in Garfield County (BarD and Rifle), distinct time series of Chi/Q values were available from the dispersion assessment. However, for the NFR site we created a hybrid time series of air concentrations by quasi-randomly merging the time series of Chi/Q values at the hypothetical Ft. St. Vrain site with that at the Anheuser-Busch site before applying the randomly selected emission rates per hour. This is similar to the dispersion assessment where for development activities we collected the 2,000 iterations of NFR air-concentration data by randomly selecting from either site approximately equally (see Section 2.7.2).

Unlike for development activities, for production activities we did not ensure that the maximum possible air concentration (according to our modeling) was included in our exposure modeling. On the hour of the year with the highest Chi/Q value, we multiplied the Chi/Q value by the hourly emissions corresponding to a randomly selected CSU emission experiment. That randomly selected experiment may or may not have the highest observed emission rate of a given VOC, and so we may or may not be simulating the highest possible air concentration of that VOC. Further, the highest emission rate of one VOC may not have been measured in the same

experiment as the highest emission rate of another VOC, so it was not possible to both maximize potential air concentrations for all VOCs *and* have all the emissions on a given hour come from the same emission experiment. In a limited quality assurance step, we observed that the maximum chemical air concentration we produced with our methods could be 10- to 50-percent lower than the conservative, maximum-possible air concentrations that would have been produced by aligning maximum Chi/Q with maximum emissions.

3.3.2. Post-processing of Exposures

After generating the time series of VOC air concentrations, we multiplied them by the APEX outputs (time series of ratios of exposure to a 1- $\mu\text{g}/\text{m}^3$ outdoor ambient air concentration), resulting in a year-long time series of hourly VOC exposure concentrations (as illustrated in the pink box in the middle of Figure 3-1). We generated these time series of VOC exposures for each hypothetical individual at each modeled O&G site, O&G activity, distance from well pad, and well-pad size. Then, for use in risk assessment, **we processed the exposure time series as we described in Sections 3.3.2.1–3.3.2.3 to estimate acute, subchronic, and chronic exposures for the hypothetical individuals.** These steps correspond to the right two sets of boxes in Figure 3-1.

We produced estimates of acute, subchronic, and chronic exposures for all O&G activities and series of activities, as applicable. As noted in Table 3-3, new calculations of acute exposures are not needed for sequential series of activities (“back-to-back” activities) because the largest acute exposure from across the individual activities will also be the largest of those activities in series (see “Redundant” designations in the table).

Table 3-3. Durations of Activities for Exposure and Risk Modeling

Size of Well Pad / Number of Wells	Site	Activity	Weighted -average Activity Duration (days)	Acute	Subchronic	Chronic
1 acre / 1 well	Northern Front Range	Drilling	4	Evaluated	Evaluated	N/A
		Fracking	2	Evaluated	Evaluated	N/A
		Flowback	5	Evaluated	Evaluated	N/A
		All Development Back-to-back	11	Redundant	Evaluated	N/A
		Production	10,957	Evaluated	N/A	Evaluated
		All Activities Back-to-back	10,968	Redundant	N/A	Evaluated
	Garfield County	Drilling	4	Evaluated	Evaluated	N/A
		Fracking	1	Evaluated	Evaluated	N/A
		Flowback	14	Evaluated	Evaluated	N/A
		All Development Back-to-back	19	Redundant	Evaluated	N/A
		Production	10,957	Evaluated	N/A	Evaluated
		All Activities Back-to-back	10,976	Redundant	N/A	Evaluated
3 acres / 8 wells	Northern Front Range	Drilling	32	Evaluated	Evaluated	N/A
		Fracking	16	Evaluated	Evaluated	N/A
		Flowback	40	Evaluated	Evaluated	N/A
		All Development Back-to-back	88	Redundant	Evaluated	N/A
		Production ^a	10,957	N/A	N/A	N/A
		All Activities Back-to-back ^a	11,045	Redundant	N/A	Evaluated
3 acres / 16 wells	Garfield County	Drilling	64	Evaluated	Evaluated	N/A
		Fracking	16	Evaluated	Evaluated	N/A
		Flowback	224	Evaluated	Evaluated	N/A
		All Development Back-to-back	304	Redundant	Evaluated	N/A
		Production ^a	10,957	N/A	N/A	N/A
		All Activities Back-to-back ^a	11,261	Redundant	N/A	Evaluated
5 acres / 32 wells	Northern Front Range	Drilling	128	Evaluated	Evaluated	N/A
		Fracking	64	Evaluated	Evaluated	N/A
		Flowback	160	Evaluated	Evaluated	N/A
		All Development Back-to-back	352	Redundant	Evaluated	N/A
		Production ^a	10,957	N/A	N/A	N/A
		All Activities Back-to-back ^a	11,309	Redundant	N/A	Evaluated
	Garfield County	Drilling	128	Evaluated	Evaluated	N/A
		Fracking	32	Evaluated	Evaluated	N/A
		Flowback	448	Evaluated	N/A	Evaluated
		All Development Back-to-back	608	Redundant	N/A	Evaluated
		Production ^a	10,957	N/A	N/A	N/A
		All Activities Back-to-back ^a	11,565	Redundant	N/A	Evaluated

Notes: Evaluated (shaded green) = evaluated this exposure scenario. Redundant (shaded yellow) = the largest acute exposures during a sequence of activities will equal the largest acute exposure from across the activities making up the sequence, so a separate evaluation for the series was not needed. N/A (shaded gray) = not applicable: exposures lasting more than 365 days received a chronic evaluation (not subchronic), and exposures lasting 365 days or less received a subchronic evaluation (not chronic); also used to indicate that we did not evaluate hypothetical production sites other than 1 acre.

^a We assessed oil and gas production only on 1-acre well pads, as discussed in Section 2.4. Following single- and multi-well development scenarios, the production phase was always 1 acre in our simulations.

We also show in Table 3-3 the assumed durations of each O&G activity or series of activities at each O&G site, which are relevant for estimating subchronic and chronic exposures. In the dispersion assessment, the Monte Carlo processing created simulated development-activity dispersion events (iterations) whose durations we sampled from the frequency distribution shown in Table 2-1. Then, as discussed in Section 3.3.1.1 above, we saved summaries of each

iteration's air concentrations and used those to create time series of air concentrations for the exposure assessment. To calculate average subchronic and chronic exposures related to an O&G activity, for simplicity we utilized a single activity duration for each O&G site and activity, where we summarized the distribution of durations using frequency-weighted averaging. For example, for fracking in Garfield County, Table 2-1 indicates 85 percent of wells are fracked in 1 day, 13 percent in 2 days, and 2 percent in 4 days, so the weighted-average duration of fracking one well in Garfield County is 1 day (as indicated in Table 3-3 above). A one-day activity duration is appropriate for subchronic evaluation (see "Evaluate" designation in the table) but not chronic (see "Do not evaluate" designation in the table), which we define as exposures lasting more than 365 days.

Subchronic evaluation is not needed for O&G activities or series of activities lasting more than 365 days. For all scenarios, we assume that each well (if there is more than one) is drilled one-by-one with no overlap and no break between wells. Similarly, each well is then sequentially fracked, and subsequently each well undergoes flowback. All wells then simultaneously begin producing. For some multi-well scenarios, some individual development activities and series of development activities last more than 365 days, qualifying them for chronic evaluation rather than subchronic. We assume that a well produces for 30 years, which qualifies for chronic evaluation.

3.3.2.1. Acute Exposure Estimation

For each of the 1,000 hypothetical individuals modeled per age group and per distance from the well pad (at one selected receptor per distance) at a given hypothetical O&G site, we identified the **daily-maximum exposures** to emissions from each O&G activity across the whole year (the maximum value among the 24 hourly exposure values within a day, for all days of the year). This created a total of 365,000 unique estimates of acute exposure across the hypothetical population (per O&G site, well pad size, O&G activity, age group, VOC, and distance from the well pad). Put another way, we **identified each hypothetical individual's largest 1-hour-average exposure per day and O&G activity across a year of potential O&G activity, where the simulated activity can be occurring at any time of year.** For convenience, we refer to each of these 365,000 days as "**person-days**" because they correspond to each hypothetical person on each modeled day. The maximum value of acute exposure from a serial sequence of activities (e.g., drilling, fracking, and flowback back-to-back) will simply be the highest acute exposure estimated from across the individual activities (e.g., if flowback has the highest value, then that will be the highest value from all development activities in sequence).

Recall, however, that for development activities each calendar day in the exposure modeling comprises randomly selected air-concentration values, which means that each hour in the exposure assessment corresponds to a random hour of the year(s) in the dispersion assessment. Therefore, except for the production phase, calendar days in the exposure assessment do not correspond to contiguous hours of real observed meteorology on that day, and even the real contiguous meteorology reflected in the Chi/Q time series employed for production¹⁰ is randomly combined with emission rates to produce the requisite time series of air

¹⁰ At the hypothetical Garfield County O&G sites in these HHRAs, the time series of Chi/Q values for use in the assessment of O&G production activities utilizes a real time series of contiguous hours of meteorology. The same is not true for the hypothetical NFR site because we constructed the NFR Chi/Q time series by randomly selecting from either the Ft. St. Vrain time series or the Anheuser-Busch time series hour-by-hour.

concentrations. As a result, for all O&G activities, a year's worth of daily-maximum exposures as identified above will not match a year's worth of daily-maximum exposures if calculated using contiguous hours of emissions (which we do not have), meteorology, and dispersion.

We utilized this daily-maximum approach to efficiently identify a wide range of possible acute exposures across various human activities and modeled air-concentration scenarios. Even though we constrain this collection of exposure results to one receptor per distance from the well pad and to each individual's highest exposure per day, the resulting set of values (365 per individual, 3,000 individuals per receptor) is still wide-ranging due to the different meteorological conditions and emissions values inherent in the air-concentration data and, to a lesser extent, due to different patterns across individuals of time spent outdoors versus indoors or in-vehicle. From these data, we identified the largest 1-hour-average exposure value from all person-days across the hypothetical population (the most-exposed simulated individual), which is the **worst-case potential acute exposure** according to our methodology (this corresponds to a real hour of meteorology combined with a real observed emission rate). The largest acute exposures in the modeling occur when the outdoor ambient air concentration is the highest (a combination of conservative meteorology and a high emission rate) and when the hypothetical individual experiences PEN=1 for that entire hour (he/she is either outside the whole hour, or is in micros where APEX assigned the individual a PEN=1). In collecting the daily-maximum exposures from all simulated persons (the maxima from all person-days), we can **put into context that worst-case potential acute exposure by relating it to the distribution of other potential daily-maximum acute exposures from across the simulated year and the hypothetical population**. As noted above, we do this with the caveat that the exposures are not the same as they would be if calculated using contiguous hours of emissions (which we do not have), meteorology, and dispersion.

3.3.2.2. Subchronic Exposure Estimation

We estimated subchronic exposures only during development activities, since the production activity has a long duration (30 years) that meets the definition of chronic exposure (more than 365 days). Some multi-well scenarios also have development activities that last more than 365 days, and sequences of development activities that last that long, and in those cases we evaluate chronic exposures instead of subchronic exposures.

Per age group and distance from the well pad at a given hypothetical O&G site, we identified the average exposure for each person-day (for each of the 1,000 hypothetical individuals, the average exposure from among the 24 hourly exposure values within a day, for each day of the year). Based on O&G activity durations unique to each O&G site and activity (see Table 3-3), we **calculated a series of average exposures starting on each calendar day and extending through the assumed activity duration**, leading to a total of 365,000 unique estimates of subchronic exposure across the hypothetical population (per O&G site, O&G activity, well-pad size, age group, VOC, and distance from well pad). That is, **for each possible multi-day period over which an O&G activity can occur in a year, we identify each hypothetical individual's average exposure for the activity**. Note that in calculating these "rolling averages", when the 'starting' day results in the rolling average crossing over into the following year, we employ exposure values from the beginning of the time series to account for this overlap between years (when at the end of the year, if needed we "wrap around" back to January). For convenience, we refer to each of these 365,000 multi-day periods as "**person-**

periods” because they correspond to each hypothetical individual in each modeled multi-day period of exposure.

As noted above for estimations of acute exposure, the calendar days in the exposure modeling of development activities do not reflect real calendar days made up of contiguous hours of real observed meteorology and dispersion. However, averaging the hourly modeled exposures across periods of time, especially across many days, will cause the average values to approach real potential average values of subchronic exposure, as they will incorporate variable meteorological conditions (meteorology can be highly variable hour-to-hour and day-to-day) and variability in emission rates (which was observed in the CSU measurements).

We utilized this approach of calculating multi-day average exposures (average person-period exposures) to efficiently identify a wide range of possible subchronic exposures across various series of human activities and modeled air-concentration scenarios. From that, we identified the largest person-period from across the simulated population (the most-exposed simulated individual), which is the **worst-case potential subchronic exposure** according to our methodology. The largest subchronic exposures in the modeling occur at the most conservative overlap of high average outdoor ambient air concentrations (a combination of conservative meteorology and high emission rates on average) and high average PENs across the micros where the hypothetical individual spends time. In collecting all simulated person-period exposures, we can **put into context that worst-case potential subchronic exposure by relating it to the distribution of other potential subchronic exposures from across the simulated year and the hypothetical population.**

After estimating subchronic exposures for drilling, fracking, and flowback activities individually, we can then calculate subchronic exposures during back-to-back sequences of development activities. These calculations utilize time-weighted averaging, where the subchronic exposures calculated for the individual drilling, fracking, and flowback activities are averaged together utilizing weights corresponding to their relative activity durations. We calculated these subchronic weighted-average exposures for back-to-back development activities by randomly selecting person-periods of drilling, fracking, and flowback from the exposure data available for each hypothetical individual, resulting in 365 randomized combinations of back-to-back development activities per individual. This leads to 365 different estimates of weighted-average exposures per person and 365,000 estimates of weighted-average exposures across the population of each age group at each distance from the well pad.

3.3.2.3. Chronic Exposure Estimation

We estimated chronic exposures only during individual O&G activities or back-to-back sequences of activities that last more than 365 days. This includes production activities (30-year duration) and individual development activities and series of development activities for some multi-well scenarios (see Table 3-3). We do not assess activities for both subchronic and chronic exposures—only one or the other based on duration.

For each of the 1,000 modeled individuals per age group and distance from the well pad at a hypothetical O&G site, we **calculated the annual-average exposures** to individual activities lasting more than 365 days. This leads to 1,000 unique estimates of chronic exposure (per O&G site, qualifying O&G activity and well-pad size, VOC, age group, and distance from well pad).

As described in Section 3.3.1.2, the individual hours of ambient air concentrations employed in the exposure modeling of production activities reflect real hours of meteorology combined with randomly selected emission rates, and these time series of air concentrations (and resulting exposure concentrations) reflect contiguous hours of meteorology. Despite the hour-to-hour randomness of the emission rates, the annual average of those hourly exposure concentrations approaches a real potential value of chronic exposure (the average of randomly selected data equals the average of ordered data). From the collection of annual-average exposures across the hypothetical population, we can **identify the most-exposed simulated individual and put that into context by relating it to the distribution of annual-average exposures from across the hypothetical population**. The hour-to-hour construction of the time series of air concentrations for development activities is randomized, but as with production the annual average of the resulting hourly exposure concentrations approaches a real potential value of chronic exposure.

As with estimating subchronic exposures for back-to-back sequences of O&G activities, for chronic exposures we calculated a time-weighted-average exposure utilizing the exposures of randomly selected individual activities, weighted by their respective durations. This results in 365 randomized combinations of back-to-back development activities per individual. The only development scenarios reaching chronic-level duration are in Garfield County with 32 wells on a 5-acre pad (see Table 3-3), and exposures during flowback likely account for the majority of the chronic back-to-back development exposure because flowback lasts substantially longer than drilling and fracking and because air concentrations during flowback tend to be higher. For the simulated back-to-back scenarios where production is included, we include in the time-weighted averaging the individual's chronic exposure during the 30 years of O&G production. In those cases, the production exposures will account for most of the chronic exposure because of its 30-year time span, as compared to less than two years for the longest modeled development sequence.

3.4. Quality Assurance and Quality Control

Throughout the workflow of the exposure modeling, we took many steps to ensure the accuracy of modeling input and output data, as well as the proper functioning of data processing scripts. In this section, we provide a synthesis of these steps as well as the results of some of the quality assurance/quality control (QA/QC) procedures undertaken.

3.4.1. APEX Modeling Inputs

Several of the various APEX inputs, discussed in detail in Section 3.2, were identical to those that are provided with the publicly available version of APEX released by EPA¹¹ and are discussed in their documentation (EPA, 2017). For other inputs, either we modified the publicly available versions or we created custom new versions. Below, we discuss briefly how we generated these files and the QA steps we took prior to implementation in the APEX modeling. In most cases, separate people conducted input generation and input QA.

¹¹ The EPA website for APEX is <https://www.epa.gov/fera/download-trimexpo-inhalation-apex>.

3.4.1.1. Air Quality

As noted in Section 3.3.1, APEX requires complete, hourly input air-concentration data for the modeled time period (one year for these HHRAs). We generated these data with unit concentrations (values of 1) using the R programming language. We then reviewed the inputs to ensure they contained these hourly values of 1 for the full year.

3.4.1.2. Meteorology

APEX requires a continuous time series of hourly temperature data over the modeling time period for each modeled location. We employed a modified version of the meteorology data used in the dispersion-modeling portion of this study (which we discuss in Section 2.5). We first filled in any instances of missing temperature data using interpolation from surrounding hours or the same hours from surrounding days. We then used custom R scripts to put the data into the requisite format for APEX. We visually examined these APEX-ready meteorology data files to ensure that the defined time periods matched those of the corresponding site, and that the data were continuous and hourly.

3.4.1.3. Demographics

Several data files input to APEX denote the geographical patterns of employment probability and population counts on the basis of sex and age group. Due to the hypothetical nature of the exposure modeling, we employed simplified demographic inputs that assumed an equal distribution of ages and sexes across all individuals in the modeled domain. As we discuss in Section 3.2.2.1, we did not utilize employment probabilities in our modeling, and instead the diary-selection process (based on age, sex, day of week, etc.) determined whether the simulated individual engaged in work-related activities. We visually analyzed these input files to ensure proper formatting before model execution.

3.4.1.4. Geographical Locations

Several input files required by APEX denote the geospatial locations of all air-quality data sources, meteorological data sources, and points of reference for population counts. Due to the simplified and hypothetical nature of the APEX runs executed here, all geographical location files referred to a single arbitrary point (instead of, as would be the case in a typical APEX run, lists of latitude/longitude coordinates denoting locations of real data stations and census tract centroids). We later use multiplicative post-processing steps to convert the modeled exposure results (unit concentrations at a single location) to the results used for risk assessment (diverse air concentrations at many locations).

We visually analyzed geographical input files to ensure they referenced the same arbitrary location and that the arbitrary location names matched as necessary between files.

3.4.1.5. Activity Diaries

The publically available version of APEX contains activity diaries and corresponding demographics data that are based on a subset of all available CHAD activity diaries (diaries from certain human-activity studies in CHAD are not included in the APEX diaries in EPA's

public release of the model). We employed a separate subset of all available CHAD diaries, tailored by age group as discussed in Section 3.2.2 using a SAS processing script.

We used custom R scripts to ensure that the criteria listed below were met in the age-group-specific diary files.

- All ages in the diaries correspond to the intended age group for modeling.
- All diary files needed per age group contain the same CHAD IDs.
- All CHAD IDs are denoted as unemployed (see Sections 3.2.2.1 and 3.4.1.3 for more information on how work-related activities were still included for many individuals).
- All CHAD IDs contain 1,440 minutes of activities (one full day of activities).
- All CHAD IDs have chronological start times.
- CHAD respondents ages 0–17 and 60–99 have approximately 50 unique states represented in their activity diaries, while ages 18–59 have Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming represented in their activity diaries.

Following these QA checks, for use in APEX, we combined the separate age-group diary files into a single set of files reflecting all age groups.

3.4.1.6. Microenvironmental Parameters

As discussed in Section 3.2.3.1, we defined the PENs for the three analyzed micros using two separate APEX input files: one for the low-PEN group of VOCs and one for the high-PEN group. We reviewed both of these files for correct formatting and to ensure that the values were set correctly for the corresponding files.

APEX requires that users define which of the user-defined microenvironmental parameters apply to the various activity locations defined throughout the activity diaries. This allows APEX to apply the correct PENs to the various micros. The publically available version of APEX denotes mappings for five separate micros, which we modified to reflect the three micros employed in these HHRAs (e.g., we mapped both the original “outdoor” and “near-road” micros to the “outdoor” micro for these HHRAs).

3.4.1.7. APEX Control Options Files

Separate APEX run files (or “Control Options Files”) were required for each of the 18 APEX runs. These run files were identical except for a few of the modeling parameters and input and output file paths. We constructed a template run file and visually reviewed it for correct parameter settings, and we generated all 18 APEX run files from this template. We further independently analyzed them to ensure that we correctly set all scenario-specific inputs for the given run file (e.g., the modeled age range, PEN factors employed, meteorology data, site-specific time span, output data locations, etc.).

3.4.1.8. Default Public Release Files

The input files for the following parameters were unchanged from the public release of APEX: physiology (distributions of weight, height, etc.), ventilation (distribution of breathing rates given a relative energy expenditure), and distributions of relative energy expenditure and how they map onto specific activities.

Additionally, APEX requires an input file that, among other things, defines how to apply different parameters to simulated individuals given variable environmental conditions (known as the “Profile Functions File”). We used a stripped-down version of this file that only contained the requisite temperature binning of activity diaries, and we ensured that this binning scheme was identical to the one used in the public release of APEX before executing the model runs.

3.4.2. APEX Modeling Outputs

We conducted several QC checks on the unit APEX exposure outputs to ensure that the modeling runs completed successfully. We synthesize these QC checks in Table 3-4 (for checks done on all model runs) and in Table 3-5 (for checks unique to each run).

Table 3-4. Quality-control Checks on All Exposure Simulations

Age Group	Number of Geographical Locations	All Modeled Individuals Unemployed?	Minimum Age	Maximum Age	% Males	% Females	Average % Population per Year of Age
0–17	1	Yes	0	17	49.40%	50.60%	5.56%
18–59	1	Yes	18	59	49.40%	50.60%	2.38%
60–99	1	Yes	60	99	49.40%	50.60%	2.50%

Table 3-5. Quality-control Checks on Specific Exposure Simulations

Chemical Group	Site	Age Group (yrs)	From Unit Exposure Concentrations		
			Annual Avg. (Avg. Across Pop.)	Lowest 1-hr Avg. (From Across Pop.)	% Individuals With 1-hr Avg.=1
High PEN	Garfield County Ridge-top Site (BarD)	0–17	0.954	0.945	97.50%
		18–59	0.953	0.942	92.30%
		60–99	0.953	0.933	92.00%
	Northern Front Range	0–17	0.955	0.959	97.50%
		18–59	0.953	0.942	93.50%
		60–99	0.954	0.941	94.30%
	Garfield County Valley Site (Rifle)	0–17	0.955	0.945	98.40%
		18–59	0.953	0.941	94.10%
		60–99	0.954	0.933	95.60%
Low PEN	Garfield County Ridge-top Site (BarD)	0–17	0.608	0.905	97.50%
		18–59	0.607	0.904	92.30%
		60–99	0.596	0.905	92.00%
	Northern Front Range	0–17	0.611	0.905	97.50%
		18–59	0.607	0.901	93.50%
		60–99	0.598	0.903	94.30%
	Garfield County Valley Site (Rifle)	0–17	0.611	0.908	98.40%
		18–59	0.608	0.904	94.10%
		60–99	0.598	0.901	95.60%

Notes: PEN = penetration factor; yrs = years; avg. = average; pop. = population; hr = hour; % = percentage.

From Table 3-4, it can be seen that all of the modeled individuals in each simulation were assigned the correct ages, and that for all runs the distribution of males and females was roughly equal. Additionally, the “Average % Population per Year of Age” column demonstrates that each distinct year of age was, on average, represented the expected number of times throughout the modeled population (based on uniform sampling of ages where each age is as likely as any other to be selected).

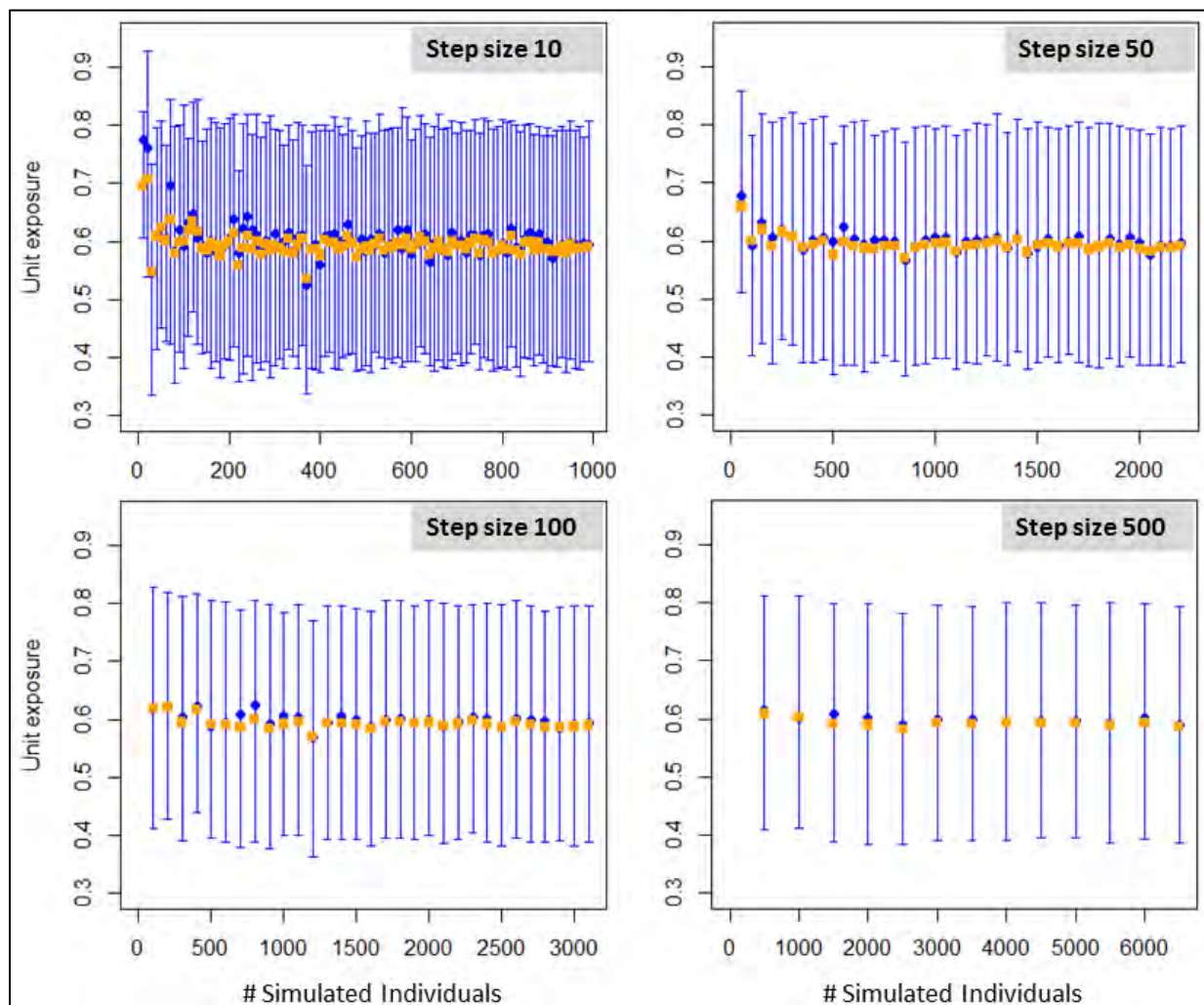
In Table 3-5, we provide the results of the QC checks that focused on parameters that differed between the various runs. For the high-PEN runs, the average simulation-long exposure across all modeled individuals (the “Annual Average (Average Across Population)” column) is about 0.95, which is expected given that most of an individual’s time is spent in the indoor micro and that the PEN factors for this micro are assigned uniformly from between 0.9 and 1. Similarly, for the low-PEN runs, the average simulation-long exposure across all profiles is roughly 0.6, reflective of the indoor PEN varying between 0.1 and 1. In both of these groups of runs, the older age groups generally have slightly lower average exposures, reflective of the fact that on average the younger age groups spend more time outdoors. The “Lowest 1-hour Average (From Across Population)” column denotes the lowest maximum 1-hour-average exposure concentration experienced by any of the 1,000 simulated individuals (we collected each person’s maximum 1-hour value, then found the lowest of these values). These values correspond to individuals that were not assigned a PEN of 1 for any micro and/or never went outside for a full hour. All of these values are above 0.9. Conversely, the “% Individuals With a 1-hour Average = 1” column denotes the percent of simulated individuals that achieved at least one occurrence of 1-hour exposure concentration equal to the outdoor ambient air concentration. Expectedly, these values are rather high (between 92 and 98.4 percent), and in each case the remainder of the population reflects those that were never in a PEN=1 micro for a full hour. Finally, we also ensured that the maximum 1-hour exposure concentration experienced by any simulated individual in each simulation was 1 $\mu\text{g}/\text{m}^3$ (that is, no higher than the outdoor ambient air concentration).

3.4.3. APEX Modeling Convergence Testing

As discussed in Section 3.1, the number of individuals simulated in each APEX run must be large enough that it captures the variability in exposure expected across a diverse population. We focus only on the variability in exposures to unit air concentrations for these purposes and not on the variability in the final analyzed exposures; that is, we analyze only the ratios of exposures to a 1 $\mu\text{g}/\text{m}^3$ outdoor ambient air concentration, and not exposures to actual VOC concentrations. The goal is to identify the number of individuals such that adding more individuals to the simulation does not substantially impact the population-wide average daily exposures (i.e., convergence in the daily-average exposure results). In the APEX modeling, the parameters that impact the variability in these unit-exposure values are the human activities (which in turn depend on the age group and the ambient outdoor temperature) and the PENs.

For the convergence testing, we selected temperature data from the modeled Rifle site because it had the largest variability in hourly temperature data. We also selected the low-PEN group because it had the largest variability in PENs. We chose the children age group (individuals below 18 years old) because the activity diaries from this group exhibit the highest average time spent outdoors (high exposure potential). We selected these higher-variability data so that the convergence testing utilized high variability in exposure, therefore ensuring convergence for high-variability scenarios.

We conducted one APEX run with these inputs, as well as all other inputs from the APEX modeling used in the exposure assessment, with 50,000 simulated individuals for one full year. We then determined the median, mean, and inner and outer quartile values of the daily-average exposure values across varying numbers of these simulated individuals (for the full year-long time series) to determine how these statistics varied with a variable number of simulated individuals being analyzed. We conducted this analysis for different step sizes in the numbers of individuals being analyzed. In Figure 3-2, we display these results with the use of step sizes of 10, 50, 100, and 500 individuals. Note that the statistics from each bin reflect data from a different subset of the modeled individuals, meaning that a larger step size results in a higher possible number of individuals being analyzed given that the simulated individuals are being sampled from a fixed number of 50,000.



Notes: Orange squares = means; blue circles = medians; top and bottom of blue lines = 75th and 25th percentiles, respectively; # = number.

Figure 3-2. Statistics of Daily-average Exposure Taken Across a Varying Number of Simulated Individuals (Exposure Concentration per Unit Air Concentration)

For daily-average exposures of fewer than 500 individuals, there are noticeable differences in the statistics between adjacent numbers of analyzed individuals. This is most apparent when the step size is 10 individuals, and is not discernable for step sizes of 100 or 500 individuals. When more than 500 individuals are analyzed, however, very little difference can be seen in the statistics from adjacent numbers of individuals, meaning the exposure values have converged (see the panels for step sizes 10 and 50). We analyzed step sizes of 100 and 500 individuals to ensure there were no major differences in the analyzed statistics when we considered much larger numbers of individuals.

Based on this analysis, we determined that 1,000 modeled individuals would be sufficient to capture the anticipated variability in exposures due to the unit air concentrations. We chose this high number relative to the apparent point of convergence (around 500) as a precaution against the possibility of higher variability in the inputs from the other scenarios.

3.4.4. Air Quality, Exposure, and Risk Processing Scripts

We developed a suite of post-APEX and post-AERMOD processing scripts in the R programming language to perform the necessary calculations for exposure and risk estimation. Generally, we structured our methodology such that one individual wrote most or all of the necessary processing code, after which a separate individual visually inspected the code to ensure it was constructed accurately. After this, we conducted numerical testing with the processing code, manually calculating a subset of the expected output given the known input values and comparing this expected output to the script output. We conducted this latter step by either using the actual AERMOD and/or APEX modeling data used throughout the exposure modeling, or by using a scaled-down version of these data to allow for easier manual calculation. We applied most, but not all, of these QA procedures to each of the processing scripts. In Table 3-6, we provide a brief description of each of the processing scripts used throughout the exposure and risk modeling calculations, as well as which of the QA/QC procedures described above we conducted to ensure the proper functioning of each.

Table 3-6. Quality-control and Quality-assurance Procedures for Post-processing Scripts

Processing Script	Description of Processing Code	Independent Review of Code	Numerical QA/QC using Full-scale Data	Numerical QA/QC using Scaled-down Data
Development AQ TS	Generates year-long TS of all VOC air conc. for development activities.	✓	✓	
Production AQ TS	Same as above, but for production activities.	✓	✓	
Acute Exposure and Risk Calc.	Scales TS of unit exposures by corresponding time series of VOC air conc., calc. daily-max. exposure per individual, & calc. population-wide %iles of daily acute exposure, HQ, HI.	✓		✓
Chronic Exposure Averaging	Scales TS of unit exposures by time series of VOC air conc., & calc. daily- and annual-avg. exposures for all individuals.	✓		✓
Subchronic Exposure and Risk Calc.	Calc. activity-duration rolling avg. & population-wide %iles of these subchronic exposures, HQs, HIs.	✓	✓	✓
Chronic Exposure and Risk Calc.	Calc. population-wide %iles of annual-avg. exposures, HQs, HIs.	✓	✓	
Back-to-back Exposure	Calc. population-wide %iles of subchronic and/or chronic exposures, HQs, & HIs for development activities & development + production activities that occur in sequence.	✓	✓	

Notes: Check mark indicates that we conducted that QA/QC step. In some instances, changes to scripts were not independently reviewed.

AQ = air quality; TS = time series; VOC = volatile organic compound; conc. = concentration; max. = maximum; calc. = calculate; %iles = percentiles; avg. = average; HQ = hazard quotient; HI = hazard index; QA/QC = quality control/quality assurance.

3.5. Exposure Modeling Results

In this section, we present a sample of the results of the exposure modeling, created primarily for QA as our main focus will be on the resultant potential risks from these exposures (discussed in Section 5). In particular, in many cases here we compare ranges of exposure

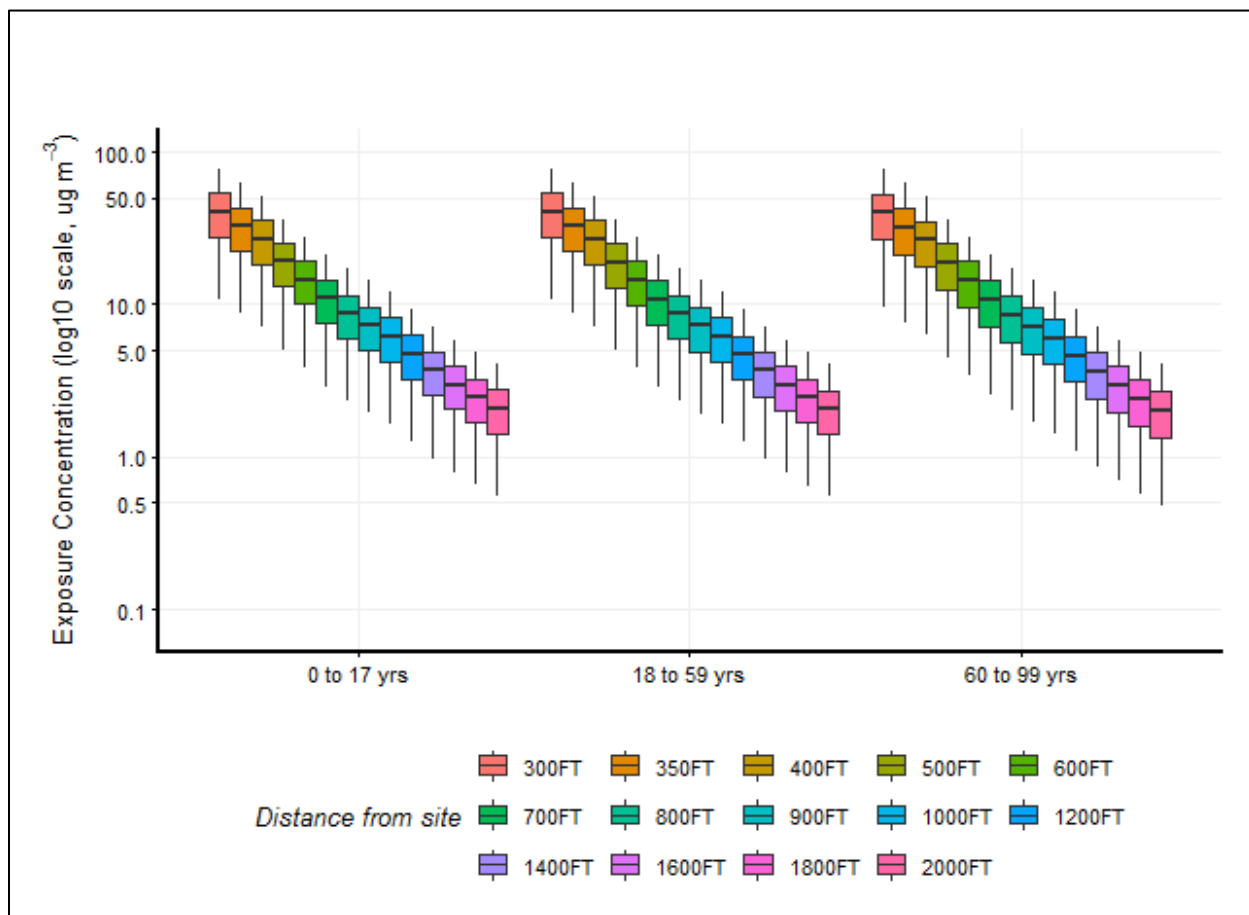
concentrations to ranges of the input air concentrations to ensure that the exposure results are logical given the air-concentration results. The observations we make here about the exposure results are pertinent to interpreting the risk results discussed in Section 5.

The structure of the box-and-whisker plots in this section are the same as those provided for hazard results later in Section 5.3, where values are plotted in log space and the shapes correspond to the 1st-percentile value (bottom whisker), 25th percentile (bottom of box), 50th percentile (i.e., median; line inside box), 75th percentile (top of box), and maximum (top whisker). Note that we define the boxes here and in Section 5.3 differently than in Section 2.9.

3.5.1. Variations in Exposure by Age

For most of the hypothetical simulated population, age has relatively little impact on distributions of exposure concentrations. As we discuss below and as illustrated in Figure 3-3 through Figure 3-6, this is true for comparisons of concentration distributions between modeled youth (ages up to 17 years) and adults (ages 18 to 59 years), and this is also true for comparisons of concentration distributions between all three age groups for VOCs modeled with higher PENs (those with indoor PEN values between 0.9 and 1). The exceptions where we see some noticeable differences in exposure concentrations between age groups are between older adults (60 years and older) and the rest of the population at lower ends of the exposure distributions, only for VOCs modeled with lower PENs (those with indoor PEN values between 0.1 and 1).

VOCs modeled with lower PENs typically penetrate into the indoor micro at lower rates than those modeled with higher PENs. For lower-PEN VOCs, the exposure concentrations were similar between age groups (to within about 1 percent) at most points of the distributions. This can be seen in Figure 3-3 for subchronic exposures to benzene emissions from NFR flowback operations on a 1-acre well pad, as an example. Figure 3-3 contains distributions of exposure concentrations for this scenario at the selected receptors at each distance from the well pad. These are distributions of person-period exposure concentrations across these simulated populations (365 values per individual, 1,000 individuals per age group and distance location). The negligible differences in the distributions between age groups suggest that many of the simulated individuals, no matter their age, are simulated to have similar basic patterns of activities in terms of time spent outdoors, indoors, and in-vehicle, and in terms of being in those micros during similar times of day, leading to similar subchronic averages of exposure concentration. As one moves toward the lower ends of the distributions of exposure concentrations, the concentrations for older adults become lower than those of the rest of the hypothetical population, approaching about 10 to 20 percent lower at the lowest exposures. This suggests that at least some hypothetical older adults were simulated to spend notably more time indoors as compared to youth and younger adults; indoor PENs can be as low as 0.1 (median 0.55), leading to lower average exposure concentrations for these people.

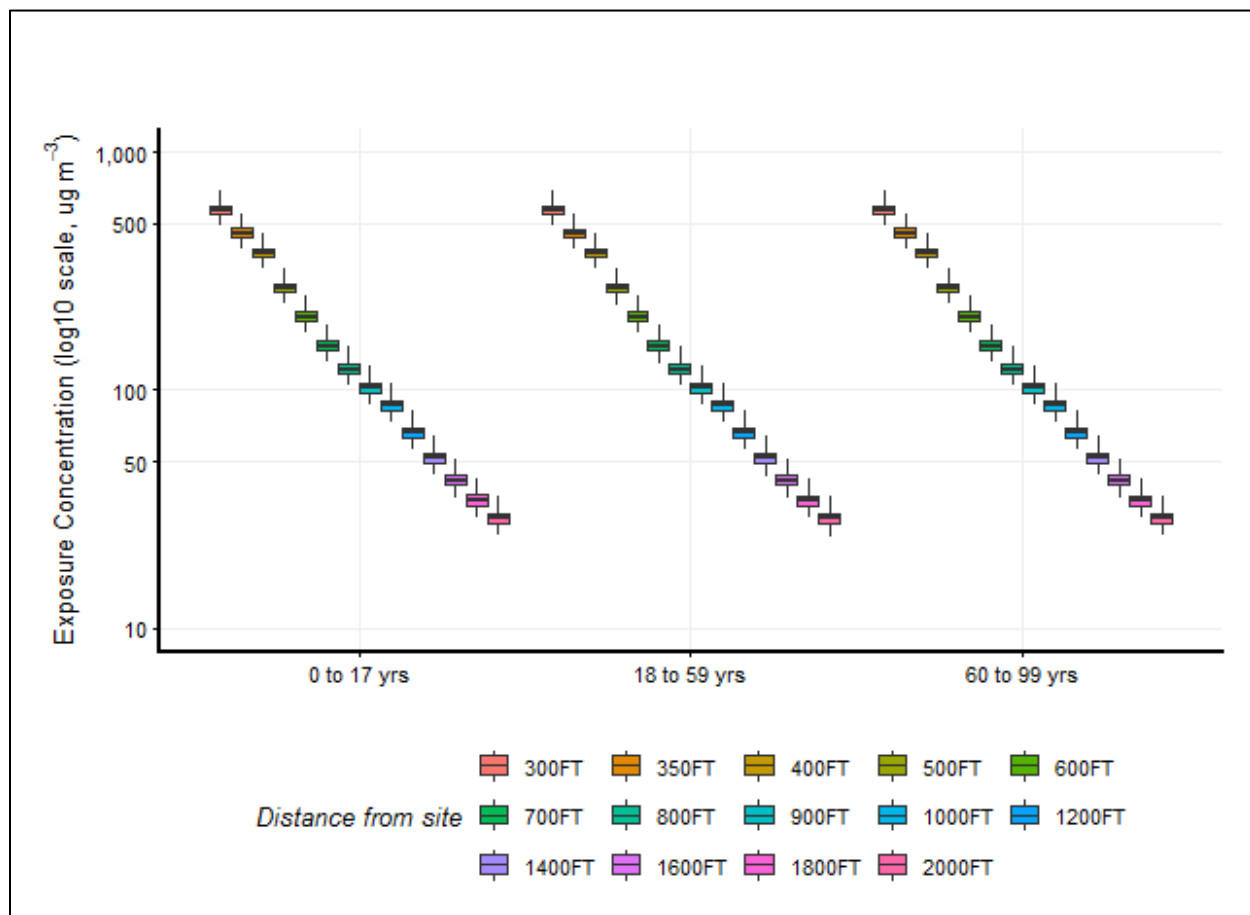


Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

log10 = logarithm base 10; ug m⁻³ = micrograms per cubic meter; FT = foot; yrs = years of age.

Figure 3-3. Distributions of Subchronic Benzene Exposure Concentrations by Distance and Age Group, for Flowback Activities at the Northern Front Range (1-acre Well Pad Only)

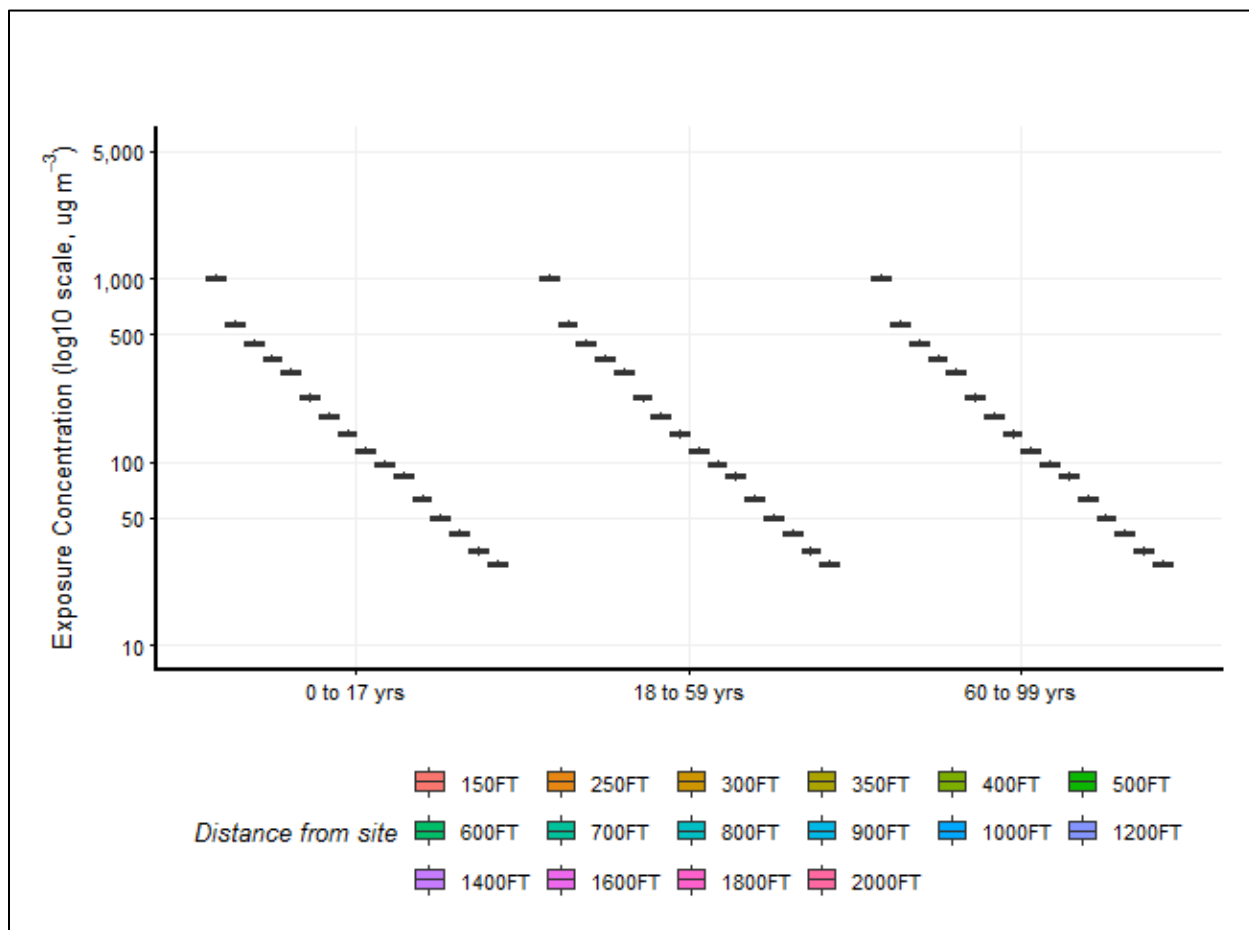
For higher-PEN VOCs, such as propane shown in Figure 3-4, indoor PENs vary between 0.9 and 1 (median 0.95), and, like all VOCs, in-vehicle PENs also vary between 0.9 and 1. This means that no matter what patterns of activities the hypothetical people are modeled with, and regardless of differences in those patterns by age, the differences in average exposure concentration between simulated individuals will be fairly small for a given ambient outdoor concentration. As can be seen in Figure 3-4, the distributions of modeled exposure concentrations are nearly identical between age groups at a given distance from the well pad. The effect of the narrow PEN ranges for high-PEN VOCs is especially apparent with distributions of chronic exposure during production activities, where all simulated individuals have almost the same chronic exposure concentrations for propane (see Figure 3-5, displaying the distributions of annual-average exposure concentrations across the simulated populations; 1,000 values per age group and distance location). For lower-PEN VOCs, however, the wider range of PENs leads to larger differences in exposure concentrations between people (see Figure 3-6, which is similar to Figure 3-5 but for benzene rather than propane).



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

\log_{10} = logarithm base 10; $\mu\text{g m}^{-3}$ = micrograms per cubic meter; FT = foot; yrs = years of age.

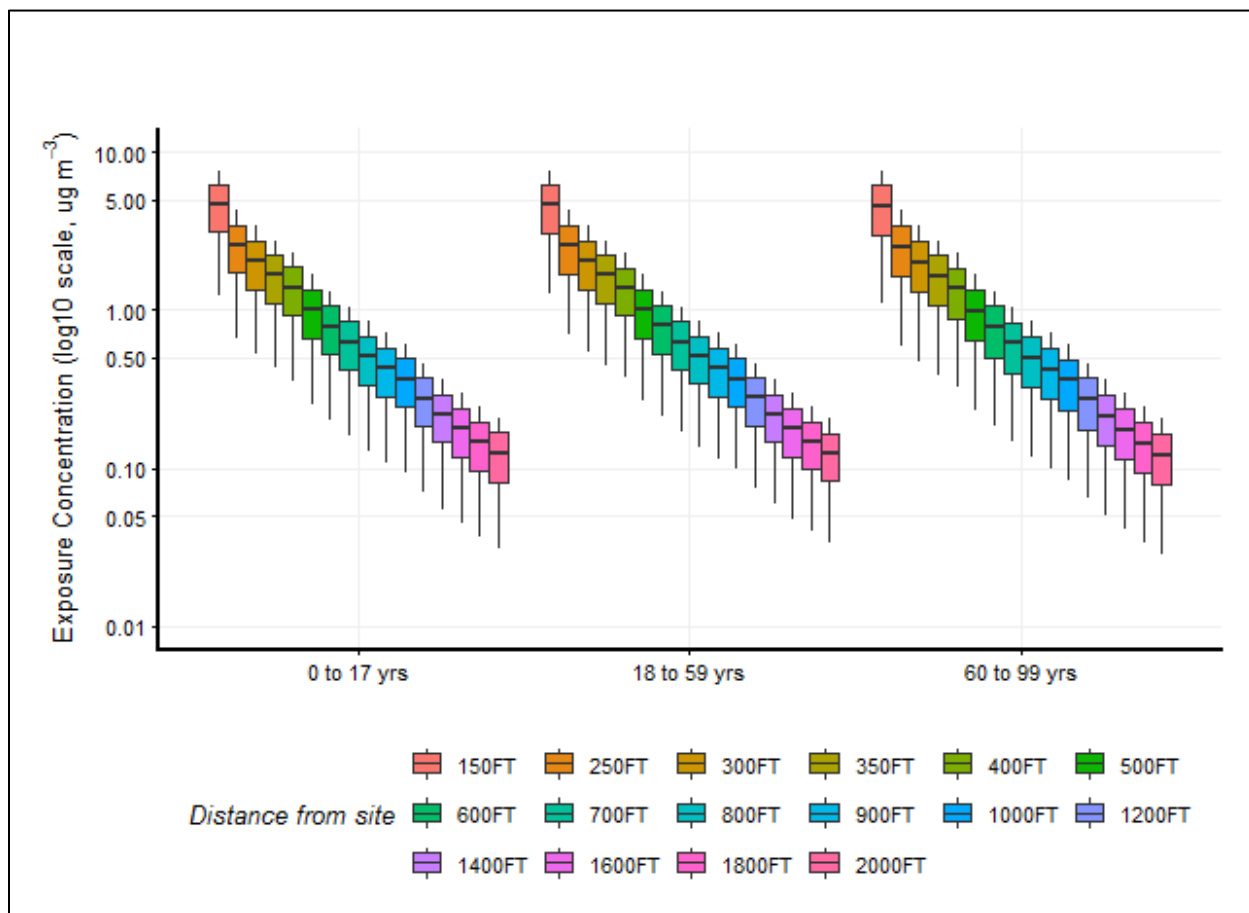
Figure 3-4. Distributions of Subchronic Propane Exposure Concentrations by Distance and Age Group, for Flowback Activities at the Northern Front Range (1-acre Well Pad Only)



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

log10 = logarithm base 10; ug m⁻³ = micrograms per cubic meter; FT = foot; yrs = years of age.

Figure 3-5. Distributions of Chronic Propane Exposure Concentrations by Distance and Age Group, for Production Activities at the Northern Front Range (1-acre Well Pad Only)



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

\log_{10} = logarithm base 10; $\mu\text{g m}^{-3}$ = micrograms per cubic meter; FT = foot; yrs = years of age.

Figure 3-6. Distributions of Chronic Benzene Exposure Concentrations by Distance and Age Group, for Production Activities at the Northern Front Range (1-acre Well Pad Only)

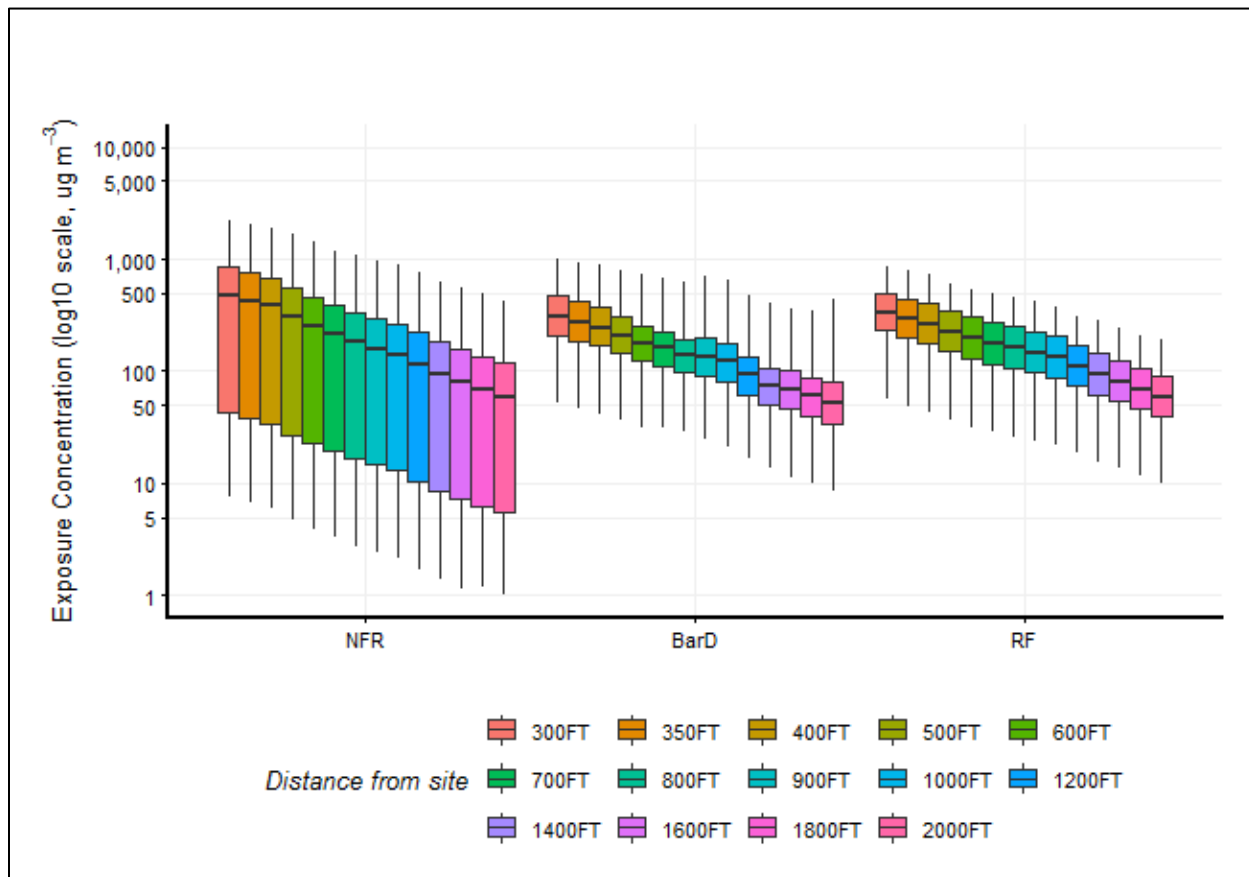
The figures and text above directly reference certain chemicals, sites, activities, and exposure durations, but the overall patterns and observations we discuss above generally apply to all scenarios in these HHRAs.

3.5.2. Variations in Exposure by Distance

Exposures generally decline rapidly with distance from the well pad and there is a substantial range of values at each distance. These patterns are expected based on the patterns of air concentrations—see Section 2.9.1.1. We illustrate these declines and ranges in several figures in this section, utilizing exposure data for the youth age group, which are generally representative of the full set of modeled exposure results.

For ease of comparison, we generated Figure 3-7 to be roughly analogous to Figure 2-19, both showing VOC concentrations declining fairly consistently with distance from the well pad, and

both also showing large ranges of concentration values at all distances. Figure 2-19 illustrates the distributions of benzene air concentrations during O&G development activities—specifically the maximum 1-hour-average values saved from each AERMOD Monte Carlo iteration, with data from all three development activities included in the distributions. These are the air-concentration data we used as ambient outdoor concentrations in the modeling of acute benzene exposures during development (with drilling air concentrations used for estimates of drilling exposure, and so on for fracking and flowback). In Figure 3-7, we illustrate the distributions of acute benzene exposure concentrations during development (drilling, fracking, and flowback are each included in this superset of benzene data). The distributions in Figure 3-7 utilize each hypothetical individual's maximum 1-hour exposure concentration from the 365-day time series (collected across the whole modeled population). Because Figure 3-7 shows collections of daily maxima rather than the full collection of all hourly acute values, the smallest of these daily-maximum exposure concentrations are larger than the smallest of the air concentrations shown in Figure 2-19, though the pattern of declining values with distance is similar in both figures. The maximum acute exposure concentrations shown in Figure 3-7 correspond well with the maximum air concentrations plotted in Figure 2-19, indicating as expected that the times of highest exposure in our modeling corresponded to a hypothetical individual either outside or in a situation of high VOC penetration into the micro during the hour of highest outdoor ambient air concentration.

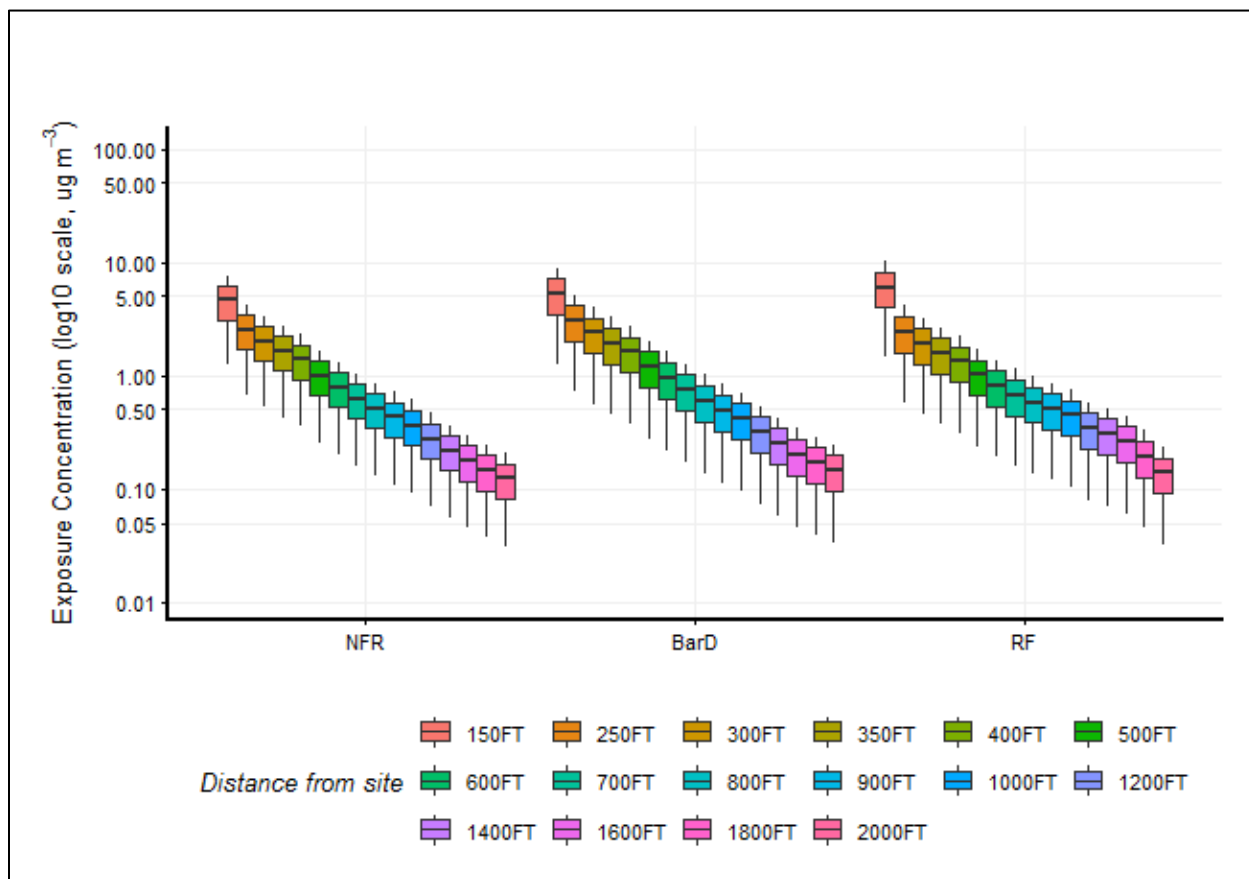


Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

log10 = logarithm base 10; ug m^{-3} = micrograms per cubic meter; FT = foot; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 3-7. Distributions of Acute Benzene Exposure Concentrations for Ages 0–17 Years, by Distance and Well-development Site (1-acre Well Pad Only), Across All Development Activity Types

Figure 3-8 is similar to Figure 3-7 but contains chronic exposure concentrations from emissions in the O&G production phase. All scenarios show generally consistent declining exposure with distance from the well pad. The ranges of chronic exposure concentrations are smaller than those of acute exposure, which is expected because the calculations in the chronic estimates average together the high and low hourly exposure concentrations, and all values in between, across a year. The air concentrations we used in chronic exposure modeling of O&G production were hourly values from modeled unit emissions (reflecting real hour-by-hour meteorology) multiplied by hourly production emissions randomly selected from the CSU VOC emission-rate data.



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

log10 = logarithm base 10; ug m⁻³ = micrograms per cubic meter; FT = foot; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 3-8. Distributions of Chronic Benzene Exposure Concentrations for Ages 0–17 Years, by Distance and Well-production Site

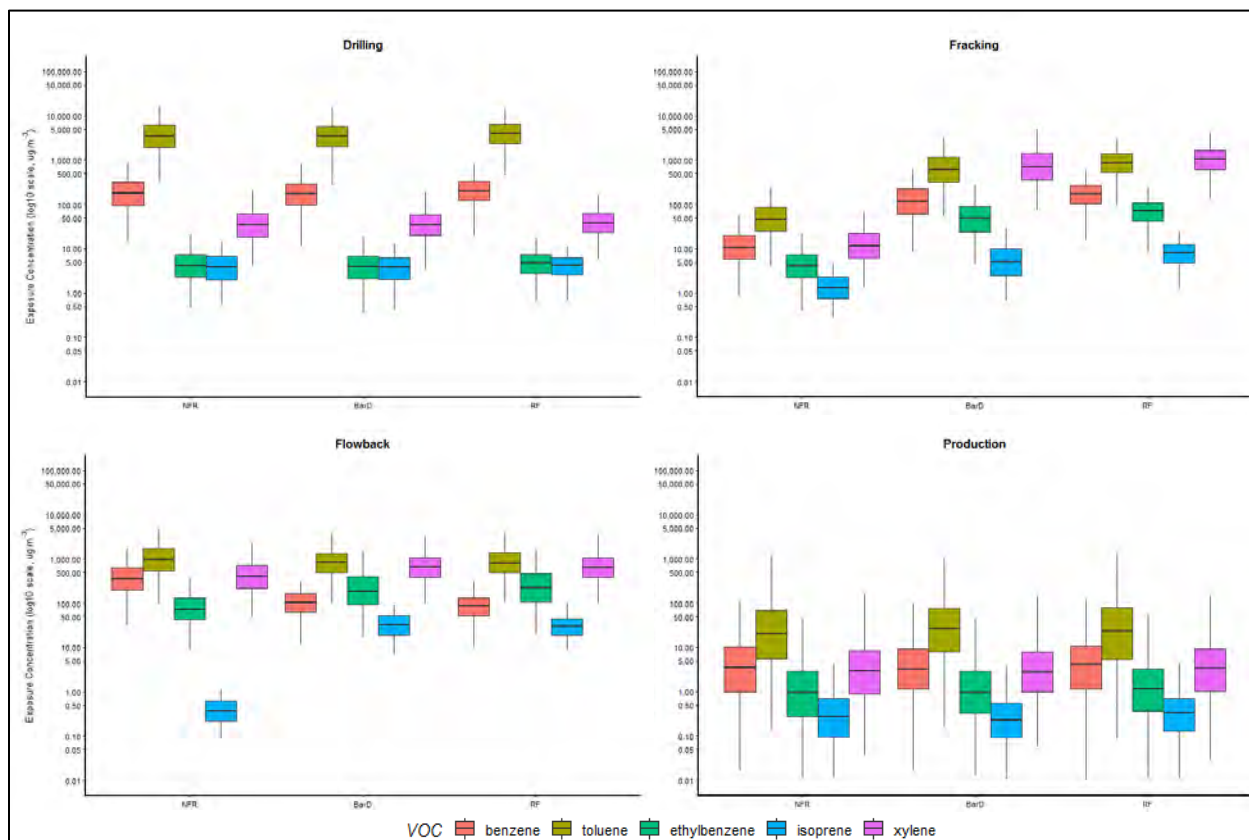
3.5.3. Variations in Exposure by Activity

As an additional QA check, we saw that **the variations in acute exposure concentrations generally follow the variations in the 1-hour-average air concentrations and the variations in the emissions**, as expected. Figure 3-9 is roughly analogous to Figure 2-21. Figure 2-21 is a plot of distributions of 1-hour-average concentrations for selected chemicals (benzene, toluene, ethylbenzene, isoprene, and m+p-xylene), stratified by O&G development activity and hypothetical O&G site, utilizing the 1-hour-maximum values from the AERMOD Monte Carlo iterations. We used these distributions of air concentrations in our modeling of acute exposure, and so we expect the resulting distributions of acute exposure concentrations to closely resemble these distributions in air concentrations. In Figure 3-9, we show distributions of acute exposure concentrations for the same chemicals as in Figure 2-21 and for the same O&G activities (plus production) and hypothetical sites. These exposure concentrations

correspond to the youth age group modeled, though the adult values are nearly identical. Data from all modeled distances are included in these distributions.

In comparing Figure 3-9 to Figure 2-21, the distributions of acute exposure concentrations are generally consistent with the distributions of air concentrations used to estimate them. As we noted in discussing trends with distance in Section 3.5.2, the smallest values here are also taken from across all hypothetical individuals' maximum 1-hour exposure concentrations from the 365-day time series, rather than from all hours of the year, which is why the smallest values shown here are larger than those in Figure 2-21.

Other modeled chemicals will have distributions of air concentrations and exposures that are different from those shown here and in Figure 2-21, based on their respective distributions of emissions.



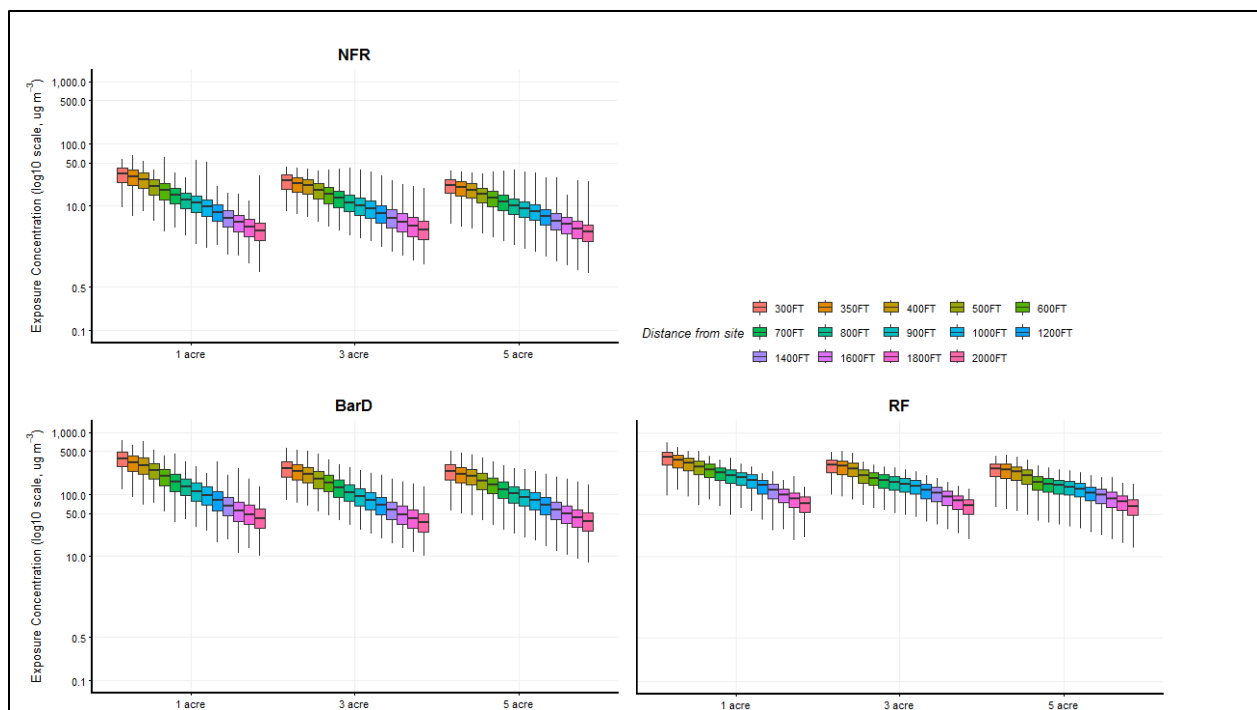
Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

log10 = logarithm base 10; ug m^{-3} = micrograms per cubic meter; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 3-9. Distributions of Acute Exposure Concentrations for Ages 0–17 Years, for Selected Chemicals by Oil and Gas Activity and Site (1-acre Well Pad Only), Across All Distances

3.5.4. Variations in Exposure by Size of Well Pad (Development Activities)

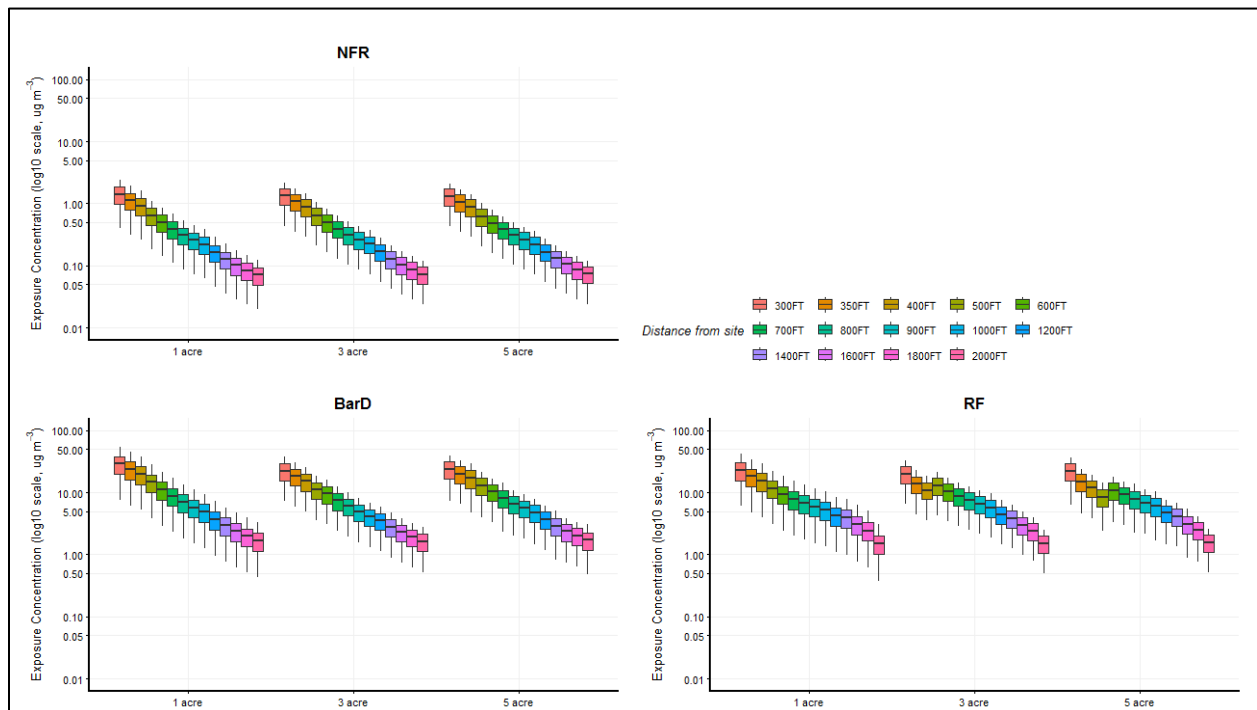
In Figure 3-10, we present distributions of acute benzene exposure concentrations during fracking, stratified by simulated O&G site, size of well pad, and distance from well pad (distances from well pad in these HHRAs are always relative to the center of the well pad). Figure 3-10 is similar to Figure 2-24 in Section 2.9.1.5, except Figure 2-24 includes data from all development activities (not just fracking), and those data are the maximum values from each Monte Carlo iteration (which we used in the acute exposure assessment, except here in Figure 3-10 the data comprise daily-maximum acute exposures). Figure 3-11 is similar to Figure 3-10 but for subchronic exposures. These values for youth are nearly identical to those for adults and older adults.



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

log10 = logarithm base 10; ug m^{-3} = micrograms per cubic meter; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 3-10. Distributions of Acute Benzene Exposure Concentrations between Different Sizes of Development Well Pads, for Fracking Activities (for Ages 0–17 Years)



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box).

log10 = logarithm base 10; ug m^{-3} = micrograms per cubic meter; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 3-11. Distributions of Subchronic Benzene Exposure Concentrations between Different Sizes of Development Well Pads, for Fracking Activities (for Ages 0–17 Years)

Maximum acute exposure concentrations related to 1-acre well pads tend to be somewhat higher than those related to 3-acre well pads, and values related to 3-acre well pads tend to be somewhat higher than those related to 5-acre well pads, although there are variations when stratified by distance from the well pad. The difference between 1-acre and 3-acre pads tends to be higher for maximum subchronic exposure concentrations relative to maximum acute exposure concentrations, with lower variability when stratified by distance. The subchronic concentrations tend to show relatively small differences when comparing 3- and 5-acre pads. For other chemicals and activities the differences can be larger in either direction.

Differences in these distributions between different O&G sites are likely related to differences in meteorological conditions, leading to different dispersion interactions between turbulence and wind flow and the initial well-pad emission plume. These general differences in exposures between different well-pad sizes, and how the O&G site and distance from well pad may affect these trends, were expected based on the dispersion results, as discussed in Section 2.9.1.5. A larger well pad will diffuse a fixed mass of emissions more than a smaller pad at locations close to the well pad, leading to lower initial concentrations in those areas, but also sometimes leading to mixed results farther from the well pad where atmospheric dispersion has a stronger effect.

3.5.5. Variations in Exposure by Duration of Exposure

The largest estimates of acute exposure from across the simulated population are always higher than the largest estimates of subchronic and chronic exposures for the same individuals, but that does not necessarily mean that estimates of potential health risks will follow that same pattern. The largest simulated acute exposure concentrations are always higher than the largest simulated subchronic and chronic exposure concentrations because those acute exposures correspond to single hours of high simulated VOC air concentrations, and across the longer subchronic and chronic averaging times those more extreme air concentrations are not sustained. During development activities, simulated maximum acute exposure concentrations (utilizing time series of air concentrations comprising the maximum values of the AERMOD Monte Carlo iterations) were about one to three orders of magnitude higher than simulated maximum subchronic exposure concentrations (utilizing time series of air concentrations comprising the mean values of the AERMOD Monte Carlo iterations), depending on the O&G site, activity, VOC, and distance from the well pad. Similarly, during production activities, simulated maximum acute exposure concentrations were about one to 2.5 orders of magnitude higher than simulated maximum chronic exposure concentrations.

The difference in a simulated individual's maximum acute and maximum subchronic or chronic exposure concentrations will depend on the amount of time the individual spends in different micros, how those times relate to the temporal patterns of ambient outdoor chemical concentrations, and how local meteorology affects dispersion. These differences will also depend on how much higher are the highest emission rates (more relevant for acute assessments) compared to the mean emission rates (more relevant for subchronic and chronic assessments). These differences do not necessarily mean that estimates of the potential for health risks will be larger for acute exposures relative to subchronic and chronic exposures; this is because the health-protective criteria concentration values (to which exposure concentrations are compared for estimates of health risks) change based on duration of exposure and expected critical effects.

3.5.6. Results Passed to the Risk Assessment

As shown in Table 3-7, for each O&G activity, we pass to the risk assessment various exposure-concentration metrics from across the modeled population, for all VOCs and sites, at the selected maximum receptor on each distance ring. These metrics are 1st percentiles, maxima, means, medians, and other percentiles, but as noted below the collection of data on which they are calculated differs between acute, subchronic, and chronic evaluations.

- For **acute** assessments, we calculated the means and percentiles of the collection, across the population, of each simulated individual's daily-maximum 1-hour-average exposure concentrations. That is 365,000 person-day values: 365 values per individual, 365,000 values across the 1,000 individuals of a given age group at each receptor location. Note that this is not the full collection of 8,760 hourly values in the year from each individual; we instead summarized the data by person-day to ease computational burdens while still being able to identify each individual's maximum 1-hour exposure, which is a primary metric for assessing the potential for acute exposures above health-protective levels.

-
- For **subchronic** assessments, we calculated the means and percentiles of the collection, across the population, of each simulated individual's multi-day-average exposure concentrations. The duration of multi-day exposure is specific to the O&G site, well-pad size, and activity, and we calculate these exposures based on contiguous calendar days for all possible periods in a year (e.g., for a four-day exposure, we calculated averages for January 1 through January 4, January 2 through January 5, and so on, with exposure periods at the end of the year being calculated as averages from December 29 through January 1, December 30 through January 2, and so on). This results in 365,000 person-period values: 365 values per individual, 365,000 values across the 1,000 individuals of a given age group at each receptor location. The exception to this methodology was for sequential development activities lasting a year or less, where we calculated exposures for the drilling, fracking, and flowback activities as a continuous exposure scenario. In these cases, we randomly paired an exposure period for the drilling activity with an exposure period for fracking, which in turn we paired with an exposure period for flowback. We performed these pairings 365 times for each of the 1,000 individuals of a given age group at a receptor. We averaged together the exposure concentrations for the individual activities, weighting based on the duration of each activity. As with subchronic exposures calculated for individual activities, we generated 365,000 person-period chemical exposure concentrations per receptor location for the sequential-activity scenarios. In some cases, based on activity durations, these sequential exposure scenarios exceeded 365 days in duration, making them subject to the chronic assessment rather than the subchronic assessment.
 - For **chronic** assessments, we calculated the means and percentiles of the collection, across the population, of each simulated individual's annual-average exposure concentration. That is one value per simulated individual, totaling 1,000 values across the 1,000 individuals of a given age group at each receptor location. For sequential-activity scenarios that pair development activities with the production activity into a continuous exposure scenario, for each individual we paired each of the 365 sequential exposure scenarios for development activities (see previous bullet) with that individual's exposure scenario for production. We averaged together the exposure concentrations from each individual activity, weighting based on the duration of each activity, creating 365 chronic chemical exposure scenarios per individual at a receptor location for the sequential-activity scenarios. In a small number of cases, the flowback activity exceeded 365 days in duration. In these flowback cases, we calculated one exposure concentration per individual (the annual-average concentration), and for sequential-activity assessment we paired that concentration with the individual's production-activity concentration and randomly selected drilling and fracking concentrations for that individual, averaging together those concentrations with weighting based on the durations of the activities.

Table 3-7. Results Passed to the Risk Assessment for the Development and Production Stages

Variable	Development Stage	Production Stage
Sites	3 (Northern Front Range; BarD; Rifle)	3 (BarD; Rifle; we merged the Anheuser-Busch and Ft. St. Vrain data in the Northern Front Range exposure assessment)
Well-pad sizes ^a	3 (1, 3, and 5 acres)	1 (1 acre)
Data type for acute assessment	Metrics of daily-maximum 1-hour-average exposure concentrations	
Data type for subchronic assessment	Metrics of multi-day average exposure concentrations (duration depends on the site, well-pad size, and activity)	Not needed (the production stage lasts 30 years, so chronic assessment is most appropriate)
Data type for chronic assessment	Metrics of annual-average exposure concentrations (only required for activities or sequences of activities with durations longer than 365 days)	Metrics of annual-average exposure concentrations
Metrics	101 (mean, maximum, and percentiles 1st through 99th)	
Number of receptors per distance ring	14 rings with one receptor per ring, selected during the dispersion assessment as discussed in Section 2.7.3	16 rings (the same 14 as development, plus 2 closer in) with one receptor per ring selected during the dispersion assessment as discussed in Section 2.8

^a When we calculate chronic exposures for the full sequence of development and production activities, the exposures to development emissions from 1-, 3-, and 5-acre well pads are each combined with exposures to production emissions from a 1-acre well pad.

3.6. Characterization of Data Gaps, Uncertainties, Variabilities, and Sensitivities

In general, the APEX exposure modeling is a hypothetical exercise where we create a synthetic population of individuals who reside, work, play, etc. in the same location (at a specific distance from the O&G activity). With any such hypothetical modeling, a number of assumptions are involved in the inputs, which in turn can introduce uncertainty/variability into the modeling.

In this section, we qualitatively discuss the various sources of uncertainty/variability in the input data used in the APEX exposure modeling, as well as potential sources of APEX model-based uncertainty, both of which can impact the estimated exposure concentrations. Additionally, we conducted some brief quantitative analyses to evaluate the sensitivity of the estimated exposure concentration results to some inputs/assumptions in the APEX modeling, as we discuss in detail in Section 3.6.3.

3.6.1. Gaps, Uncertainties, and Variabilities in Data

3.6.1.1. Air Concentration Inputs from AERMOD

APEX modeling uses air concentrations passed on by the air-dispersion modeling effort (Section 2), which essentially combines **emission rates** of specific O&G activities with the **meteorological data** from specific locations being modeled. These inputs into AERMOD are sources of uncertainty/variability, the nature of which was described in detail previously (see Section 2.10). **These uncertainties/variabilities will then be propagated into the APEX exposure modeling via the air concentrations.** Briefly, VOC emission rates used in these HHRAs are based on the limited, non-continuous air samples collected by CSU corresponding

to certain specific O&G sites and activities. Although these can be assumed to be generally representative of the different activities and sites that we are trying to model, there is uncertainty introduced by the limited number of samples and the limited range of sampling times (sampling was done mostly during the day). For example, as a result of assuming the nighttime emission rates to be similar to those in the day, we might not be capturing any potential diurnal patterns in the VOC emissions, leading to possible under- or over-estimations of exposures. We believe our collaborative efforts with CDPHE resulted in choosing meteorology data representative of the variability between different sites to the best extent possible. As it is, any diurnal pattern seen in the modeled air concentrations from the air-dispersion modeling effort represents the diurnal pattern of meteorology of the site.

3.6.1.2. Penetration Factors

As discussed in Section 3.2.3.1, in this APEX modeling exercise we used the **factors method** of modeling penetration of the VOCs into the indoor and in-vehicle micros. This simply assumes that a fixed fraction, sampled from a distribution of factors, of the outdoor VOC concentration penetrates into the micro. The alternative method would have been a mass-balance-based method, which would have utilized more parameters such as the air-exchange rate, volume of the micro (for example, the house volume), and chemical sinks. Since our modeling exercise is mostly hypothetical, with a simulated population without any real data on building properties, **any assumptions about these additional input parameters would have introduced additional uncertainty into our exposure estimates.**

We have separated the 47 VOCs into two groups for indoor PENs: one with higher PENs (0.9–1) and the other with a larger range of PENs (0.1–1). Running the APEX model for each chemical separately would have been computationally prohibitive. We based these ranges on values obtained from scientific literature and on chemical properties that are relevant to chemical penetration. While the data available from the literature showed generally what we expected for the less-volatile group of VOCs (some lower PEN values), the data were much scarcer for the higher-volatility group and we assumed they followed a high-PEN distribution. Many of the studies were real-world measurements of micro/outdoor ratios where indoor sources, indoor sinks, and chemical build-up may have been present. The assumption of a maximum PEN restricted to 1 was based on the recommendation in the published studies that if there are no indoor emission sources (which we assume for these HHRAs), over a period of many hours a maximum PEN of 1 on average can be expected. An absolute restriction of maximum PEN=1 also neglects the possibility of lag time in air infiltration. We sampled from uniform distributions in the ranges of PENs, irrespective of time of year or any potential local patterns of building “tightness” in terms of chemical penetration, both of which can modify PEN distributions. **All of these issues and assumptions lead to uncertainty in our exposure modeling.** Therefore, we have further quantified the sensitivity of the estimated exposure concentrations to PEN distributions in a separate analysis discussed in Section 3.6.3.3, where we estimate sensitivities much less than a factor of 2 based on somewhat reasonable alternative assumptions.

3.6.1.3. Activity Diaries

As discussed in Section 3.2.2, we used a **hybrid set of CHAD activity diaries** due to CHAD data-availability restrictions: we employed in our modeling either diaries specific to the Mountain West states (adults) or from across the US (youth and older adults). Choosing activity diaries

from across the US instead of those from just the Mountain West states could potentially mischaracterize expected activities for the region and in turn introduce uncertainty into the exposure estimates. If more age/region-specific CHAD activity data were available for children and older adults, that would reduce the uncertainty. In order to test if these assumptions had any impact on our exposure estimates, we did a simple quantitative sensitivity analysis (discussed below in Section 3.6.3.2) and found that there is virtually no difference between using adult activity diaries from the Mountain West and those from the entire US.

3.6.1.4. Commuting to Work

In our current modeling effort, we **assume that the modeled hypothetical children and adults commute** to a school/workplace (if the activity is present in the chosen CHAD diary), **but we also assume that the school/workplace is located at exactly the same location as the individual's residence**. This is a conservative assumption, since the schools/workplaces are almost certainly outside of the 2,000-foot modeling radius we use around the O&G site. This could impact the magnitude of the estimated VOC exposure concentrations. We ran a simple quantitative test with hypothetical individuals leaving the model domain for a period of the day. We describe this test in Section 3.6.3.1, where we saw relatively low impacts of daytime commuting on the modeled exposure estimates, mainly owing to lower concentrations near the O&G site during these times when the individuals were away at school/work.

3.6.2. Model Uncertainty

As it is, the estimation of exposure concentrations in the APEX modeling is a simple calculation of time spent in a micro and the air concentration in that micro, averaging across time and across micros. Therefore, there is **minimal model uncertainty for estimates of exposure concentrations**, with most of the uncertainty introduced by the model inputs/assumptions as discussed earlier.

3.6.3. Sensitivity Analyses

Exposure concentrations estimated by APEX are most sensitive to inputs of air concentrations and chemical PENs. We discuss estimated air concentrations in Section 2. In this section, we examine the sensitivity of the exposure modeling results to the three separate factors enumerated below.

1. spending time away from the well site during hours 8 am to 6 pm
2. expanding the database of activity diaries
3. expanding the range of PENs

As discussed in the remainder of this section, **of these three factors the PENs may potentially be the most influential, although the estimated 41-percent reduction in mean chronic exposure required a fairly extreme assumption.** It is also unlikely that one could increase the mean exposure by more than this. Spending time away from home between 8 am and 6 pm reduced exposure between 3 and 25 percent, depending on site and distance from the source. If one worked on the night shift, this reduction would clearly be larger, but that would

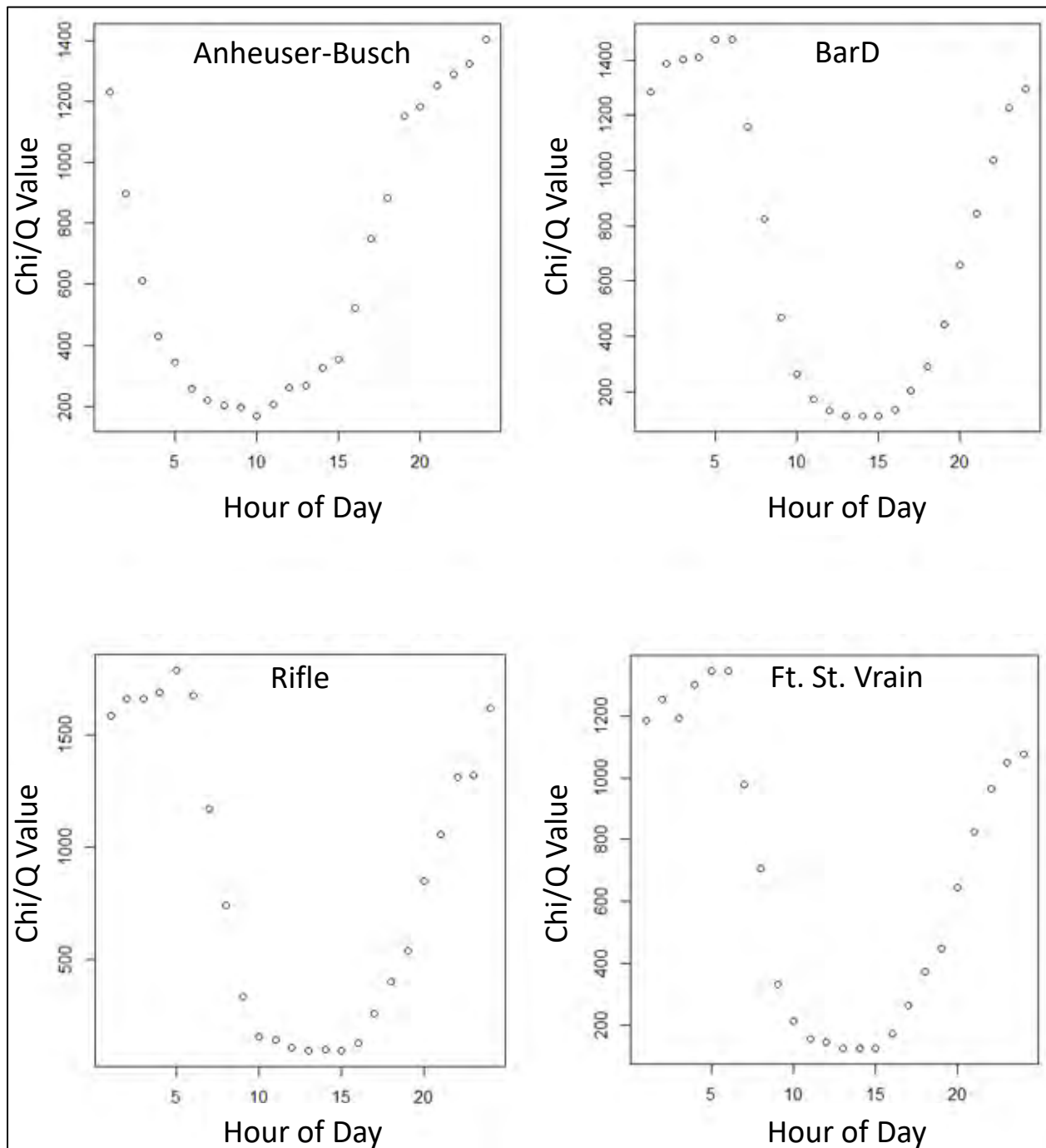
apply to a small fraction of the population. The geographical limitation of the database of activity diaries had a negligible effect on exposure.

3.6.3.1. Commuting

We conducted the APEX exposure modeling on hypothetical individuals who live and stay at the same location relative to the well pad at all times. This is straightforward to implement, compared to the alternative of constructing realistic workplace exposures without data collected on those individuals' places of employment. In the absence of such information, for nearly all simulated individuals the existing method of estimating exposure is health-protective, which means that it somewhat overstates the potential for exposure to emissions from the modeled well pads. The reason for this is that nearly everyone living close to a well pad will work, go to school, or otherwise spend time farther away from that pad (where VOC concentrations from the pad will be lower), and we are not considering exposure to other sources of the modeled VOCs.

The purpose of the first type of sensitivity analysis is to quantify the effect of this assumption. The simple, intuitive estimate is that if a person is near the well pad for just 14 hours per day (e.g., 6 pm to 8 am), and if there is no exposure to the evaluated VOCs during the remaining hours, then their exposure would be about 14/24, or 58 percent, of their exposure had they stayed home all day (a 42-percent reduction). This would be true (on average) if the time spent at home (or away from home) is not correlated with air concentrations.

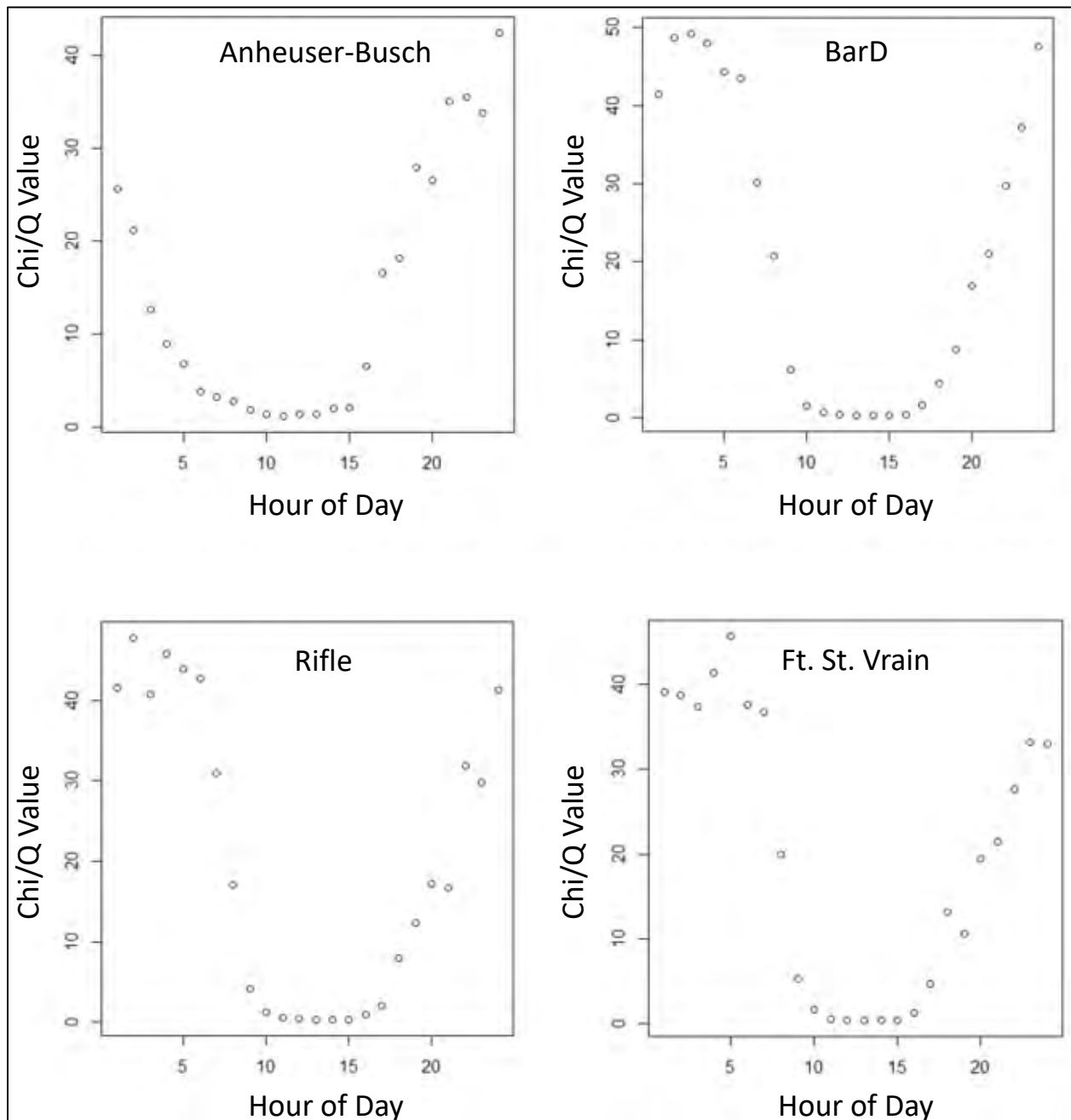
However, the air-dispersion modeling results show a strong diurnal pattern in concentrations that apply to all VOCs. This arises from the combination of a strong diurnal pattern in the dispersion measure Chi/Q (air concentration per unit emission strength), coupled with emission rates that are not dependent on time of day in our modeling. We show in Figure 3-12 and Figure 3-13 plots of mean Chi/Q values by hour of the day for the closest and farthest radial distances (150 and 2,000 feet), respectively, at each of the four meteorological sites. These are annual-average values by hour of day utilizing a 1-acre well pad, and the values correspond to the receptors selected as described in Section 2.8. The shapes of the profiles are generally similar between the two distances, indicating **substantially lower concentrations during daytime hours relative to nighttime**, with peaks in the early morning hours and minima near noon, plus or minus a few hours. This trend is likely due to higher mixing heights and greater turbulent mixing during the daytime, leading to more chemical dilution relative to nighttime when mixing heights and turbulent mixing tend to be lower. Variable wind speeds may also play a role.



Notes: Receptor selected as per methodology described in Section 2.8.

Chi/Q = air concentration (micrograms per cubic meter) per emission rate of 1 gram per second; Anheuser-Busch and Ft. St. Vrain = the Northern Front Range sites; BarD and Rifle = the Garfield County ridge-top and valley sites.

Figure 3-12. Average Air Concentration per Unit Emissions at Selected Receptor 150 feet from 1-acre Well Pad



Notes: Receptor selected as per methodology described in Section 2.8.

Chi/Q = air concentration (micrograms per cubic meter) per emission rate of 1 gram per second; Anheuser-Busch and Ft. St. Vrain = the Northern Front Range sites; BarD and Rifle = the Garfield County ridge-top and valley sites.

Figure 3-13. Average Air Concentration per Unit Emissions at Selected Receptor 2,000 feet from 1-acre Well Pad

The “No Commuting” column in Table 3-8 contains annual-average air concentrations for the scenario where modeled individuals spend all their time near the well pad (the scenario employed in the HHRAs). For the alternate scenario of commuting and spending time away from home, the time spent away should include work time plus travel (commute) time and lunch

time. For simplicity, this is also applied on weekends, when the time away from home may include shopping, visits with friends or family, and other activities. The choice of time away from home was 8 am to 6 pm, or 10 hours per day. For data presented in the “With Commuting” column in Table 3-8, we replaced those hours with Chi/Q values of zero and recalculated the annual average. Since exposures per unit air concentration are nearly independent of the time of day in our modeling, these are reasonable estimates for the ratios of chronic or subchronic exposures when commuting is and is not accounted for.

Table 3-8. Annual-average Air Concentration per Unit Emissions at Selected 150-foot Receptor and Selected 2,000-foot Receptor (1-acre Well Pad)

Distance from Well Pad (feet)	Site	Annual-average Chi/Q		
		No Commuting	With Commuting	Ratio (With Commuting / No Commuting)
150	Anheuser-Busch	655.3	491.4	0.750
	BarD	746.7	663.8	0.889
	Ft. St. Vrain	681.2	596.8	0.876
	Rifle	853.6	777.2	0.911
2,000	Anheuser-Busch	14.15	11.95	0.844
	BarD	21.97	20.30	0.968
	Ft. St. Vrain	19.61	18.42	0.939
	Rifle	19.91	19.16	0.962

Notes: Chi/Q = air concentration (micrograms per cubic meter) per emission rate of 1 gram per second; Anheuser-Busch and Ft. St. Vrain = the Northern Front Range sites; BarD and Rifle = the Garfield County ridge-top and valley sites.

At the 150-foot location, the ratios ranged from 0.750 to 0.911 (concentrations with commuting were 9–25 percent lower than without commuting), which are much higher than the simple estimate of 0.58 (concentrations with commuting being 42 percent lower than without commuting) based on the fraction of time spent at home. At the 2,000-foot location, all the ratios were closer to one, ranging from 0.844 to 0.968. The conclusion is that **people who are away from home between 8 am and 6 pm every day and experiencing zero exposure during those times would have between 3- and 25-percent lower average exposures than people who are always near the well pad**, depending on the site and the distance from the pad. Individuals working the nightshift would experience a greater reduction in exposure by being away from the well pad overnight.

3.6.3.2. Choice of Activity Diaries

For the HHRAs, for the adult age group (ages 18–59 years) we used CHAD activity diaries (corresponding to suitable ages) from the eight Mountain West states (Colorado, Arizona, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming). The other two age groups used diaries from all states because of the relative paucity of diary data for their ages from the Mountain West states. This particular sensitivity analysis is meant to quantify the effect of geographically restricting the database of activity diaries when running the APEX model, whereby we conducted test runs of hypothetical adults (ages 18–59 years) at the Rifle site utilizing the full national database of activity diaries and compared the resulting exposures to those utilizing only the Mountain West database.

Average exposure concentrations were nearly unchanged between the Mountain West runs and the national runs. There was no difference in peak hourly exposure, and there were

differences of less than 1 percent for annual-average exposures. The conclusion is that **the geographical extent of the activity database has a negligible effect on the exposure results**. This occurs because even when restricted to eight states, a large population's activities, in aggregate, do not differ very much from the rest of the country in either outdoor time or travel time. Other aspects of behavioral differences may exist but are not captured by the current calculations.

3.6.3.3. Changing the Penetration Factors

This sensitivity analysis examines the consequence of using lower PENs than in the HHRA runs, for indoor and in-vehicle micros. Each of the 1,000 simulated individuals in the run was randomly assigned one PEN value for the vehicle micro and one PEN value for the indoor micro, from their respective distributions of PENs. These values were assumed to remain constant over time, as people tend to have fairly consistent habits. For example, in some houses the windows will be opened regularly, and in others they will never be opened. This also applies to cars. This assumption creates wider variation in the chronic exposures across modeled individuals than if each simulated individual was assigned many random PENs over time. In the latter case, the annual-average exposure would reflect a time-averaged PEN, and this would have relatively little variation from one person to another.

Calculation of VOC concentrations during time spent in vehicles in the HHRA runs used PENs sampled from a uniform distribution between 0.9 and 1, which is written as $U(0.9,1)$ for short. Higher PENs are health-protective in that the resulting exposure is relatively high. While many vehicles have high PENs, it is also possible to keep the windows closed and have the climate-control system on "recirculate". To account for "tighter" vehicles, in this sensitivity analysis we set the alternative distribution for the vehicle PEN as $U(0.5,1)$. This results in a roughly 21-percent drop in the typically selected in-vehicle PEN.

Homes may also be relatively "tight", with reduced air exchange. However, in our literature searches for the HHRAs we found few (if any) observations indicating $PEN < 0.1$, which was the lower bound we used for the lower-PEN VOCs in the HHRAs. The distribution for the HHRA APEX runs was $U(0.1,1)$ for lower-PEN VOCs. For the sensitivity analysis, we utilized $U(0.1,0.5)$, resulting in a roughly 45-percent drop in the typically selected indoor PEN for these VOCs.

In our test runs with adults (ages 18–59 years) at the Rifle site, **utilizing the altered PEN ranges (lower minimum PEN for vehicles, lower maximum PEN for indoors) made no difference in peak hourly exposure concentrations, but they resulted in a 41-percent reduction in the annual-average exposure concentrations**. This reduction makes sense given that people will usually spend most of their time indoors, so that the typical 45-percent reduction in indoor PEN will have a large impact on overall exposure. It is reasonable to conclude that the HHRA runs might overestimate exposure by up to 50 percent (but probably not more) for lower-PEN VOCs, in cases where highly energy-efficient home construction may significantly reduce infiltration of such VOCs. This may apply only to VOCs with low PENs; for high-PEN VOCs, it may be difficult to achieve much reduction by tightening houses.

We did not conduct sensitivity analyses with increased PENs because it is clear that they have an upper bound of 1 in the absence of indoor sources. Hence, even for a person who always has windows down/open in their vehicles and homes, exposures indoors and in vehicles will

never exceed outdoor exposures given the chemical infiltration modeling assumptions. Compared to the PEN ranges used in the HHRAs, utilizing PEN=1 in all micros (constant exposure to outdoor levels of VOCs) would lead to a 65-percent increase in annual-average exposures for the low-PEN VOCs and a 5-percent increase for the high-PEN VOCs. Thus, **the potential for underestimating chronic exposure due to choice of PENs is no more than 65 percent, and probably much lower than 65 percent.**

4. Selection of Health Criteria Values for Assessment of Potential Health Risks

To characterize the potential for non-cancer health effects from acute, subchronic, and chronic exposures to the assessed VOCs, and to estimate lifetime cancer risks associated with chronic exposures to two VOCs believed to be carcinogenic to humans, **these HHRAs rely on toxicological and health-effects assessments conducted by EPA, Agency for Toxic Substances and Disease Registry (ATSDR), and state agencies charged with protecting the public health from adverse effects of chemical exposures.** In deriving these toxicological criteria, the agencies adopt health-protective assumptions to protect against adverse effects of chemical exposure. In this analysis, we estimate the potential for health risks from chemical exposure by **comparing our chemical exposure estimates to these protective health criteria values.**

4.1. Non-cancer Hazard Estimates for Individual Chemicals

We assessed the potential for non-cancer health effects by calculating hazard quotients (HQs) for exposure to individual VOCs. We calculated HQs for a VOC by dividing the estimated exposure by the corresponding VOC health criterion, as shown in Eq. 4-1 below.

$$\text{HQ} = \text{Exposure Concentration} / \text{Health Criterion Value} \quad \text{Eq. 4-1}$$

The exposure concentration used in each calculation is unique to each modeled O&G scenario (site, size of well pad/number of wells, O&G activity) and each modeled distance of a simulated person relative to the well pad. The exposure concentration also changes based on the duration of exposure, and as does the health criterion value. **That is, the health criterion value in each HQ calculation is unique to each VOC and time frame of exposure.** We list in Section 3.3 the three time frames of exposure that are relevant to these HHRAs. Therefore, each VOC has up to three relevant health criteria values (see further discussion in Section 4.1.1).

HQ values do not provide numerical estimates of the incidence or severity of adverse effects; instead, they are intended as a **screening tool** used to identify chemical exposures that pose potential concern for adverse health effects. HQ values less than 1.0 (exposures below criteria values) are generally considered to indicate that adverse health effects are unlikely to occur, even in sensitive subpopulations, for the exposure durations being evaluated. **HQ values greater than 1.0 (exposures above criteria values) suggest the need for additional evaluation as to the potential for adverse effects.** The greater the HQ above a value of 1.0, the greater the potential for adverse effects. In Section 5.6, we provide additional discussion about uncertainties associated with these criteria values.

4.1.1. Sources and Selection of Health-based Criteria and Data Gaps

For the screening analysis of potential non-cancer effects, we conducted a review of the available health criteria values (exposure levels defined as being without appreciable risk of adverse effects) promulgated by EPA, ATSDR, and state regulatory and health agencies. Numerical criteria values for the same VOC often vary among agencies because they were derived based on different supporting data and studies, the agencies used different methods in the derivation of “no-effects levels,” and the agencies made different science policy decisions with regard to margin of safety for the general population and sensitive groups. **In selecting criteria values that were appropriately health-protective, we used a systematic approach to select the values for each of the assessed VOCs for acute, subchronic, and chronic exposures** (which we defined earlier in Section 3.3).

We list below the potential health criteria values included in our review.

- EPA Reference Concentration (RfC)
- ATSDR Minimal Risk Level (MRL)
- Other inhalation health criteria promulgated by EPA, principally the Provisional Peer-reviewed Toxicity Value (PPRTV)
- Inhalation health criteria by state agencies including those listed below.
 - ◆ Reference Value (ReV) promulgated by the Texas Commission on Environmental Quality (TCEQ)
 - ◆ Reference Exposure Level (REL) promulgated by the California Office of Environmental Health Hazard Assessment (OEHHA)
 - ◆ Effects Screening Levels (ESLs) promulgated by the TCEQ, where an ReV was not available

We based the selection of each health criterion value for each VOC on which values were the best documented, were based on the most recent studies, used current, generally accepted derivation methodologies, and had sufficient supporting documentation. When values meeting these criteria were unavailable, we used alternative values in their place (e.g., values with more limited supporting data or were not peer reviewed). Where available, we generally found EPA RfCs and ATSDR MRLs to be the best-documented of the reviewed values, having been subject to extensive scientific review, and derived in such a way as to be protective of both the general population and sensitive groups. When available, we preferred RfCs and MRLs as criteria values. PPRTVs are, by definition, provisional, and therefore intended for use when RfCs or MRLs were not available. We used criteria values promulgated by state agencies either when EPA or ATSDR had not promulgated criteria values or when state values were derived based on more recent data, analyses, or hazard-characterization methods (e.g., benchmark doses rather than no-observed- or lowest-observed-adverse effects levels). In addition, where two or more criteria values were available from sources derived using similar methodologies and approaches, we generally selected the more protective value or value derived from more recent data. In some cases, we used the same health criteria values for more than one chemical, following guidance from the various agencies as to which chemicals can be “grouped”

together and reference the same data. When data are lacking on a specific chemical, data from a similar chemical or “surrogate” (e.g., based on chemical structure) can be used for decision making. We provide in Appendix B a complete table of the criteria values selected for these HHRAs. Table 4-1 contains a summary of the number and types of VOCs whose criteria values we selected from each source.

Table 4-1. Selected Sources of Non-cancer Health Criteria Values for the Assessed Chemicals

Source Hierarchy	Number of Chemicals	Types of Chemicals
Chronic		
EPA RfC	11	hexane, cyclohexane, substituted benzenes
ATSDR MRL	1	benzene
EPA PPRTV	5	C5-C9 alkanes
TCEQ ReV	20	mostly low-MW alkanes, alkenes
TCEQ ESL	7	disubstituted benzenes, isoprene, etc.
OEHHA REL	1	propane
NA	2	asphyxiants
Subchronic		
EPA RfC	3	trimethylbenzenes
EPA PPRTV	29	substituted benzenes, medium-MW alkanes, alkenes
NA	16	styrene, most low-MW alkanes, alkenes
Acute		
Literature Review	1	benzene
ATSDR MRL	1	toluene
TCEQ ReV	32	most aromatics, aliphatics, isoprene = proposed
TCEQ (interim) ESL	10	11 interim, 4 based on TCEQ surrogates
NA	3	ethane, propane, propene

Notes: RfC = Reference Concentration; MRL = Minimum Risk Level; PPRTV = Provisional Peer-reviewed Toxicity Value; ReV = Reference Value; ESL = Effects Screening Level; REL = Reference Exposure Level; EPA = U.S. Environmental Protection Agency; ATSDR = Agency for Toxic Substances and Disease Registry; TCEQ = Texas Commission on Environmental Quality; OEHHA = California Office of Environmental Health Hazard Assessment; MW = molecular weight; NA = not available.

As can be seen in Table 4-1 and Appendix B, for a given VOC we often selected the criterion value from different sources for acute, subchronic, and chronic exposure durations. For chronic exposures, TCEQ ReV and ESL values constituted a large proportion of selected criteria values; this is primarily because RfC or MRL values have not been promulgated by EPA or ATSDR, respectively, for most of the VOCs. For subchronic exposures, EPA PPRTVs were the only criteria values available for the majority of VOCs and no values were available for 16 of the VOCs. For acute exposures, most of the available criteria values were promulgated by TCEQ. If a criterion value was not available from any of these sources, we did not calculate the HQ for that VOC; this occurred for 2 VOCs for chronic non-cancer assessment, 16 VOCs for subchronic, and 3 VOCs for acute.

In the case of benzene, which is frequently detected near O&G operations, the available acute criteria values promulgated by different regulatory agencies (OEHHA and TCEQ) differed by more than a factor of 20—8 parts per billion (ppb) versus 180 ppb. We therefore conducted a detailed literature review to evaluate the basis for the acute criteria derivation (see Appendix C). We did not consider ATSDR acute MRL values in this analysis because they apply to durations of 14 days or less instead of 1-hour exposures. Based on the literature review, we chose to utilize a criterion value of 30 ppb to evaluate hazards associated with acute benzene exposure.

4.2. Hazard Characterization for Combined Exposures

HQ values characterize the potential for adverse effects from exposures to individual chemicals. Because a large number of VOCs are released concurrently from O&G well-development and production activities, it is also necessary to generate hazard estimates for multiple (simultaneous) exposures. Because there usually are little or no data related to the health hazards associated with a specific chemical mixture, **we calculated hazard indices (HIs) to estimate the combined effects of multiple VOCs that might act on the same target organ or show similar critical effects.**

In these HHRAs, we calculated the HI for a critical-effect group by summing the HQ values for all VOCs having that critical toxic effect, as shown in Eq. 4-2 below for n VOCs in each group.

$$HI = \sum_{i=1}^n HQ_i \quad \text{Eq. 4-2}$$

Conventionally, HI values less than 1.0 are also considered to be health-protective because of the high degree of conservatism built into the constituent HQ calculations; however, the degree of uncertainty associated with interpreting the values is probably larger than for individual HQs. **As with HQs, instances where HI values exceed 1.0 are subject to further analysis.**

4.2.1. Selection of Critical-effect Groups

For each VOC, we assigned one or more critical-effect group based on the critical adverse effects reported in the literature for that VOC (effects occurring at the lowest exposures in the studies used to derive the criteria values). We assigned more than one critical-effect group if the effects were seen at similar exposure levels. In addition to effects noted in critical studies, we also identified other toxic effects that were well-documented to occur at similar exposures. We did not use toxicity occurring only at exposures far above the critical effects to inform the groups. We show in Table 4-2 the **ten non-cancer critical-effect groups** identified for the VOCs in these HHRAs. We provide in Appendix D the complete list of group assignments of each VOC.

Table 4-2. Hazard Index Critical-effect Groups

developmental
endocrine
hematological
hepatotoxicity
immune
nephrotoxicity
neurotoxicity
respiratory
sensory
systemic

We assigned these groups separately for acute, subchronic, and chronic effects. Often, the critical effects identified for a given VOC differed depending on exposure duration, and if no effect data were available in the supporting information, we did not assign the chemical to any effect group. Also, the individual group meanings may cover slightly different spectra of effects for different exposure durations (see Appendix D). Groups vary with regard to specificity, as noted below.

- The “neurotoxicity” group includes pathological changes in the central and peripheral nervous system, as well as neurobehavioral changes. For acute exposures, neurotoxicity may include reversible “intoxication” (blurred vision, diminished reflexes, decrease alertness), while subchronic and chronic neurotoxicity also covers less reversible pathological changes in the peripheral and central nervous system.
- The “hematological” group includes changes in both red and white blood-cell populations (short of overt immune effects).
- The “systemic” group is limited primarily to VOCs for which the observed critical effect is reported to be loss (or reduced gain) in body weight. The underlying cause for the observed effects is often not known.
- We applied the “sensory” group exclusively to acute exposures. Sensory effects include eye, nose, and throat irritation.
- For chemicals showing a lack of an effect at the levels used in the criteria-value calculations, we grouped them as best as possible based on known effects at higher doses according to the conventions described here.

4.3. Calculation of Potential Cancer Risks

In addition to non-cancer hazards, we assessed lifetime cancer risks for exposure to the VOC for which strong evidence of carcinogenicity was available. **A value of inhalation unit risk (IUR) for cancer has been promulgated by a federal agency for one VOC included in these HHRAs—benzene.**

Through the Integrated Risk Information System (IRIS) (EPA, 2018), **EPA has promulgated an IUR for benzene for leukemia risk, defined as a range from 2.2×10^{-6} to 7.8×10^{-6} per $\mu\text{g}/\text{m}^3$.** Using slightly different modeling assumptions, TCEQ independently derived a point estimate identical to the lower end of the EPA range. In estimating lifetime cancer risks from benzene exposure in these HHRAs, we used both the upper and lower end of the EPA range.

It is important to note that varying levels of evidence exist regarding the potential cancer-causing potential of several other chemicals included in these HHRAs. For example, the International Agency for Research on Cancer has classified ethylbenzene as “possibly carcinogenic to humans” (IARC, 2006), and the National Toxicity Program has indicated that both styrene and isoprene are “reasonably anticipated to be a human carcinogen” (NTP, 2016). In all three cases, however, the quantitative data regarding carcinogenicity come exclusively from animal studies, and information from epidemiological studies is limited or ambiguous. No federal agency has issued quantitative health criteria (IURs) for carcinogenic risks for any of the

three chemicals, and, given the large uncertainties associated with the use of unit risk values derived solely the currently available data, no quantitative cancer risks estimates have been derived for these chemicals. These HHRAs also do not assess other chemicals that are suspected of increasing human cancer risks and that may be emitted by O&G operations (e.g., formaldehyde, acetaldehyde).

The “lifetime” exposure typically used in cancer risk calculations is a 70-year duration. In these HHRAs, no O&G activity or sequence of activities lasts for 70 years—individual development activities typically last days to weeks (except for flowback activities and sequences of development activities at 5-acre Garfield County sites, which last between 1 and 2 years), and we model the production activity to last 30 years. In these scenarios, the calculation of a lifetime-average exposure concentration is a time-weighted-average calculation of X years of exposure (e.g., 30 years of exposure to production emissions) and 70-X years of zero exposure (e.g., 40 years of zero exposure to production emissions). Seventy-year, time-weighted-average exposures for development activities would include at least 68 years of zero exposure, which would result in lifetime cancer risks very far below levels of concern. Therefore, we focused our cancer assessment on production activities (30 years of exposure, 40 years of zero exposure) and on sequences of development and production activities altogether (30–32 years of exposure, 38–40 years of zero exposure).

4.4. Sensitive Populations (Age Groups)

As discussed in Section 3.2.1, the exposure assessment in these HHRAs generates exposure estimates for three age groups: children through 17 years old, adults 18 to 59 years old, and people aged 60 years or older. Receptor populations are not further broken down by potential sensitivity to inhaled pollutants (e.g., gender, pregnancy status or coexisting conditions). **In evaluating potential risks, we have taken into account that the toxicity reference values selected for this analysis are intended to account for differences in sensitivity within the general population, from whatever cause.**¹²

The calculation of non-cancer criteria values generally includes the application of “uncertainty factors” (UFs) that take into account likely differences in sensitivity to a chemical between that of a “typical” human and members of the most sensitive subgroups. Support for the use of UFs is better documented for chronic criteria than for shorter-term criteria; in some cases, numerical values of the UFs used to derive subchronic and acute criteria values are increased by an agency to reflect this greater uncertainty. UFs are not intended to protect against extreme sensitivity due to rare genetic conditions. For the purposes of these HHRAs, **we have assumed, in the absence of data to the contrary, that the criteria values are adequately protective of all groups in the exposed population.** Thus, we assume that HQ and HI values have the same meaning for all age groups and for all exposure durations. That is, HQ or HI values greater than 1.0 indicate concern for potential adverse effects, while values below 1.0 indicate less cause for concern, and values less than 0.1 provide even greater assurance of the lack of adverse health consequences, irrespective of the age groups involved.

¹² The EPA IRIS program indicates that RfC values are estimated including consideration of “sensitive subgroups” (EPA, 2018). TCEQ (2015) guidance on establishing ReVs includes exactly the same language, and OEHHA (2014) states that the derivation of RELs “explicitly includes consideration of possible differential effects on the health of infants, children, and other sensitive subpopulations.”

In the estimation of cancer risks, no quantitative adjustment has been made to account for differences in individual sensitivity or age of exposure. This is consistent with current practice in the absence of mechanistic evidence that could affect metabolism of the toxic compound or innate sensitivity to exposure. Lifetime exposures are weighted equally over the life stages when exposure takes place for each (hypothetical) individual in the simulation. EPA (2005) issued guidance suggesting that early-life exposures (below age 16 years) should be more heavily weighted in assessing cancer risks only for carcinogens known to be acting through a mutagenic mode of action. We have chosen not to implement this approach, because (1) the overall correction to lifetime risk is relatively small compared to uncertainty associated with the exposure assessment and other aspects of these HHRAs, and (2) there is insufficient information regarding the precise carcinogenic mode of action of benzene (the only VOC for which we are estimating cancer risks in these HHRAs) to justify the use of such an adjustment.

5. Results of the Risk Assessment

As we discuss in the previous sections, for these HHRAs **we focused principally on health-protective exposure scenarios where hypothetical individuals spend all of their time close to an O&G facility for the lifetime of the facility, and where they are frequently downwind of emissions from the facility.** We have also described how we estimate potential health risks from these exposures by **comparing our VOC exposure estimates to the VOCs' health-protective criteria values.** In this section, we describe the results of comparing modeled exposures to the criteria values, across all scenarios and locations included in the HHRAs. We also describe the potential cancer risks associated with chronic exposures to benzene.

In Section 5.1, we provide a summary of the key assumptions made during the risk assessment, which helps place the assessment results into proper context. Section 5.2 contains a broad summary discussion of the risk results, which we cover in more detail in Sections 5.3, 5.4, 5.5, and Appendix E. In Section 5.6, we discuss potential impacts on estimates of hazards and risks from data gaps, uncertainties, and variabilities related to the health-criteria values.

5.1. Key Assumptions of the Risk Assessment

In the course of conducting the HHRAs and calculating the risk values, we made a number key assumptions intended to provide a prudent (and conservative) degree of health protection, as described below.

O&G Development

Most of the modeled O&G development scenarios last several days to several weeks per activity (per period of drilling, fracking, or flowback), so we focused primarily on acute (1-hour) exposures when defining the areas of highest exposure for risk assessment of O&G development. More specifically, during O&G development activities, we identified these areas by distance from the facility for each modeled VOC during each O&G activity, with the criterion that **they most frequently experience the highest 1-hour-average VOC air concentrations in the simulations** (as discussed further in Section 2.7.3). This criterion particularly favors identifying locations where acute exposures will be highest. We also

simulated subchronic exposures (and chronic exposures for a few scenarios lasting more than 365 days) for these same individuals during O&G development. We assumed that hypothetical individuals at these locations **spent all their time there, either indoors, outdoors, or in vehicles**. As discussed further in Section 2.4, O&G development analyses included three different configurations of well pads: 1-acre pad (corresponding to a single well under development) and 3- and 5-acre pads (where larger numbers of wells are being developed).

O&G Production

The modeled O&G production scenario lasts 30 years, so we focused primarily on chronic exposures when defining the areas of highest exposure for risk assessment of O&G production. More specifically, during O&G production activities, we identified these areas by distance from the facility, with the criterion that **they experience the highest annual-average air concentrations in the simulations** (as discussed further in Section 2.8). These production-assessment locations were the same for each VOC, and while it favors identifying locations where chronic exposures will be highest, we also simulated acute exposures for the same individuals during O&G production. We assumed that hypothetical individuals at these locations **spent all their time there, either indoors, outdoors, or in vehicles**. As discussed further in Section 2.4, O&G production analyses only included 1-acre well pad scenarios, as we assumed an average-size production pad according to the air monitoring conducted during production operations. Note that when we estimated chronic hazards and risks for development activities in sequence with the production activity (which is over 30 years of total exposure to O&G emissions), the receptor locations utilized for exposures during development activities may have been different from those utilized for exposures during production, though we treated them as the same individuals in our calculations.

Acute Assessments

For the acute assessment, the most-exposed individuals were those simulated to be outdoors or in a PEN=1 micro during the time of highest 1-hour-average air concentration. That is, the individuals were hypothetically outdoors or in a highly ventilated building or vehicle at a time when O&G emissions were at their peak in our modeling, and those emissions moved towards the individuals according to “worst-case” meteorological conditions. **These individuals experienced the worst potential combination of the micro location, peak 1-hour emissions of the O&G facility, and short-term unfavorable meteorological conditions.**

These higher-end conditions occurred quite infrequently in our modeling, much less than 10 percent of the time and likely less than a few percent of the time. For example, we looked at the full distribution of exposure concentrations related to benzene emitted from NFR flowback activities, at the selected “worst” receptor at 300 ft from the 1-acre well pad. In that example, only about 4 percent of the person-days (4 percent of the 365,000 daily-maximum values collected at that location) reached exposure concentrations within one standard deviation of the absolute maximum exposure there. The “real” frequency will be much lower than this, as this example calculation does not consider other receptors at the same distance where typical exposures are lower (e.g., at locations more commonly upwind of the O&G site; see Section 2.9.1.4), other hours of each day when exposure can be much lower

than the daily peak (see Section 3.6.3.1), or other combinations of emissions and meteorology that were not part of the summary values passed from the dispersion assessment to the exposure and risk assessments.

Subchronic and Chronic Assessments

For the subchronic and chronic assessments, we simulated hypothetical exposed individuals to be outdoors very frequently or in a high-PEN micro during times of higher air concentrations. That is, the individuals were often hypothetically outdoors or in a highly ventilated building or vehicle during times when O&G emissions were higher than average, and those emissions moved towards the individuals at a relatively high frequency according to higher-end meteorological conditions. Again, **these individuals experienced the worst potential long-term combination of the activities of the modeled individual, the emissions of the O&G facility, and the local meteorological conditions.**

As with acute assessments, for longer-term assessments these higher-end conditions likely occurred less than a few percent of the time in our modeling. Using the same example as above for acute (benzene emitted from NFR flowback activities, at the selected “worst” receptor at 300 ft from the 1-acre well pad), about 11 percent of person-periods (11 percent of the 365,000 subchronic “rolling-average” exposure values collected at that location) reached exposure concentrations within one standard deviation of the absolute maximum exposure there. The “real” frequency will be much lower than this, as this example calculation does not consider other receptors at the same distance where typical exposures are lower (see Section 2.9.1.4).

Health Criterion Values

These HHRAs rely on toxicological and health-effects assessments conducted by agencies charged with protecting the public health from adverse effects of chemical exposures. Numerical criteria values for the same VOC often vary among agencies because they were derived based on different supporting data and studies and/or based on different estimations of “no-effects levels” and margins of safety. **In selecting criteria values that were appropriately health-protective, we used a systematic approach to select the values for each of the assessed VOCs for acute, subchronic, and chronic exposures that favored the most well documented and technically defensible values.** Further details on our selection approach can be found in Section 4.1.1.

Characterizations of Hazards and Potential Cancer Risk

We assessed the potential for non-cancer health effects by calculating HQs for exposure to individual VOCs. We calculated HQs for a VOC by dividing the estimated exposure by the corresponding VOC health criterion. **Rather than providing numerical estimates of the incidence or severity of adverse effects, HQs are intended as a screening tool** used to identify chemical exposures that pose potential concern for adverse health effects. Recognizing uncertainties in the derivation of the health criteria and in the exposure assessment, we utilize the convention that HQs less than 1.0 (exposures below criteria values) indicate that adverse health effects are unlikely to occur, even in sensitive subpopulations, for the exposure durations being evaluated. **HQs greater than 1.0 (exposures above criteria values) suggest the need for additional evaluation as to the**

potential for adverse effects. In addition to non-cancer hazards, we assessed **incremental lifetime cancer risks** for exposure to the O&G VOC for which strong evidence of carcinogenicity was available (**benzene**).

Combined Exposures

Because a large number of VOCs are released concurrently from O&G activities, it is also necessary to generate hazard estimates for multiple (simultaneous) exposures. Since there was usually little or no data related to the health hazards associated with a specific chemical mixtures, **we calculated HIs to characterize the combined effects of multiple VOCs that might act on the same target organ or show similar critical effects.** In these HHRAs, we calculated the HI for a critical-effect group by summing the HQ values for all VOCs having that critical toxic effect. Conventionally, HI values less than 1.0 are considered to be health-protective because of the high degree of conservatism built into the constituent HQ calculations; however, the degree of uncertainty associated with interpreting the values is probably larger than for individual HQs.

The results presented here in Section 5 follow from the decisions outlined above and **are chiefly concerned with the highest-exposed hypothetical individuals at locations of relatively high air concentrations for the exposure durations being considered.** We do this in order to address the primary objective of these HHRAs—to simulate a wide variety of exposure scenarios and **estimate if any have the potential for adverse risks and impacts to human health.** The discussions in the following sections focus primarily on scenarios of highest interest or that demonstrate the results, and they are broken down by O&G activity, duration, and well-pad size. A comprehensive presentation of maximum estimated chemical hazards can be found in Appendix E. The simulations across all of the exposure scenarios resulted in many thousands of hazard estimates, and in the following sections **we utilize these many estimates to also characterize the distributions of potential HQs and HIs across the simulated individuals at these locations of highest exposure.**

5.2. Summary of Risk Results

The results presented in this section align with the scenarios outlined above and described in detail in Section 3.3.2. In that section, we described how emissions data, sizes of well pads, O&G sites, duration of activities, and activity types all come together in specific scenarios for which we evaluated exposure and risk.

While discussing the highest potential exposures at specific distances and orientations with respect to the O&G facilities, it is important to put those exposures into context of the overall range of potential exposures for all hypothetical individuals at all hypothetical locations. The range of potential 1-hour-average (acute) exposures is quite large for each modeled individual, and for the lower-PEN VOCs the range is also high for multi-day (subchronic) exposures. For lower-PEN VOCs, the range of chronic exposures is also large across the modeled population. These large ranges mean that **modeled exposures, and therefore estimates of HQ, HI, and risk, are very frequently much lower than the peak values reported throughout Section 5.** In this section, we provide a high-level summary of the results, and in subsequent sections (including Appendix E) we provide further details. Several times here we refer to Figure 5-1, which summarizes the highest HQ and HIs at the 500-ft modeled distance (the distance of

COGCC's current Exception Zone Setback for well and production facilities relative to a building unit) and the 2,000-ft modeled distance (the farthest modeled distance)—medium and darker blue shades indicate if the highest HQ or HI of any chemical or critical-effect group reached 1 or 10, respectively, while light blue indicates values remaining below 1. The results shown in Figure 5-1 align with the scenarios outlined in Table 3-3.

Acute Exposures

Exposure modeling for most chemicals indicated that acute exposures to O&G emissions were below guideline levels for all hypothetical exposed individuals. **At the most-exposed (downwind) locations at 500 ft from the well pads, the highest estimated 1-hour exposures exceeded guideline levels for a small number of chemicals, including benzene during development and production activities, and toluene and ethyltoluenes during development activities.** At those locations, estimated exposures to benzene and 2-ethyltoluene were sometimes more than a factor of 10 above guideline levels during development activities, particularly during flowback activities at smaller well pads. These higher chemical exposures lead to estimates of maximum hematological HIs above 1 during development and production activities (sometimes above 10 during development activities), and also maximum neurotoxicity and respiratory HIs above 1 during development activities. These higher hazard estimates are reflected in the medium- and dark-blue shading for the acute scenarios in Figure 5-1. One-hour exposures decreased rapidly with distance from the hypothetical facilities, but some remained above guideline levels out to 2,000 ft. Exposures will be smaller, sometimes substantially smaller, at other locations that are less frequently downwind of the well pads.

While the highest values were largest at the NFR site, the average difference between sites in HQs and HIs was less than a factor of 2. HQs and HIs tended to become somewhat smaller as the size of the development well pad increased in the modeling. HQs and HIs were much smaller during production activities relative to development activities.

As noted above in Section 5.1, **our identification of these estimated exceedances of acute health guidelines is highly conservative**, in that these highest-estimated exposures occur relatively rarely. For example, at the 500-ft selected receptors, the median benzene HQs during flowback activities (the median of the 365,000 maximum person-day HQs at those locations) tended to be a factor of 1.6–2.7 smaller than the absolute maximum HQs, and while some of the highest benzene HQs were above 10 at the NFR site, they were below 10 for most people on most days.

Subchronic (Multi-Day) Exposures

Subchronic HQs and HIs were generally much lower than acute HQs and HIs. As summarized in Figure 5-1, **most modeled multi-day VOC exposures (and all such exposures at the 500-ft distance and beyond) were at or far below subchronic guideline levels during development activities** (not evaluated for production activities—see chronic results). **Emissions of trimethylbenzenes were of primary concern due to their contributions to maximum neurotoxicity and hematological HIs slightly above 1** at distances out to about 800 ft from the development well pads during fracking activities. During development activities in sequence (total exposures to development emissions, drilling through flowback), the highest subchronic HQs and HIs were generally lower than those during individual development

activities, and they were all below 1 at 500+ ft from the well pads. Subchronic HQs and HIs generally decreased with increasing distances from the well pads.

While the highest values were largest at the Garfield County ridge-top site, the average difference between sites in HQs and HIs was generally less than a factor of 3 for individual development activities and generally less than a factor of 2 for development activities in sequence. Subchronic HQs and HIs tended to become somewhat smaller as the size of the development well pad increased from 1 to 3 acres in the modeling, though differences between 3- and 5-acre pads tended to be mixed.

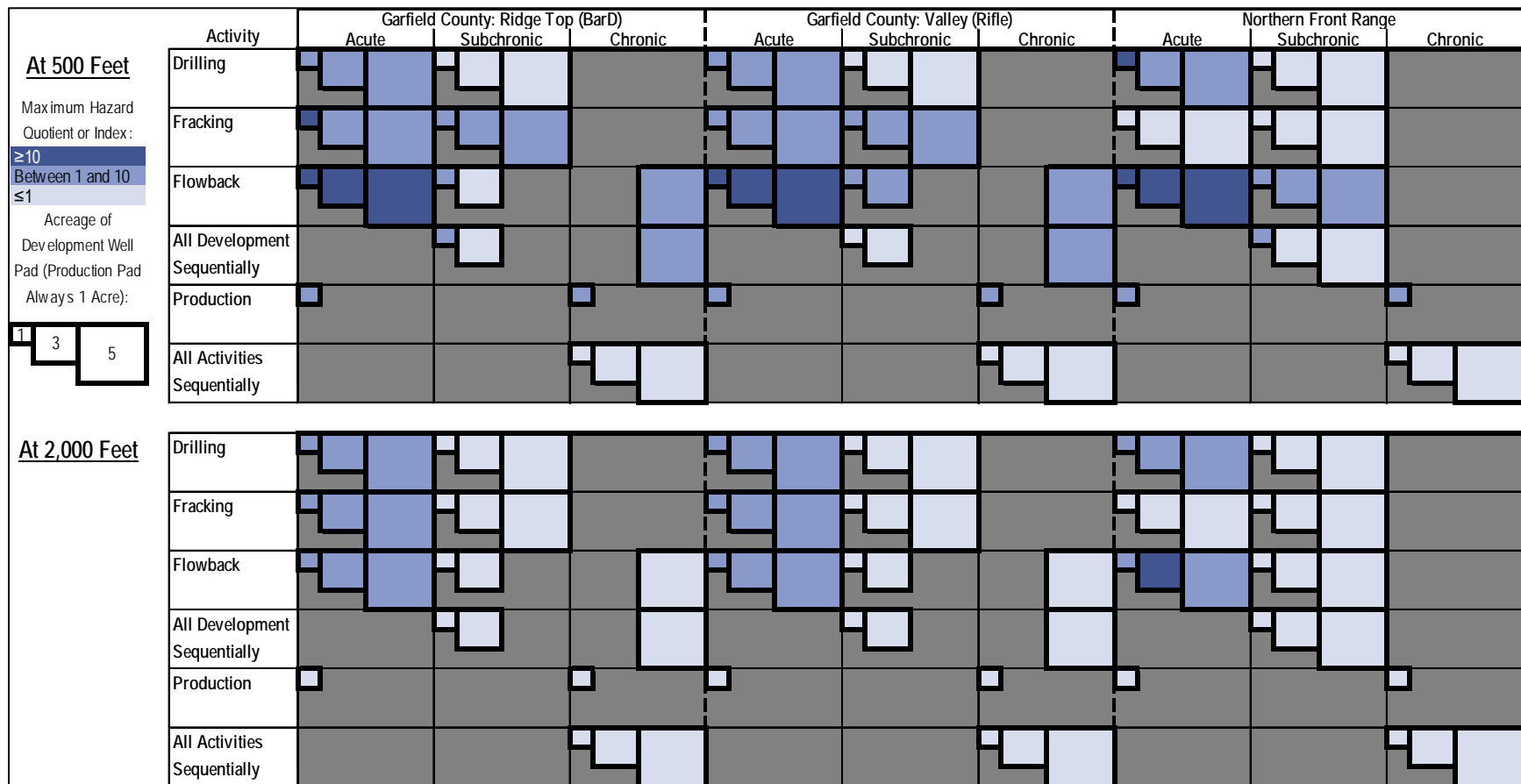
As with the highest 1-hour exposures, **our identification of these estimated exceedances of multi-day health guidelines is conservative**, corresponding to relatively rare exposure scenarios. For example, at the 500-ft selected receptors, the median neurotoxicity HIs during fracking activities (the median of the 365,000 person-period HIs at those locations) tended to be a factor of 1.7–2.5 smaller than the absolute maximum HQs, and while some of the highest neurotoxicity HIs were above 1 at the Garfield County sites, they were below 1 for the majority of people during most of the year.

Chronic Exposures

We also estimated chronic exposures for production operations (which we modeled for 30 years), for the sequence of all development and production activities (which lasts 30–32 years in our modeling), and for some long flowback operations that can last 14–15 months at the Garfield County sites.

At the 500-ft distance from the well pads, chronic exposures during these long, multi-well flowback activities were far below chemical guideline levels, though neurotoxicity and hematological HIs slightly exceeded 1 due primarily to the contributions of n-nonane, benzene, m+p-xylene, and trimethylbenzenes (see Figure 5-1). When exposures to these long flowback activities were aggregated with exposures to the preceding and shorter-duration drilling and fracking activities at the same sites, we saw generally the same results of all HQs below 1, and neurotoxicity and hematological HIs slightly above 1, at the 500-ft distance. These chronic HIs during flowback decreased with distance from the well pads, falling below 1 well before the 2,000-ft edge of our modeling domains, and such exposures will be much lower at locations away from these higher-impact locations (e.g., those more upwind of the well pad).

The chronic exposures during production operations (and when these chronic exposures include the preceding development operations) were below guideline levels at the 500-ft distance in all scenarios, and these HQs and HIs were generally the lowest from among all simulated exposures in the assessment. Also at the 500-ft distance, incremental lifetime cancer risks due to benzene exposure were 5-in-one million or less for the average-exposed individuals, dropping below 1-in-one million before the 2,000-ft distance.



Notes: This snapshot reflects the highest exposures in all our modeling scenarios, across all age groups at the indicted receptors. If there is no box indicating results, we did not evaluate that scenario. We did not evaluate acute exposure for sequential activities, as the largest acute results of the constituent activities will also be the largest for the activities in sequence. We did not evaluate subchronic exposures for activities or sequences of activities lasting longer than one year; that information is reflected in the chronic results. See Section 3.3.2 for further discussion of applicable scenarios.

Figure 5-1. Snapshot of Maximum Estimated Hazard Quotients and Hazard Indices at the Selected Receptors 500 feet (top) and 2,000 feet (bottom) from the Well Pads

5.3. Oil and Gas Development

In the subsections below, and relevant sections of Appendix E, we discuss estimates for acute, subchronic, and chronic non-cancer HQs and HIs for emissions during individual O&G development activities (see Section 5.5 for a discussion on development activities in sequence). **We focus particularly on the highest simulated potential values of these HQs and HIs, but we also discuss the ranges of potential values, to place the higher values in context.** We provide additional quantifications of HQs and HIs, both maximum values as well as frequencies of HQs and HIs above a value of 1, in Appendix E.1. We generally present the same types of tables and figures (the same basic content and purpose) in each individual subsection here. We provide the most comprehensive description of these tables and figures in the first subsection below (Section 5.3.1.1, which are acute non-cancer hazards related to a 1-acre development well pad). In later sections, we provide less description in order to reduce repetition; please reference the Section 5.3.1.1 descriptions as needed for interpretation.

As discussed further in Section 2.4, we evaluated three different configurations of the hypothetical O&G development well pads. The 1-acre pad corresponds to a single well under development. For scenarios where larger numbers of wells are being developed, the well pad necessarily grows in size: 3 acres for 8 wells at the hypothetical NFR site and 16 wells at the hypothetical Garfield County sites, and 5 acres for 32 wells at all hypothetical sites. Total emissions from the well pad per unit time do not change between well-pad configurations because we assume, based on typical practices, that wells are drilled one at a time, fracked one at a time, and undergo flowback one at a time. The differences between well pads, therefore, correspond to the duration of the various O&G activities (shorter for lower numbers of wells, longer for higher numbers of wells) and the size and diffusion of the initial emission plume at the well site. Longer activity durations (and larger numbers of wells) can correspond to longer exposure times, in a few cases lasting more than one year. A larger and more diffuse initial plume (associated with larger pads) typically will lower the highest concentrations and exposures compared to the plumes at smaller pads (see Section 3.5.4); that is, **HQs and HIs tend to be lower, and higher HQs and HIs tend to be less common, for emissions from larger O&G development operations relative to smaller operations.** We discuss this in the remainder of this section.

We also demonstrate below that **acute HQs and HIs tended to be substantially higher than subchronic HQs and HIs.** This result is expected, given the high variability in the O&G emissions data used in these HHRAs, where the larger 1-hour-average VOC air concentrations (which are relevant to the acute assessment) are generally much higher than the average concentrations across time (which are relevant to the subchronic and chronic assessments). This result is also expected given that the highest acute HQ and HI values are estimated for hypothetical individuals who live where the maximum 1-hour concentrations are highest, due to the chance combinations of highest estimated emissions and worst-case meteorological that occur only rarely in the simulations. While we do not make a direct comparison of subchronic and chronic HQs and HIs during individual development activities (because only flowback activities at the 5-acre Garfield County sites reach chronic duration; in those cases, we calculate only chronic values, not subchronic), we note that **in general most subchronic and chronic values are below 1 (and, at worst only a small amount above 1).**

5.3.1. Acute Non-cancer Hazards

In this section, we discuss the potential for acute (1-hour) exposures above health-criteria levels, due to emissions from O&G individual development activities. We discuss the results of each size of well pad separately: 1 acre (Section 5.3.1.1), 3 acre (Section 5.3.1.2), and 5 acre (Section 5.3.1.3). Within each subsection, we stratify the results by O&G activity as well. Recall that all modeled sites are hypothetical.

Overall, benzene and 2-ethyltoluene were of primary concern for potential adverse effects from acute exposure. These were the VOCs for which modeled acute exposures were sometimes more than a factor of 10 above criteria levels at 500 ft from the pad (the distance of COGCC's current Exception Zone Setback for well and production facilities relative to a building unit), **particularly for the selected receptors most frequently downwind from the pad and during flowback operations.** Acute HQs for these chemicals were above 1 for most simulated individuals at least once during most simulated days, at the 500-ft selected receptor (e.g., Figure 5-3, Figure 5-7, and Figure 5-11 showing benzene from flowback activities). **Acute HQs were also sometimes above 1 for toluene and 3-ethyltoluene at the same locations.** The same is true of HIs reflecting multiple chemical exposures for critical-effect groups such as **hematological and neurotoxicity**, and occasionally respiratory (e.g., Table 5-2, Table 5-4, and Table 5-6). **HQs and HIs generally decreased with distance from the well pad** (e.g., Figure 5-2, Figure 5-6, and Figure 5-10), **and for many chemicals the exposures were always well below criteria levels even during the worst simulated conditions.**

While the highest acute HQs and HIs were largest at the NFR site, on average across chemicals/critical-effect groups, distances, and O&G activities the differences in HQs and HIs between NFR and Garfield County sites were less than a factor of 2. Our modeling also indicated **small or negligible differences between simulated individuals in different age groups** in their typical and higher acute HQs and HIs, as expected based on the exposure modeling (see Section 3.5.1). Our discussion in this acute section does not differentiate results by age group (focusing on ages up to 17 years for convenience), though results stratified by age group can be found in Appendix E.1.1.

Differences in the maximum chemical HQs and critical-effect-group HIs by distance were more noticeable when comparing 1-, 3-, and 5-acre well-pad scenarios. We previously noted these differences in terms of air concentrations (Section 2.9.1.5) and acute exposures (Section 3.5.4). These comparisons **typically show smaller acute HQs and HIs at 3-acre pads relative to 1-acre pads (by about 20–30 percent on average across VOCs and O&G activities at the 500-ft distance), and at 5-acre pads relative to 3-acre pads (by about 20–60 percent on average across VOCs and O&G activities at the 500-ft distance).** These differences **tended to be smaller at farther distances from the well pad.** These are average differences, and for individual chemicals/critical-effect groups and activities the differences can be larger in either direction. These variations may be due to several factors, including: the complex interactions between the initial plume and meteorological parameters such as wind flow and turbulence, the focus here on maximum 1-hour values rather than averages or medians, and the identification of the selected receptor at each distance, which occurred independently by well-pad size.

We must use caution in interpreting these higher acute results, given the health-protective approach we selected for acute assessments. We built several layers of

conservativeness into our acute assessment, as discussed in Sections 5.1 and 5.2, such that these higher acute results reflect narrow subsets of the potentially exposed population during relatively rare exposure scenarios. See discussions around Figure 5-4, Figure 5-8, and Figure 5-12 for more context about the maximum values and how they compare to more typical values in the simulations.

In each subsection below, we first discuss the potential for exposures above health-criteria levels, and the trend of that potential by distance of exposure relative to the center of the well pad. To assess this potential, we focused on the highest simulated exposures—**at the selected receptor at a given distance from the well, this highest value comes from the simulated individual with the highest single hour of exposure from among all simulated individuals and days of the year.** In the 1-acre section directly below, for example, we show these highest results in Table 5-1 and Figure 5-2 for HQs of individual VOCs, and in Table 5-2 and Figure 5-5 for HIs of critical-effect groups. We then take a broader look at the simulated chemical exposures across all individuals and days of the year, to **put the highest HQ results into context of the full distribution of results, giving a sense of what are the more typical HQs.** These HQ distributions, at the selected receptor at a given distance from the well, consist of the 365 daily-maximum acute HQs for each of the 1,000 simulated individuals. In the 1-acre section, for example, we show these distribution-based results in Figure 5-3 and Figure 5-4 for HQs of individual VOCs. The discussions generally focus on the 500-ft distance from the pad and the 2,000-ft distance (the farthest modeled distance). The discussions also generally stratify results by HQ and HI values of 10 or above, between 1 and 10, and between 0.1 and 1. HQs above 1 indicate modeled exposure concentrations (from specific simulated scenarios) above health-criteria levels. **We generally do not discuss the many chemicals whose HQs were below 0.1 at all times.** A more detailed presentation of HQs and HIs at various distances can be found in Appendix E.1.1.

5.3.1.1. 1-acre Well Pad

Overall Maximum Chemical Hazard Quotients by Distance

Benzene and 2-ethyltoluene were of primary concern, showing acute HQs above 10 at the selected receptors 500-ft downwind during development activities (Table 5-1). **Toluene and 3-ethyltoluene were of lesser concern, with HQs sometimes above 1 in the same locations.** This was particularly true during flowback activities. The bullets below pertain to maximum HQs at the selected receptor at the 500-ft distance.

- Benzene HQs reached as high as 20 during flowback activities at the simulated NFR site; they were also above 10 during drilling at NFR, and between 1 and 10 during all activities at the Garfield County sites. HQs below 1 during fracking at NFR.
- HQs for 2-ethyltoluene were up to 13 during flowback activities at the Garfield County sites, but they were below 1 in all other cases (all activities at the NFR site, and drilling and fracking at the Garfield County sites).
- Toluene HQs were slightly above 1 during drilling at all three sites but were below 1 in all other cases).

-
- HQs for 3-ethyltoluene were slightly above 1 during flowback activities at the Garfield County sites but were below 1 in all other cases.

However, at 2,000 ft, all chemicals had HQs less than 10 across all sites and activities. Maximum HQs were between 1 and 10 at the selected 2,000-ft receptor for

- benzene at all three sites (HQ=1.8–5.3; during all activities except for flowback at the Garfield County valley site and fracking at the NFR site, where HQs were below 1),
- toluene during drilling at the Garfield County ridge-top site (HQ=1.2; HQs below 1 in all other cases), and
- 2-ethyltoluene during flowback at the Garfield County sites (HQ=3.1–7.3; HQs below 1 in all other cases).

Comparing HQs between the three sites, while the highest maximum HQs at 500 ft from the well pad corresponded to the NFR site, and while there were notable other differences by chemical and activity, the HQs averaged across chemicals, activities, and distances were less than 50-percent different between the three sites.

In Figure 5-2, we plot maximum acute HQs by distance from the 1-acre well pad to illustrate more clearly the overall trend of decreasing HQs with increasing distance from the pad. As noted above, the highest acute HQ at the 500-ft distance during 1-acre development activities corresponded to benzene during flowback activities at the NFR site; Figure 5-2 plots these benzene HQs from flowback at NFR, and for comparison we also plot the HQs from flowback at the Garfield County sites. The values are also available in Table E-1. The lines connect the highest 1-hour HQ experienced by anyone at the selected receptor at the 300-ft distance with the highest value experienced by anyone at the selected 350-ft receptor, and so on out to 2,000 ft.

As noted above and illustrated here, these maximum benzene acute HQs during flowback activities remained above 1 at all modeled distances at the NFR and Garfield County ridge-top sites, while at the Garfield County valley site they dropped below 1 by the 1,800-ft distance. While the general trend in HQ is downward with increasing distance, there can be deviations in that trend from one distance to another (see Section 2.9.1.1), caused by the particular modeled dispersion patterns at a site and how those relate to the precise location of the selected receptor at each distance (see Section 2.7.3).

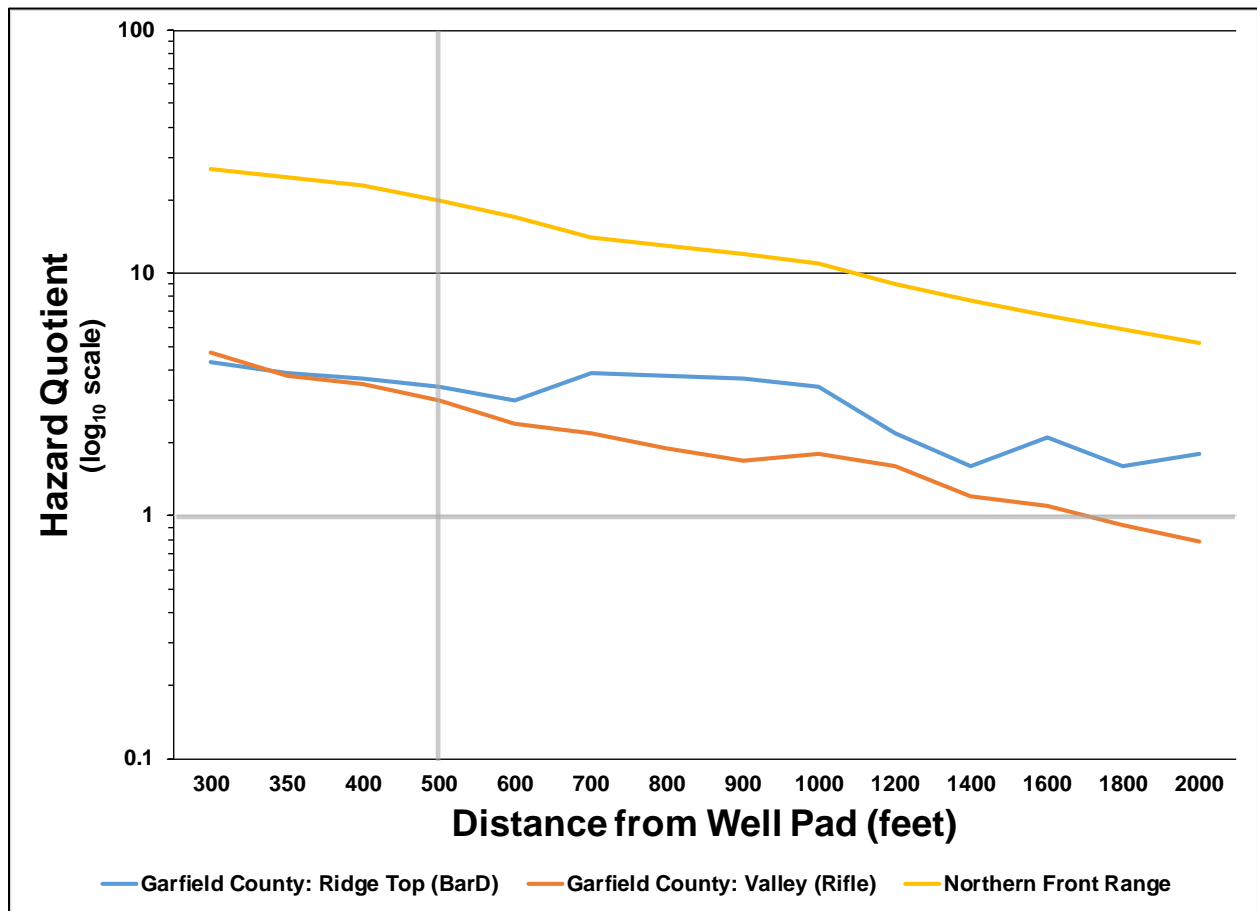
The decrease in HQs with distance for the 1-acre well pad was typical of most scenarios and activities, but there will be variations for each scenario in the specific chemicals that show HQs above 1, the numerical values of the maximum HQs, and the distance at which HQs might fall below 1. Table E-1 shows all modeled values for each site and VOC, including those used to create this graph.

Table 5-1. Overview of the Largest Acute Non-cancer Hazard Quotients during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Well Pad

Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none		benzene	none		
	Fracking	none			none		
	Flowback	2-ET	2-ET	benzene	none		
Between 1 and 10	Drilling	benzene	benzene	toluene	benzene	benzene	benzene
		toluene	toluene		toluene		
	Fracking	benzene	benzene	none	benzene	benzene	none
	Flowback	3-ET	3-ET	none	2-ET	2-ET	benzene
0.1 to 1		benzene	benzene		benzene		
	Drilling	2-ET	2-ET	2-ET	none	toluene	toluene
		2-ET	2-ET	2-ET	2-ET	2-ET	benzene
		3-ET	3-ET	benzene	3-ET	m+p-xylene	
		4-ET	4-ET		m+p-xylene	toluene	
		CHX	CHX		n-decane		
		m+p-xylene	m+p-xylene		toluene		
		MCHX	MCHX				
		n-decane	n-decane				
		n-nonane	n-nonane				
		n-octane	n-octane				
		T2B	T2B				
		toluene	toluene				
	Flowback	123-TMB	123-TMB	2-ET	123-TMB	13-DEB	CHX
		124-TMB	124-TMB	2-MHP	124-TMB	3-ET	3-ET
		135-TMB	135-TMB	3-ET	135-TMB	4-ET	m+p-xylene
		13-DEB	13-DEB	CHX	13-DEB	benzene	toluene
		4-ET	4-ET	m+p-xylene	3-ET	IPB	
		CHX	CHX	MCHX	4-ET	m+p-xylene	
		IPB	IPB	n-decane	IPB	n-decane	
		m+p-xylene	m+p-xylene	n-hexane	m+p-xylene	n-PB	
		MCHX	MCHX	n-nonane	n-decane	toluene	
		n-decane	n-decane	n-octane	n-PB		
		n-nonane	n-nonane	o-xylene	o-xylene		
		n-PB	n-PB	toluene	toluene		
		o-xylene	o-xylene				
		styrene	styrene				
		toluene	toluene				

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

CHX = cyclohexane; DEB = diethylbenzene; DMP = dimethylpentane; ET = ethyltoluene; IPB = isopropylbenzene; MCHX = methylcyclohexane; PB = propylbenzene; T2B = trans-t-butene; TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard quotient=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10

Figure 5-2. Largest Acute Non-cancer Hazard Quotients for Benzene, for the Highest Exposed Hypothetical Individuals at Various Distances from the 1-acre Well Pad during Flowback Activities

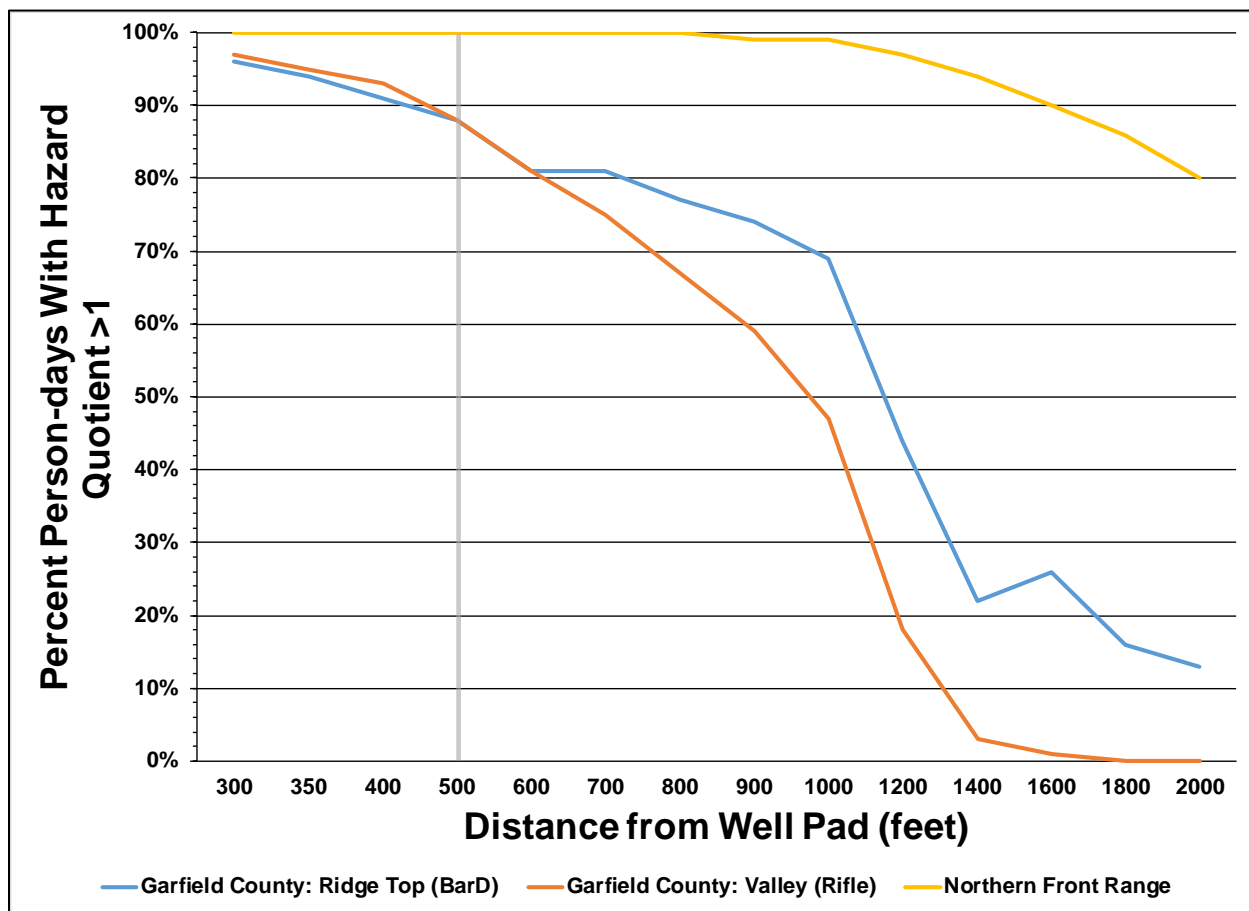
Analysis of Person-day Chemical Hazard Quotients by Distance

For the same scenarios used in Figure 5-2, in Figure 5-3 we illustrate the frequency of daily-maximum acute HQs reaching above a value of 1. These percentages are taken from the collection of each simulated individual's 365 daily-maximum acute HQs (which we term "person-days"), for 1,000 simulated youths up to 17 years old at each selected downwind receptor. The results for all age groups were nearly identical (see Section 3.5.1 and Section E.1). This analysis shows how often (on a daily basis) HQs above 1 occurred across a year of modeled acute scenarios for development activities at 1-acre well pads. A value of 100 percent indicates that every simulated individual experienced at least one acute HQ above 1 on every simulated day of the year. A value of 50 percent indicates that, among the 365,000 daily HQ data points across the population at a receptor, about half of them (about 182,500) were above 1.

In this example, under the conservative exposure assumptions used in this analysis (high emissions and unfavorable meteorology), the model results indicated the characteristics we note below.

- At distances 300–800 ft from the 1-acre NFR well pad, flowback activities during any day of the year produced at least one hourly acute benzene exposure above criteria levels (HQ above 1) for all simulated individuals.
 - ◆ By the 2,000-ft distance, flowback activities at the NFR site during most days of the year still produced at least one acute benzene HQ above 1 for most people (80 percent of all person-days modeled).
- Flowback activities during most days of the year produced at least one hourly acute benzene HQ above 1 for most people at 1,000 ft from the well pad or closer at the Garfield County ridge-top site (at 800 ft or closer at the Garfield County valley site). For example, at 500 ft from both sites, 88 percent of all person-days had HQs above 1. That percentage fell below 50 at the 1,000-ft distance (to 0 percent at 1,800 ft) at the valley site, and it fell below 50 at the 1,200-ft distance (to 13 percent at 2,000 ft) at the ridge-top site.

Generally, the rate of decline in these percentages with distance will vary across chemicals, sites, and O&G activities, depending on several factors. For these benzene HQs during flowback, the relatively slow rate of decline with distance at the NFR site, compared with the Garfield County sites, reflects the much higher benzene emission rates used for the NFR flowback modeling (see Table 2-5). Table E-2 shows the percentage of person-days with HQ above 1 for all chemicals, including those used to create this graph.



Notes: X-axis is not to scale. "Person-days" refers to the collection across the hypothetical population of each modeled individual's daily-maximum acute hazard quotients for a year of modeling. The data in this graph refer to the percentage of hazard quotients (in this collection of hazard quotients) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-3. Percentage of Daily-maximum Acute Non-cancer Hazard Quotients for Benzene (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 1-acre Well Pad during Flowback Activities

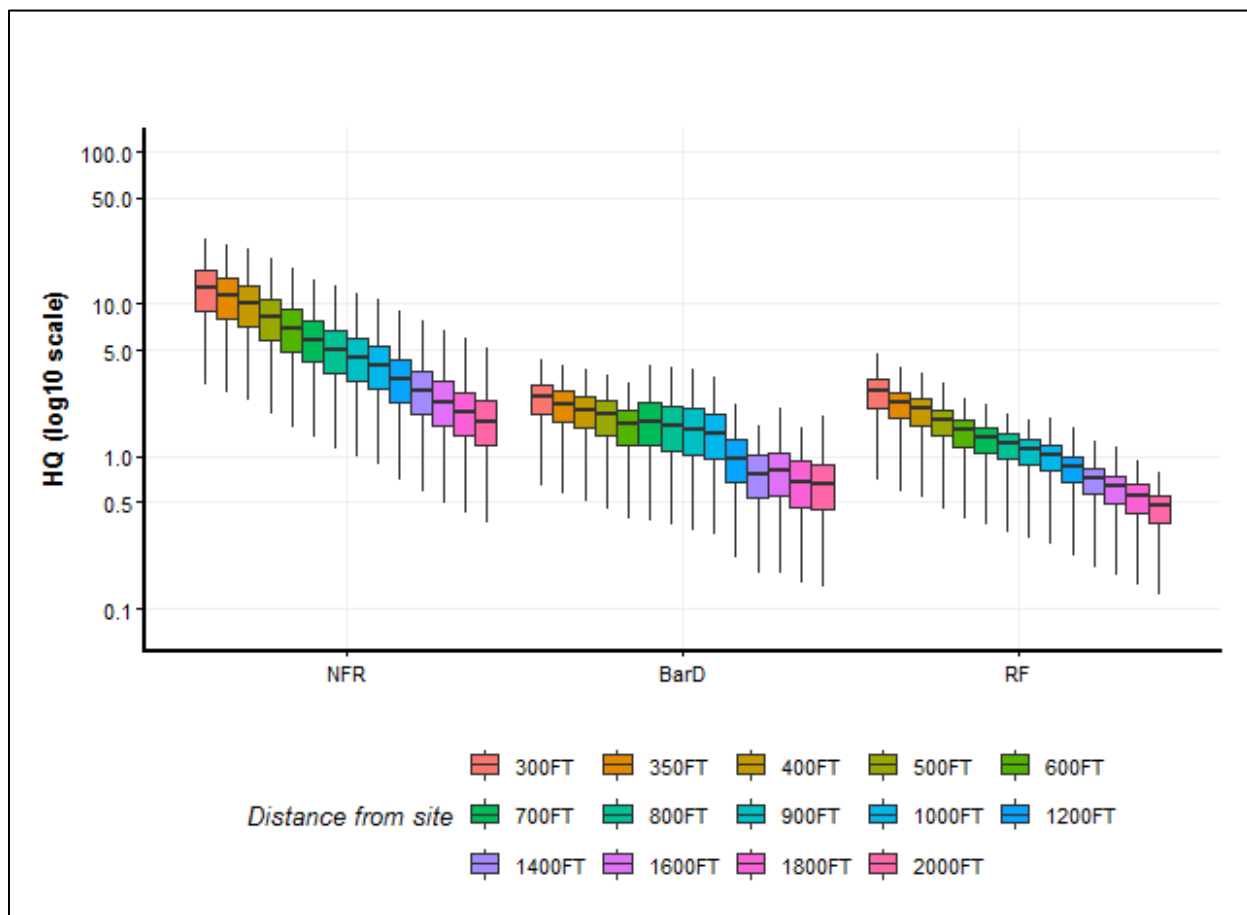
Figure 5-4 contains box-and-whisker plots reflecting the distributions of benzene HQs during flowback activities, across all person-days, stratified by O&G site and distance. The structure of these plots are the same as those provided for exposures in Section 3.5, where values are plotted in log space and the shapes correspond to the 1st-percentile value (bottom whisker), 25th percentile (bottom of box), 50th percentile (i.e., median; line inside box), 75th percentile (top of box), and maximum (top whisker). Note that we define the boxes here and in Section 3.5 differently than in Section 2.9.

The maximum HQ values discussed earlier and reflected in Table 5-1 are visible here as the tops of the whiskers (e.g., maximum HQ of 20 at NFR at the 500-ft distance; maximum HQ at the Garfield County valley site dropping below 1 at the 1,800-ft distance; etc.).

The boxes, providing a range of HQs between the 25th and 75th percentiles, can be considered to be reflective of a typical range of exposures at the respective receptor distance, and they can be compared against the maximum values discussed up to this point. As an example, the 25th-

to-75th-percentile ranges of maximum person-day HQs for benzene were 1.4–2.3, 1.3–2, and 5.7–11 at 500 ft from the Garfield County ridge-top, Garfield County valley, and NFR well pads, respectively. These are notably lower than the absolute maximum values at that same distance: 3.4, 3, and 20, respectively. The median benzene HQs during flowback, represented by the line inside the box and corresponding to the central-tendency of the maximum person-day exposures, were 1.9, 1.7, and 8.1 at 500 ft from the three sites respectively, which were factors of 1.8–2.5 smaller than the absolute maximum values at the same distance.

For the scenario which had the highest HQs at the 500-ft distance (benzene from flowback at NFR), Figure 5-4 shows approximately 68 percent of all maximum person-day HQs at the 500-ft distance were below 10 (though, as shown in Figure 5-3, 100 percent of values at this distance and site were above 1). All maximum person-day benzene HQs during flowback activities at the Garfield County sites were already below 10 at the 500-ft distance, but approximately 10–11 percent of those values were below 1.



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HQ = hazard quotient; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-4. Distributions of Daily-maximum Acute Non-cancer Hazard Quotients for Benzene (Across the Hypothetical Population) at Various Distances from the 1-acre Well Pad during Flowback Activities

Overall Maximum Critical-effect-group Hazard Indices by Distance

For combined chemical exposures during development activities on a 1-acre well pad, hematological health effects (driven by benzene exposure; see Appendix B) were of primary concern, followed by neurotoxicity effects (with several VOCs contributing substantially; see Table 5-2). The bullets below pertain to the selected receptor at the 500-ft distance.

- Hematological HIs, as with benzene HQs that dominate the hematological HI calculation, reached as high as 20 during flowback activities at the simulated NFR site. They were also above 10 during drilling at NFR, and between 1 and 10 during all activities at the Garfield County sites (below 1 during fracking at NFR).

-
- ◆ The primary contribution of benzene to the hematological HI also can be seen in Figure 5-5, which represents approximate contributions of individual VOC HQs towards HIs of critical-effect groups. This plot uses HQs during flowback at the NFR site (specifically at 500 ft), which was the site and activity that produced the highest acute HQs and HIs at the 500-ft distance.
 - HIs for neurotoxicity effects were slightly above 1 during all activities at all sites, except for fracking from the NFR site where they were below 1.
 - ◆ The HQs of several chemicals, including toluene, m+p-xylene, n-hexane, and n-decane, contributed substantially to the neurotoxicity HIs, as shown in Figure 5-5. Note that these VOC HQs were each less than 1 individually, but when aggregated they led to HIs above 1.
 - HIs for respiratory effects were also slightly above 1 during fracking activities at the Garfield County ridge-top site, mostly as a result of m+p-xylene exposure (below 1 for all other cases).

However, at 2,000 ft, all chemicals had HIs less than 10 across sites and activities. HIs were between 1 and 10 at the selected 2,000-ft receptor for

- hematological effects at all three sites (HI=2–5.3; during all activities except for flowback at the Garfield County valley site and fracking at the NFR site where HIs were below 1), and
- neurotoxicity effects during drilling and flowback at the Garfield County ridge-top site (HI=1.3–1.5; HI below 1 in all other cases).

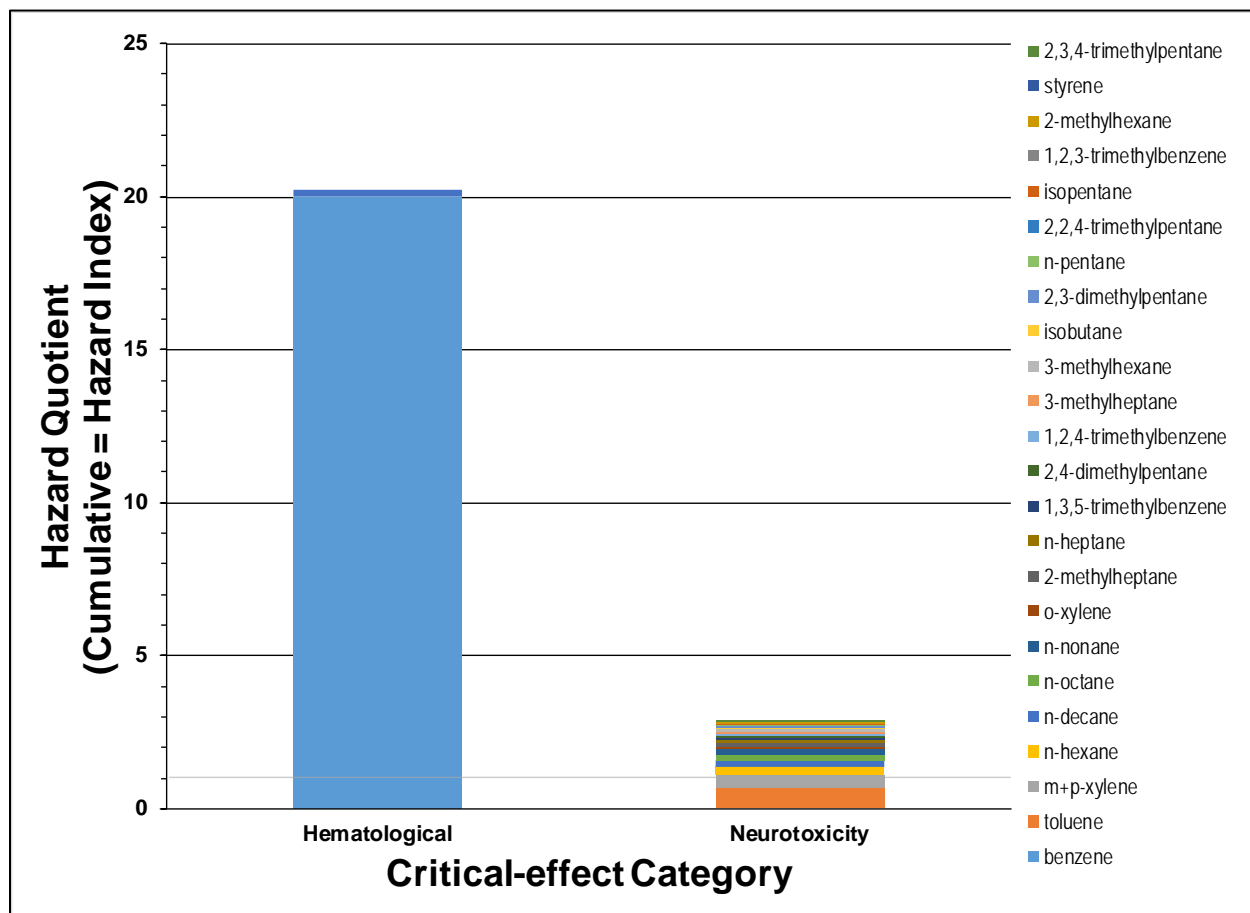
Note that we were unable, in our professional judgment based on available data, to assign ethyltoluenes to any acute critical-effect groups. This means that the acute HQs for ethyltoluenes (which sometimes were above 1) were not included in any acute HI results. Some other VOCs also were not assigned to any acute groups (see Appendix D).

A more detailed presentation of these HI values can be found in Table E-3, and Table E-4 contains data on the percentage of daily-maximum acute HIs above 1. The same HQ trends with distance discussed above existed also for HIs. Specifically, as distance from the well pad increased, HIs generally decreased and frequencies of HIs above 1 decreased for all modeled scenarios and critical-effect groups at the 1-acre development well pad.

Table 5-2. Overview of the Largest Acute Non-cancer Hazard Indices during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Well Pad

Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none		hematological	none		
	Fracking	none			none		
	Flowback	none		hematological	none		
Between 1 and 10	Drilling	hematological neurotoxicity	hematological neurotoxicity	neurotoxicity	hematological neurotoxicity	hematological	hematological
	Fracking	hematological neurotoxicity respiratory	hematological neurotoxicity	none	hematological	hematological	none
	Flowback	hematological neurotoxicity	hematological neurotoxicity	neurotoxicity	hematological neurotoxicity	none	hematological
0.1 to 1	Drilling	respiratory	none	respiratory	none	neurotoxicity	neurotoxicity
	Fracking	sensory systemic	respiratory sensory systemic	hematological	neurotoxicity respiratory sensory	neurotoxicity respiratory	hematological
	Flowback	respiratory sensory	respiratory sensory	endocrine respiratory sensory systemic	respiratory sensory	hematological neurotoxicity respiratory sensory	neurotoxicity respiratory

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: Gray line emphasizes hazard quotient/index=1. The order of chemicals listed in the legend matches the order of plotting (e.g., benzene plotted first on the bottom if applicable to that critical-effect group, then toluene, etc.). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-5. Approximate Chemical Contributions to the Largest Hazard Indices of Selected Critical-effect Groups: Acute Non-cancer Assessment for the Highest Exposed Hypothetical Individuals at 500 Feet from the 1-acre Well Pad during Flowback Activities at the Northern Front Range Site

5.3.1.2. 3-acre Well Pad

For the 3-acre scenarios discussed here, compared to the 1-acre scenarios discussed in Section 5.3.1.1, HQs (Table 5-3, Figure 5-6) and HIs (Table 5-4), and frequencies of HQs and HIs above 1 on a daily basis (Figure 5-7), tended to be lower. The distributions of HQs (Figure 5-8) also tended to be shifted to lower values for the 3-acre scenarios relative to the 1-acre scenarios. This relationship between 3-acre and 1-acre results was not universal because the source size affects the spatial pattern of chemical dispersion, and because more than one aspect of the assessment was different between the acreage scenarios (i.e., this is not a true sensitivity test). While a change in source size resulted in different modeled air concentrations (which tended to be lower for larger sources as compared to smaller sources), those changes in air concentrations fluctuated depending on the receptor location relative to the emission source, which can cause a different selected effective-maximum receptor at a given distance. A change

in the selected receptor leads to a different collection of air concentrations saved per Monte Carlo iteration, which directly affects the distribution of estimated HQs and HIs.

Overall Maximum Chemical Hazard Quotients by Distance

As with the 1-acre pads, for the 3-acre assessment **benzene and 2-ethyltoluene were of primary concern, some showing acute HQs above 10 at the selected receptors 500-ft downwind during development activities** (Table 5-3, Table E-5). **Toluene and 3-ethyltoluene were of lesser concern, with HQs sometimes above 1 in the same locations.** This was particularly true during flowback activities. Maximum chemical HQs at 500 ft were generally smaller for the 3-acre results relative to the 1-acre results (by less than about 20–30 percent on average across VOCs and O&G activities). The bullets below pertain to maximum HQs at the selected receptor at the 500-ft distance.

- Benzene HQs reached as high as 18 during flowback activities at the simulated NFR site (down from 20 at the 1-acre pad). While benzene HQs during drilling at NFR were also above 10 at the 1-acre pad, they were below 10 in that and all other scenarios at 3-acre pads, and, as with the 1-acre pad, below 1 during fracking at NFR.
- Comparing results between the 3-acre and 1-acre pads, while the HQ for 2-ethyltoluene was unchanged at 13 during flowback at the Garfield County ridge-top site, it decreased from 13 to 11 at the 3-acre pad for flowback at the Garfield County valley site. As with the 1-acre pad, 2-ethyltoluene HQs were below 1 in all other cases (all activities at the NFR site, and drilling and fracking at the Garfield County sites).
- As with the results at the 1-acre pad, toluene HQs at the 3-acre pad were slightly above 1 during drilling at all three sites, changing from 2.2, 1.6, and 2.4 at the 1-acre Garfield County ridge-top, Garfield County valley, and NFR pads, respectively, to 1.8, 1.7, and 1.7 at the 3-acre pads. HQs were below 1 in all other cases.
- As with the assessment of 1-acre pads, HQs for 3-ethyltoluene at the 3-acre pad were slightly above 1 during flowback activities at the Garfield County sites, changing from 1.3 and 1.4 at the 1-acre ridge-top and valley pads, respectively, to 1.4 and 1.1 at the 3-acre pads. HQs were below 1 in all other cases.

At the selected receptors at 2,000 ft, maximum benzene HQs remained above 10 (HQ=12) during flowback at the NFR site, as compared to HQ=5.2 at the 1-acre pad. However, as with the 1-acre pads, all other chemical HQs were below 10 across all sites and activities. Maximum HQs were between 1 and 10 at the selected 2,000-ft receptor for

- benzene at all three sites (HQ=1.5–4.9, as opposed to HQ=1.8–5.3 at the 1-acre pads), during all activities except for flowback at the NFR and Garfield County valley sites and fracking at the NFR site, where HQs were below 1;
- toluene during drilling at the Garfield County ridge-top site (HQ=1.1, as opposed to HQ=1.2 at the 1-acre pad), with HQs below 1 in all other cases; and
- 2-ethyltoluene during flowback at the Garfield County sites (HQ=2.9–6.7, as opposed to HQ=3.1–7.3 at the 1-acre pad), with HQs below 1 in all other cases.

Comparing HQs between the three sites, while the highest maximum HQs at 500 ft from the well pad corresponded to the NFR site, and while there were notable other differences by chemical and activity, the HQs averaged across chemicals, activities, and distances were less than 40-percent different between the three sites.

Table 5-3. Overview of the Largest Acute Non-cancer Hazard Quotients during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Well Pad

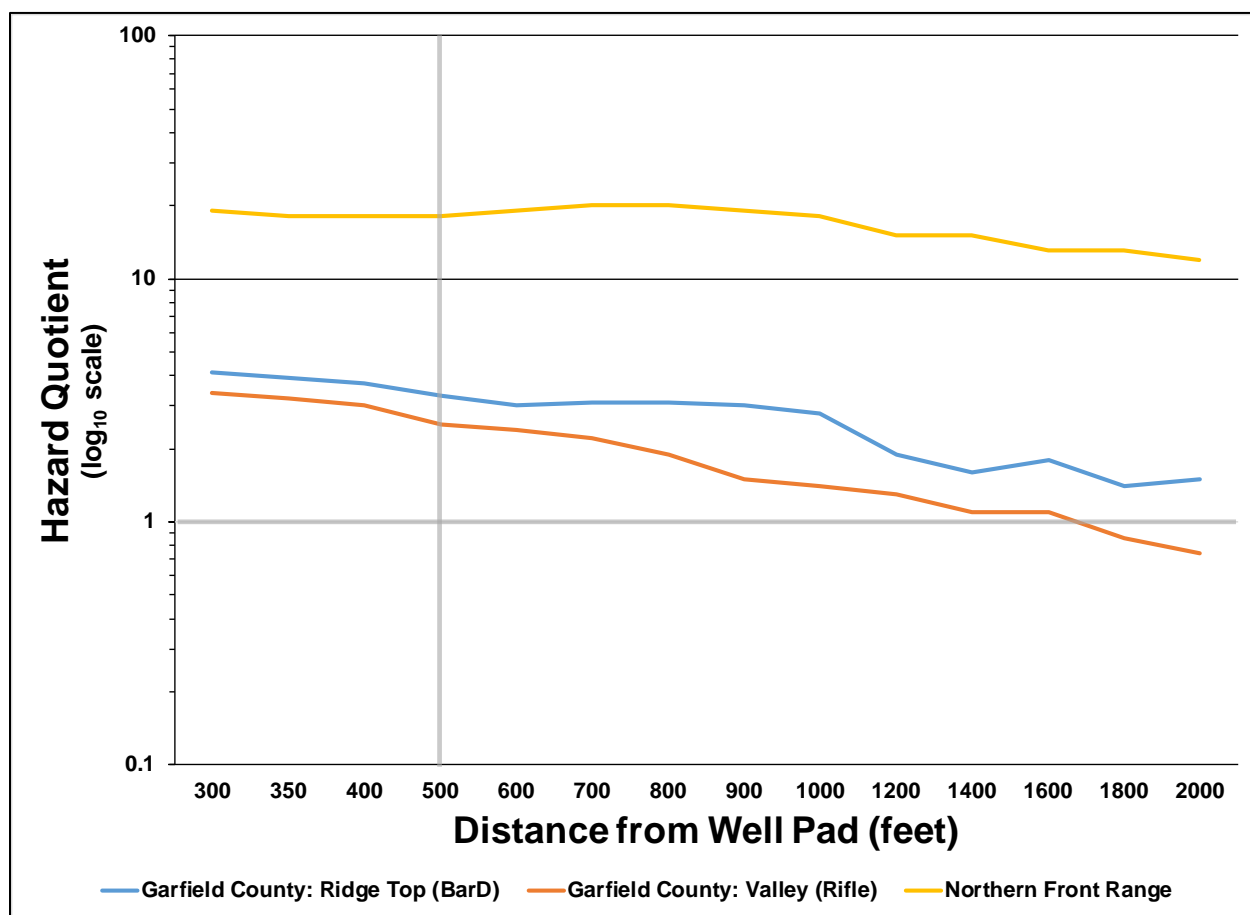
Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	2-ET	2-ET	benzene	none		benzene
Between 1 and 10	Drilling	benzene toluene	benzene toluene	benzene toluene	benzene toluene	benzene	benzene
	Fracking	benzene	benzene	none	benzene	benzene	none
	Flowback	3-ET benzene	3-ET benzene	none	2-ET benzene	2-ET	none
0.1 to 1	Drilling	2-ET	2-ET	2-ET	none	toluene	toluene
	Fracking	2-ET	2-ET	2-ET	2-ET	2-ET	benzene
		3-ET	3-ET	benzene	3-ET	m+p-xylene	
		4-ET	CHX		m+p-xylene	toluene	
		CHX	m+p-xylene		toluene		
		m+p-xylene	MCHX				
		MCHX	n-decane				
		n-decane	toluene				
		n-nonane	T2B				
		n-octane					
		toluene					
		T2B					
		123-TMB	123-TMB	2-ET	123-TMB	13-DEB	3-ET
		124-TMB	124-TMB	3-ET	124-TMB	3-ET	CHX
		135-TMB	135-TMB	CHX	135-TMB	4-ET	m+p-xylene
		13-DEB	13-DEB	m+p-xylene	13-DEB	benzene	MCHX
		4-ET	4-ET	MCHX	3-ET	IPB	n-decane
		CHX	CHX	n-decane	4-ET	m+p-xylene	n-hexane
		IPB	IPB	n-hexane	IPB	n-decane	n-octane
		m+p-xylene	m+p-xylene	n-nonane	m+p-xylene	n-PB	toluene
		MCHX	MCHX	n-octane	n-decane	toluene	
		n-decane	n-decane	o-xylene	n-PB		
		n-nonane	n-nonane	toluene	toluene		
		n-PB	n-PB				
		o-xylene	o-xylene				
		styrene	styrene				
		toluene	toluene				

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

CHX = cyclohexane; DEB = diethylbenzene; DMP = dimethylpentane; ET = ethyltoluene; IPB = isopropylbenzene; MCHX = methylcyclohexane; PB = propylbenzene; T2B = trans-t-butene; TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Figure 5-6 is analogous to the 1-acre Figure 5-2 (showing trends with distance in maximum benzene HQs at the selected receptors during flowback activities). Both figures show the same general trends in HQs with distance at the Garfield County sites, with HQs at the ridge-top site

meandering somewhat between 300 and 1,000 ft before decreasing more steadily thereafter (due to complex interactions between the well-pad emission plume and local meteorology, as well as the exact locations of the selected receptors). For the same reasons, with the 3-acre pads, we also see meandering HQ values at the NFR site inside of 800 ft from the pad, while decreasing at farther distances. Table E-5 shows all modeled values for each site and VOC, including those used to create this graph.



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard quotient=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10.

Figure 5-6. Largest Acute Non-cancer Hazard Quotients for Benzene, for the Highest Exposed Hypothetical Individuals at Various Distances from the 3-acre Well Pad during Flowback Activities

Analysis of Person-day Chemical Hazard Quotients by Distance

Figure 5-7 is analogous to the 1-acre Figure 5-3 (showing trends with distance in the percentage of population person-days with maximum benzene HQs at the selected receptors exceeding 1 during flowback activities). Both figures show that these daily-maximum HQs are above 1 for most hypothetical people on most days at distances closer to the well pad (at the Garfield County sites) or at all distances (at the NFR site). The slopes of these lines are generally steeper for the 3-acre pads relative to 1-acre, meaning that these percentages tend to

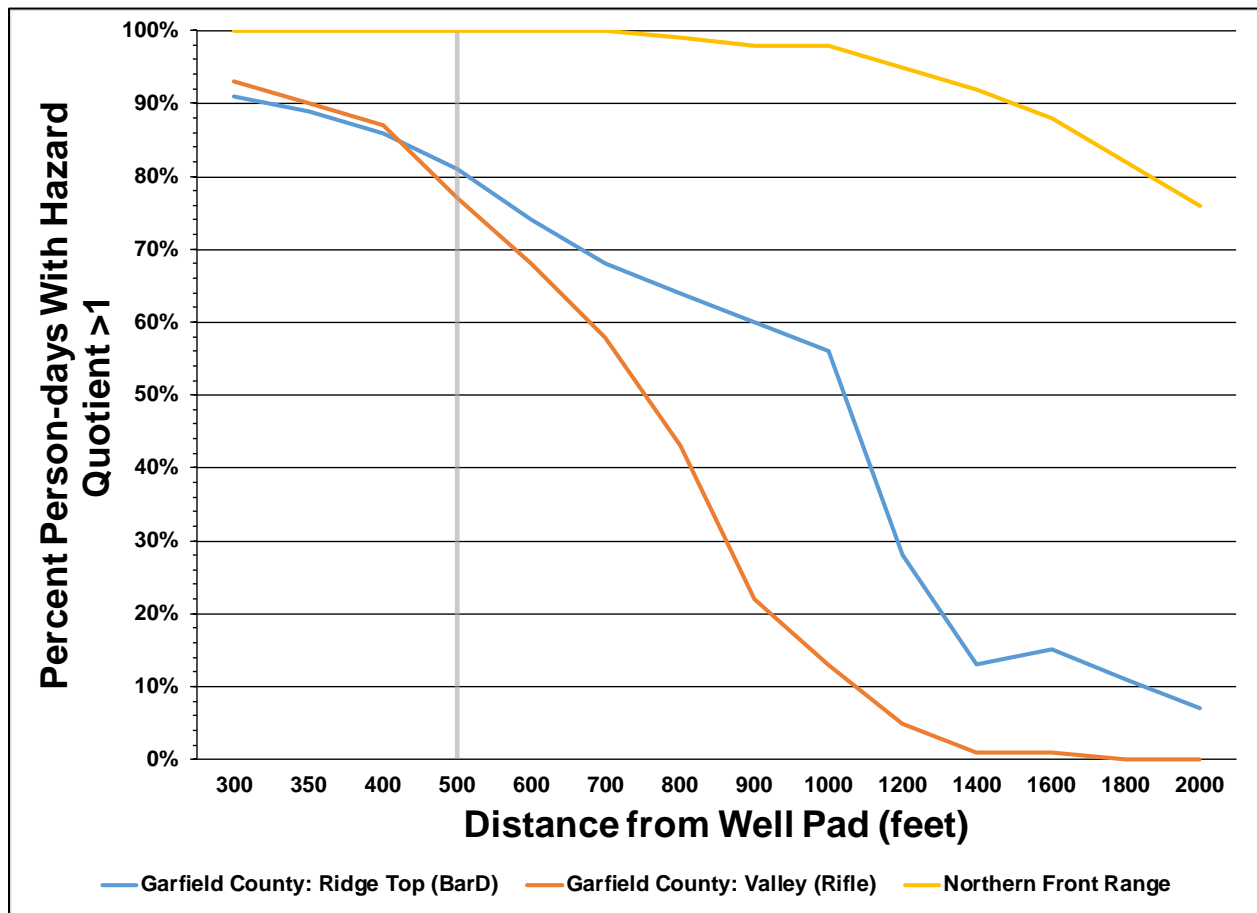
drop more rapidly with distance, which is a reflection of the generally lower HQ values near 3-acre pads relative to 1-acre pads.

- At distances 300–700 ft from the 3-acre NFR well pad, flowback activities during any day of the year produced at least one hourly acute benzene exposure above criteria levels (HQ above 1) for all simulated individuals (this was also true at 800 ft for the 1-acre pad).
 - ◆ By the 2,000-ft distance, flowback activities at the NFR site during most days of the year still produced at least one acute benzene HQ above 1 for most people (76 percent of all person-days modeled, as opposed to 80 percent with the 1-acre pad).
- Flowback activities during most days of the year produced at least one hourly acute benzene HQ above 1 for most people at 900 ft from the well pad or closer at the Garfield County ridge-top site (at 600 ft or closer at the Garfield County valley site). These distances at the 1-acre pads were 1,000 ft and 800 ft, respectively. For example, at 500 ft from both Garfield County sites, 77–81 percent of all person-days had HQs above 1 (relative to 88 percent at the 1-acre pads). That percentage fell below 50 at the 800-ft distance at the 3-acre valley pad (relative to 1,000 ft at the 1-acre pad; to 0 percent at 1,800 ft at both the 1- and 3-acre pads) and at 1,200-ft distance at the ridge-top 3-acre pad (same as the 1-acre site; to 7 percent at 2,000 ft from the 3-acre pad, relative to 13 percent at the 1-acre pad).

The numbers used for this figure are available in Table E-6.

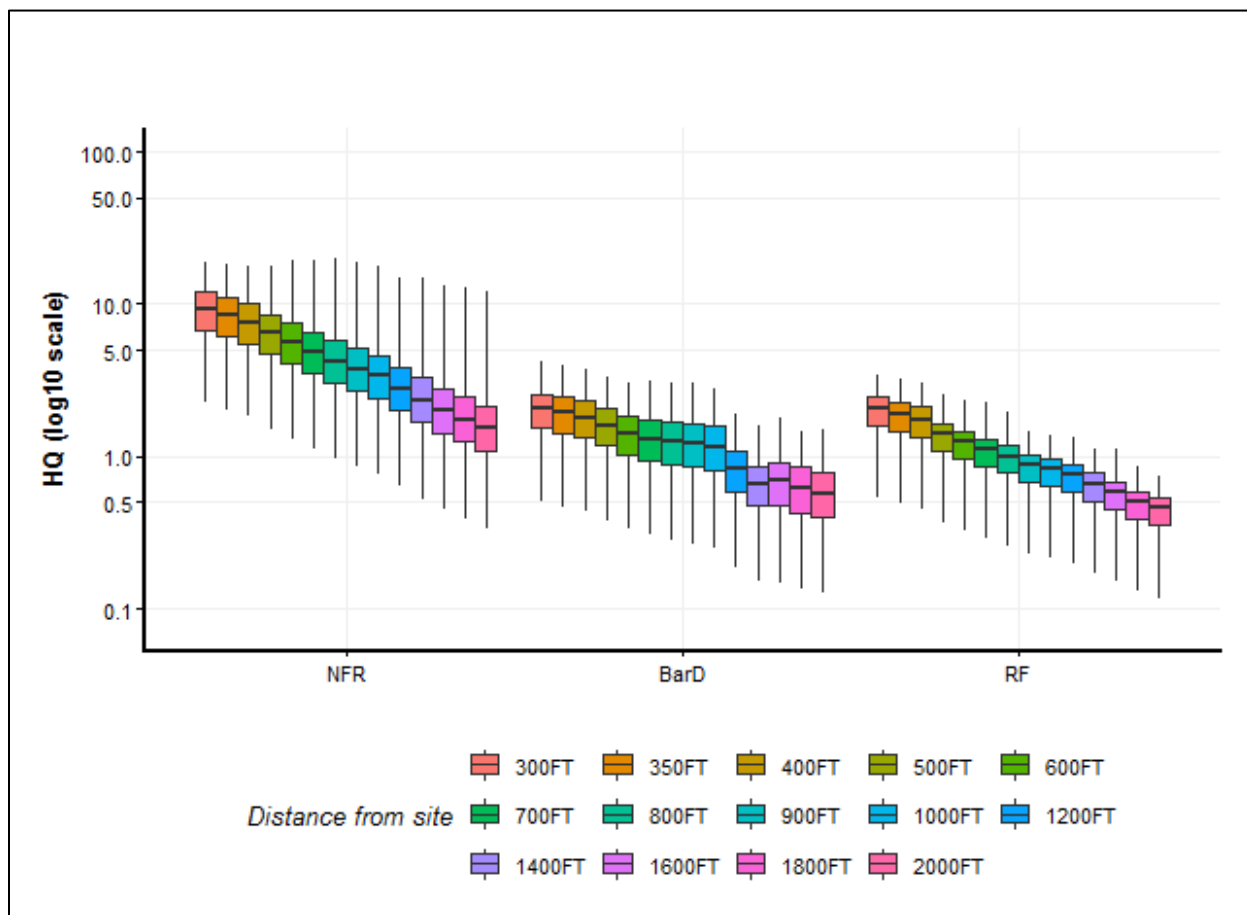
Figure 5-8 is analogous to Figure 5-4 in the 1-acre results, showing distributions of benzene HQs during flowback activities, across all person-days. The 25th-to-75th-percentile ranges of maximum person-day HQs for benzene at the 500-ft distance were 1.2–2.1, 1.1–1.6, and 4.6–8.6 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively (rather than 1.4–2.3, 1.3–2, and 5.7–11 at the 1-acre pads). These are notably lower than the absolute maximum values at that same distance: 3.3, 2.5, and 18, respectively. The median benzene HQs during flowback were 1.6, 1.4, and 6.4 at 500 ft from the three sites respectively (rather than 1.9, 1.7, and 8.1 at the 1-acre pads), which were factors of 1.9–2.7 smaller than the absolute maximum values at the same distance.

For the scenario which had the highest HQs at the 500-ft distance (benzene from flowback at NFR), Figure 5-8 shows approximately 86 percent of all maximum person-day HQs at the 500-ft distance were below 10 (up from 68 percent with the 1-acre pad), though, as shown in Figure 5-7, 100 percent of values at this distance and site were above 1. All maximum person-day benzene HQs during flowback activities at the Garfield County sites were already below 10 at the 500-ft distance, but approximately 17–20 percent of those values were below 1 (up from 10–11 percent with the 1-acre pads).



Notes: X-axis is not to scale. "Person-days" refers to the collection across the hypothetical population of each modeled individual's daily-maximum acute hazard quotients for a year of modeling. The data in this graph refer to the percentage of hazard quotients (in this collection of hazard quotients) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-7. Percentage of Daily-maximum Acute Non-cancer Hazard Quotients for Benzene (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 3-acre Well Pad during Flowback Activities



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HQ = hazard quotient; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-8. Distributions of Daily-maximum Acute Non-cancer Hazard Quotients for Benzene (Across the Hypothetical Population) at Various Distances from the 3-acre Well Pad during Flowback Activities

Overall Maximum Critical-effect-group Hazard Indices by Distance

As with the 1-acre pads, **for combined chemical exposures during development activities on a 3-acre well pad, hematological health effects (driven by benzene exposure; see Appendix B) were of primary concern, followed by neurotoxicity effects (with several VOCs contributing substantially; see Table 5-4).** Maximum critical-effect-group HIs at 500-ft were generally smaller for the 3-acre results relative to the 1-acre results (by less than about 20–30 percent on average across VOCs and O&G activities). The bullets below pertain to the selected receptor at the 500-ft distance.

- Hematological HIs, as with benzene HQs that dominate the hematological HI calculation, reached as high as 18 during flowback activities at the simulated NFR site (down from 20 at

the 1-acre pad). While they were above 10 during drilling at NFR for the 1-acre pad, they were between 1 and 10 in that scenario at the 3-acre pad and during all activities at the Garfield County 3-acre pads (below 1 during fracking at NFR).

- ◆ The primary contribution of benzene to the hematological HI also can be seen in Figure 5-9, which is analogous to Figure 5-5 in the 1-acre results.
- As with the 1-acre pads, for the 3-acre pads the HIs for neurotoxicity effects were slightly above 1 during all activities at all sites, except for fracking from the NFR site where they were below 1.
 - ◆ The HQs of several chemicals, including toluene, m+p-xylene, n-hexane, and n-decane, contributed substantially to the neurotoxicity HIs, as shown in Figure 5-9.
- Whereas at the 1-acre pads the HIs for respiratory effects were slightly above 1 during fracking activities at the Garfield County ridge-top site, at the 3-acre pads all respiratory HIs were 1 or below.

At the selected receptor at 2,000 ft from the well pad, the hematological HI was 12 during flowback at the NFR site, corresponding to the benzene HQ of 12 there. Otherwise, all other HIs were less than 10. HIs were between 1 and 10 at the selected 2,000-ft receptor for

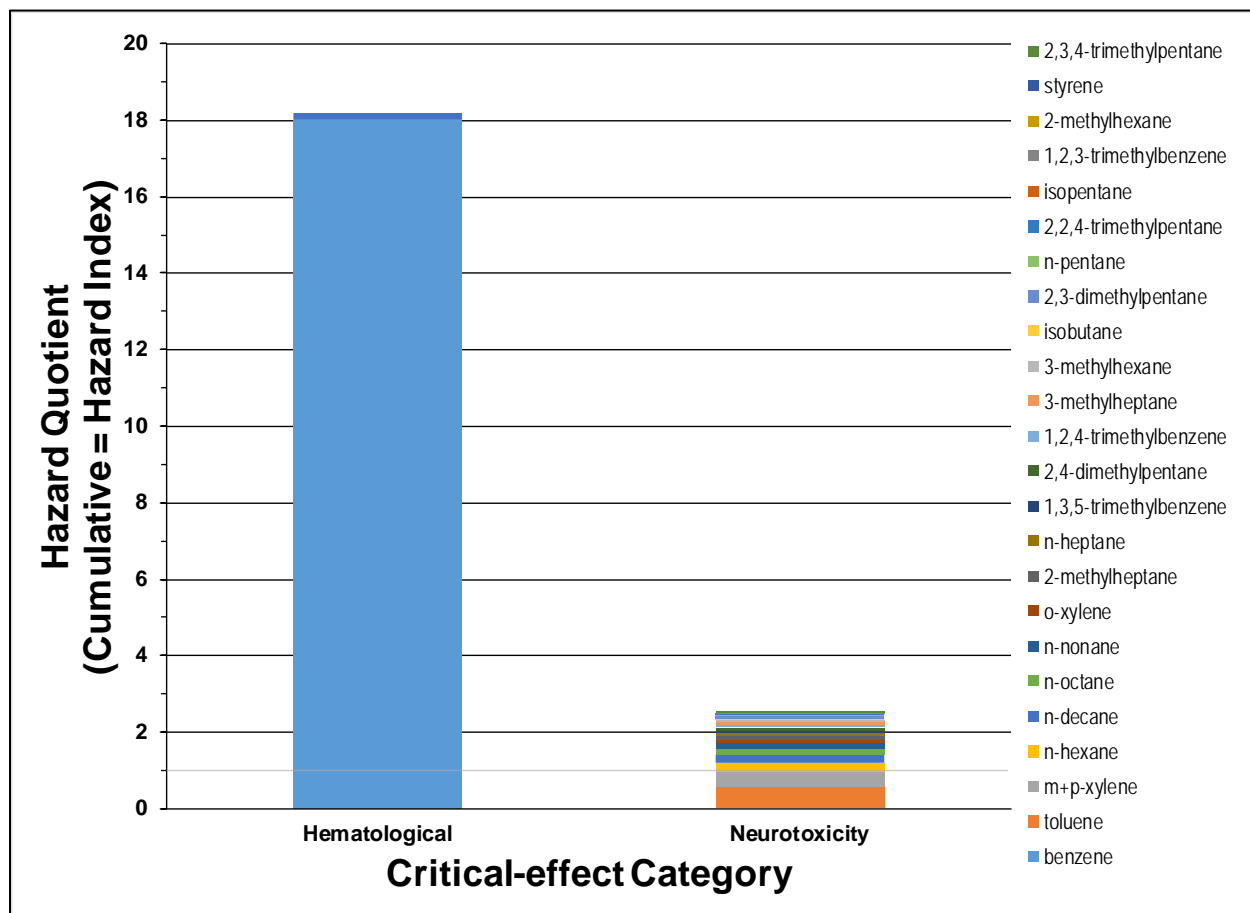
- hematological effects at all three sites (HI=1.7–4.9, rather than 2–5.3 at the 1-acre pads), during all activities except for flowback at the Garfield County valley site and fracking and flowback at the NFR site; and
- neurotoxicity effects during drilling and flowback at the Garfield County ridge-top site, and, contrary to the 1-acre results, also during flowback at the NFR site (HI=1.1–1.6, rather than 0.68–1.5 at the 1-acre pads; HI below 1 in all other cases).

Note that we were not able to assign some chemicals, including ethyltoluenes, to any acute critical-effect groups (see Appendix B). A more detailed presentation of these HI values can be found in Table E-7, and Table E-8 contains data on the percentage of daily-maximum acute HIs above 1. The same HQ trends with distance discussed above exist also for HIs. Specifically, as distance increased, HIs generally decreased and frequencies of HIs above 1 decreased for all modeled scenarios and critical-effect groups at the 3-acre development well pad.

Table 5-4. Overview of the Largest Acute Non-cancer Hazard Indices during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Well Pad

Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none		hematological	none		hematological
Between 1 and 10	Drilling	hematological neurotoxicity	hematological neurotoxicity	hematological neurotoxicity	hematological neurotoxicity	hematological	hematological
	Fracking	hematological neurotoxicity	hematological neurotoxicity	none	hematological	hematological	none
	Flowback	hematological neurotoxicity	hematological neurotoxicity	neurotoxicity	hematological neurotoxicity	none	neurotoxicity
0.1 to 1	Drilling	none			none	neurotoxicity	neurotoxicity
	Fracking	respiratory sensory systemic	respiratory sensory systemic	hematological	neurotoxicity respiratory	neurotoxicity respiratory	hematological
	Flowback	respiratory sensory	respiratory sensory	endocrine respiratory sensory	respiratory sensory	hematological neurotoxicity respiratory sensory	endocrine respiratory sensory

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: Gray line emphasizes hazard quotient/index=1. The order of chemicals listed in the legend matches the order of plotting (e.g., benzene plotted first on the bottom if applicable to that critical-effect group, then toluene, etc.). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-9. Approximate Chemical Contributions to the Largest Hazard Indices of Selected Critical-effect Groups: Acute Non-cancer Assessment for the Highest Exposed Hypothetical Individuals at 500 Feet from the 3-acre Well Pad during Flowback Activities at the Northern Front Range Site

5.3.1.3. 5-acre Well Pad

For the 5-acre scenarios discussed here, compared to the 1-acre and 3-acre scenarios discussed in Sections 5.3.1.1 and 5.3.1.2, respectively, HQs (Table 5-5, Figure 5-10) and HIs (Table 5-6), and frequencies of HQs and HIs above 1 on a daily basis (Figure 5-11), **tended to be lower**. The distributions of HQs (Figure 5-12) also tended to be shifted to lower values for the 5-acre scenarios than the 1- and 3-acre scenarios. These relationships between 5-acre results and 1- and 3-acre results was not universal for reasons discussed in Section 5.3.1.2.

Overall Maximum Chemical Hazard Quotients by Distance

As with the 1- and 3-acre pads, for the 5-acre assessment **benzene and 2-ethyltoluene were of primary concern, sometimes showing acute HQs above 10 at the selected receptors**

500-ft downwind during development activities (Table 5-5, Table E-9). **Toluene and 3-ethyltoluene were of lesser concern, with HQs sometimes above 1 in the same locations.**

This was particularly true during flowback activities. Maximum chemical HQs at 500 ft were generally smaller for the 5-acre results relative to the 3-acre results (by less than about 20–60 percent on average across VOCs and O&G activities), which themselves were generally smaller than the 1-acre results (as discussed in Section 5.3.1.2). The bullets below pertain to maximum HQs at the selected receptor at the 500-ft distance.

- Benzene HQs reached as high as 12 during flowback activities at the simulated NFR site (down from 18 at the 3-acre pad). As with the 3-acre pad, benzene HQs were below 10 in that and all other scenarios at 5-acre pads, and, as with the 3-acre pad, below 1 during fracking at NFR.
- Comparing results between the 5-acre and 3-acre pads, HQs for 2-ethyltoluene decreased from 13 to 11 and from 11 to 9.3 at the 5-acre pad for flowback at the Garfield County ridge-top and valley sites, respectively. As with the 3-acre pad, 2-ethyltoluene HQs were below 1 in all other cases (all activities at the NFR site, and drilling and fracking at the Garfield County sites).
- As with the results at the 3-acre pad, toluene HQs at the 5-acre pad were slightly above 1 during drilling at all three sites, changing from 1.8, 1.7, and 1.7 at the 3-acre Garfield County ridge-top, Garfield County valley, and NFR pads, respectively, to 1.4, 1.4, and 1.5 at the 5-acre pads. HQs were below 1 in all other cases.
- As with the assessment of 3-acre pads, HQs for 3-ethyltoluene at the 5-acre pad were slightly above 1 during flowback activities at the Garfield County ridge-top site (but not the valley site, where HQs were slightly above 1 at the 3-acre pad), changing from 1.4 and 1.1 at the 3-acre ridge-top and valley sites, respectively, to 1.2 and 0.97 at the 5-acre pads. HQs were below 1 in all other cases.

At the selected receptors at 2,000 ft, maximum HQs were between 1 and 10 at the selected 2,000-ft receptor for

- benzene at all three sites (HQ=1.6–4.4, as opposed to HQ=1.5–4.9 at the 3-acre pads), during all activities except for flowback at the Garfield County valley site and fracking at the NFR site, where HQs were below 1 (note that benzene HQs were above 10 in the 3-acre scenario, but not the 5-acre scenario, for flowback from the NFR site); and
- 2-ethyltoluene during flowback at the Garfield County sites (HQ=2.8–6.2, as opposed to HQ=2.9–6.7 at the 3-acre pad), with HQs below 1 in all other cases.

(Note that toluene HQs associated with the 5-acre pads were below 1 at the 2,000-ft distance, which was not the case with the 3-acre Garfield County ridge-top drilling scenario where HQ was 1.1.)

Comparing HQs between the three sites, while the highest maximum HQs at 500 ft from the well pad corresponded to the NFR site (e.g., the benzene HQ of 18 during flowback at NFR), and while there are notable other differences by chemical and activity, the HQs averaged across chemicals, activities, and distances were less than 60-percent different between the three sites.

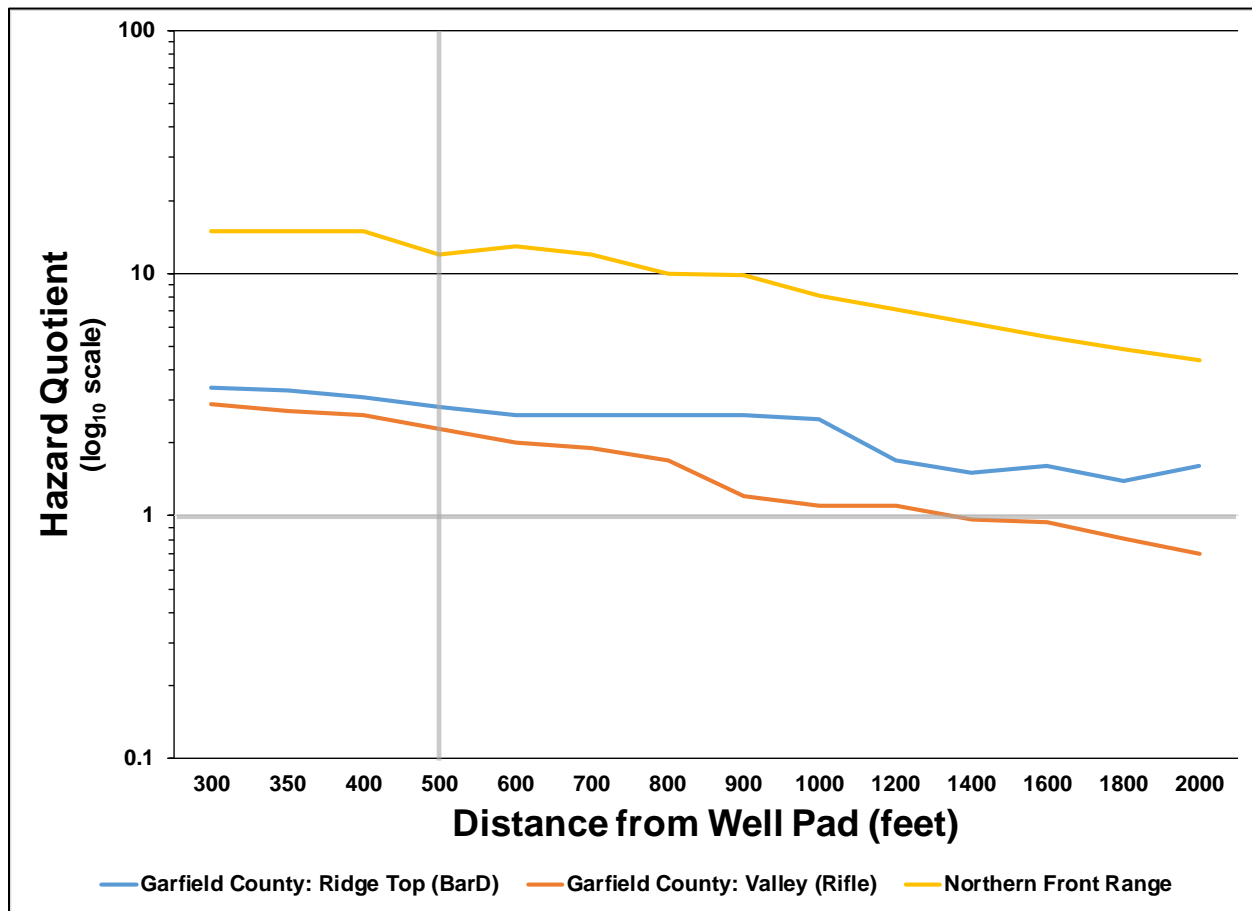
Table 5-5. Overview of the Largest Acute Non-cancer Hazard Quotients during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	2-ET	none	benzene	none		
Between 1 and 10	Drilling	benzene	benzene	benzene	benzene	benzene	benzene
		toluene	toluene	toluene			
	Fracking	benzene	benzene	none	benzene	benzene	none
	Flowback	3-ET	2-ET	none	2-ET	2-ET	benzene
0.1 to 1	Fracking	benzene	benzene		benzene		
		2-ET	2-ET	benzene	2-ET	2-ET	benzene
		3-ET	3-ET		m+p-xylene	m+p-xylene	
		CHX	CHX		toluene	toluene	
		m+p-xylene	m+p-xylene				
		MCHX	MCHX				
		n-decane	n-decane				
		toluene	toluene				
		T2B	T2B				
	Flowback	123-TMB	123-TMB	3-ET	123-TMB	13-DEB	3-ET
		124-TMB	124-TMB	CHX	124-TMB	3-ET	CHX
		135-TMB	135-TMB	m+p-xylene	135-TMB	4-ET	toluene
		13-DEB	13-DEB	MCHX	13-DEB	benzene	
		4-ET	3-ET	n-decane	3-ET	IPB	
		CHX	4-ET	n-hexane	4-ET	m+p-xylene	
		IPB	CHX	n-nonane	IPB	n-decane	
		m+p-xylene	IPB	n-octane	m+p-xylene	n-PB	
		MCHX	m+p-xylene	toluene	n-decane	toluene	
		n-decane	MCHX		n-PB		
		n-nonane	n-decane		toluene		
		n-PB	n-nonane				
		o-xylene	n-PB				
		styrene	o-xylene				
		toluene	styrene				
			toluene				

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

CHX = cyclohexane; DEB = diethylbenzene; ET = ethyltoluene; IPB = isopropylbenzene; MCHX = methylcyclohexane; PB = propylbenzene; T2B = trans-2-butene; TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Figure 5-10 is analogous to the 3-acre Figure 5-6 (showing trends with distance in maximum benzene HQs at the selected receptors during flowback activities). Both figures show the same general trends in HQs with distance at the Garfield County sites, with HQs at the ridge-top site meandering somewhat between 300 and 1,000 ft before decreasing more steadily thereafter (due to complex interactions between the well-pad emission plume and local meteorology, as well as the exact locations of the selected receptors). As noted above, while the HQ remained above 10 at all distances for the 3-acre pad at the NFR site, it drops below 10 by 900 ft from the 5-acre pad. The HQ at the Garfield County valley site also drops below 1 at a closer distance from the 5-acre pad relative to the 3-acre pad (by 1,400 ft rather than 1,800 ft). Table E-9 shows all modeled values for each site and VOC, including those used to create this graph.



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard quotient=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10.

Figure 5-10. Largest Acute Non-cancer Hazard Quotients for Benzene, for the Highest Exposed Hypothetical Individuals at Various Distances from the 5-acre Well Pad during Flowback Activities

Analysis of Person-day Chemical Hazard Quotients by Distance

Figure 5-11 is analogous to the 3-acre Figure 5-7 (showing trends with distance in the percentage of population person-days with maximum benzene HQs at the selected receptors exceeding 1 during flowback activities). Both figures show that these daily-maximum HQs are above 1 for most hypothetical people on most days at distances closer to the well pad (at the Garfield County sites) or at all distances (at the NFR site). The slopes of these Garfield County lines are generally steeper for the 5-acre pads relative to 3-acres, meaning that these percentages tend to drop more rapidly with distance, which is a reflection of the generally lower HQ values near 5-acre pads relative to 3-acre pads.

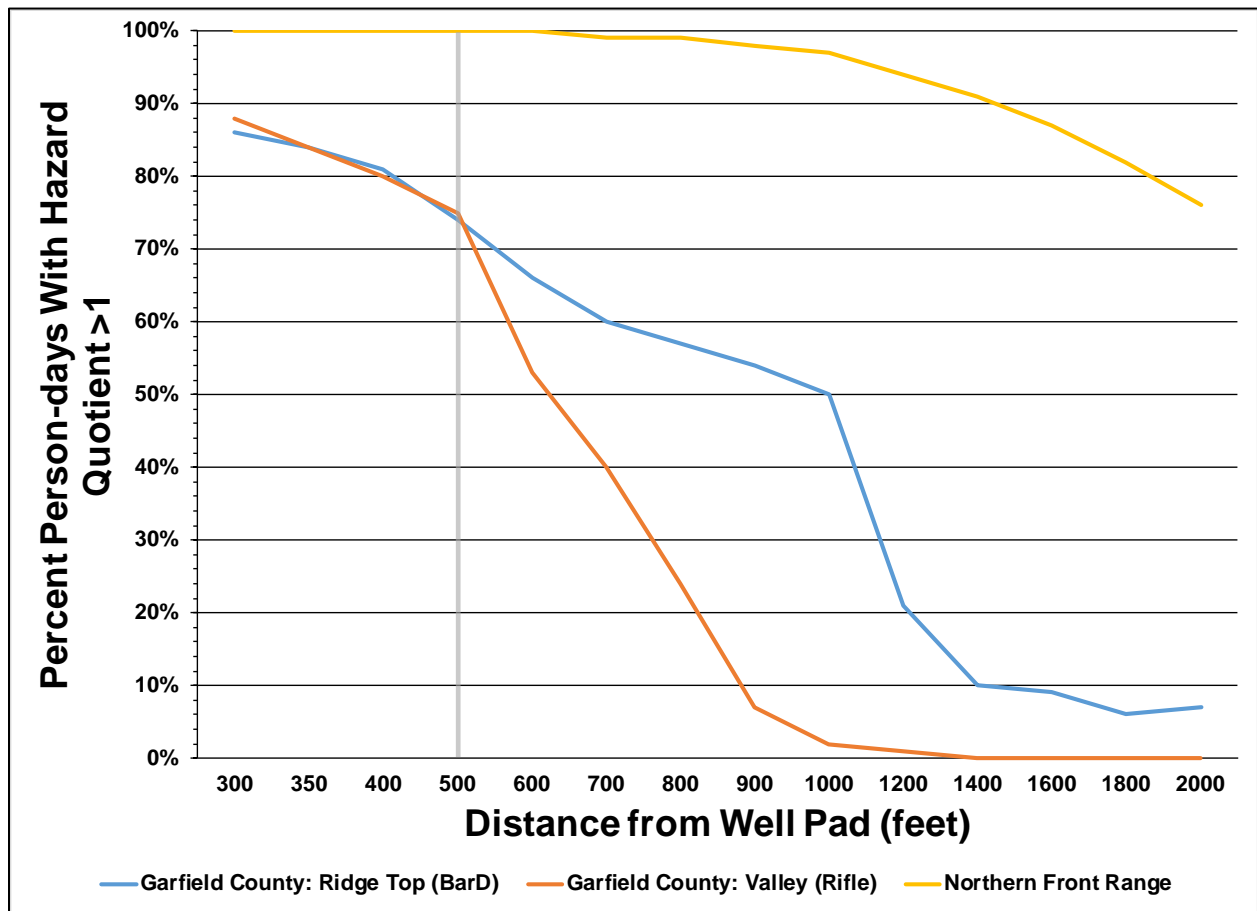
- At distances 300–600 ft from the 5-acre NFR well pad, flowback activities during any day of the year produced at least one hourly acute benzene exposure above criteria levels (HQ above 1) for all simulated individuals (this was also true at 700 ft for the 3-acre pad).

-
- ◆ By the 2,000-ft distance, flowback activities at the NFR site during most days of the year still produced at least one acute benzene HQ above 1 for most people (76 percent of all person-days modeled, same as with the 3-acre pad).
 - Flowback activities during most days of the year produced at least one hourly acute benzene HQ above 1 for most people at 700 ft from the well pad or closer at the Garfield County ridge-top site (at 500 ft or closer at the Garfield County valley site). These distances at the 3-acre pads were 900 ft and 600 ft, respectively. For example, at 500 ft from both Garfield County sites, 74–75 percent of all person-days had HQs above 1 (relative to 77–81 percent at the 3-acre pads). That percentage fell below 50 at the 700-ft distance at the 5-acre valley pad (relative to 800 ft at the 3-acre pad; to 0 percent at 1,400 ft, relative to 1,800 ft at the 3-acre pads) and at 1,200-ft distance at the ridge-top 5-acre pad (same as the 1-acre site; to 7 percent at 2,000 ft from both the 3- and 5-acre pads).

The numbers used for this figure are available in Table E-10.

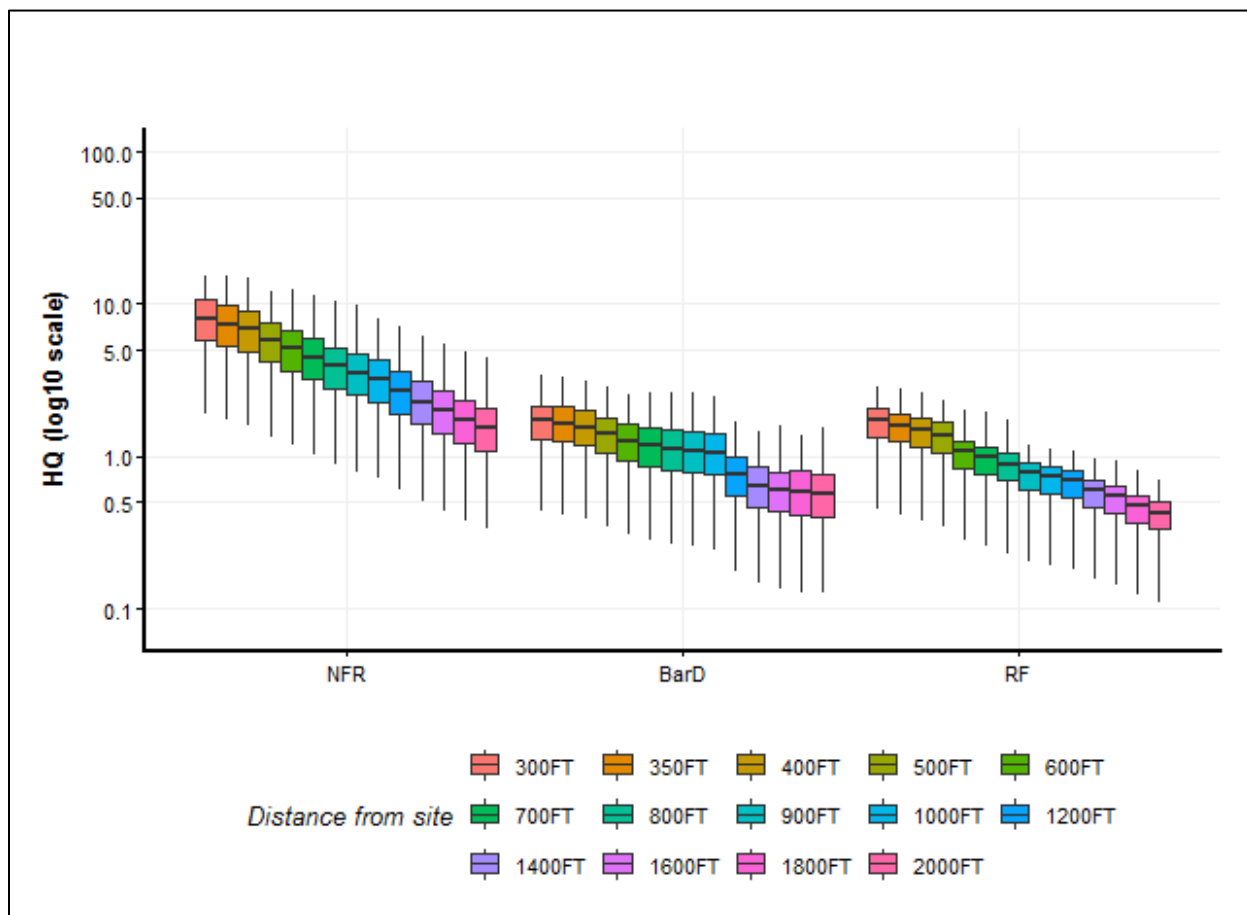
Figure 5-12 is analogous to Figure 5-8 in the 3-acre results, showing distributions of benzene HQs during flowback activities, across all person-days. The 25th-to-75th-percentile ranges of maximum person-day HQs for benzene at the 500-ft distance were 1–1.8, 1–1.7, and 4.1–7.6 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively (rather than 1.2–2.1, 1.1–1.6, and 4.6–8.6 at the 3-acre pads). These are notably lower than the absolute maximum values at that same distance: 2.8, 2.3, and 12, respectively. The median benzene HQs during flowback were 1.4, 1.4, and 5.8 at 500 ft from the three sites respectively (rather than 1.6, 1.4, and 6.4 at the 3-acre pads), which were factors of 1.6–2.1 smaller than the absolute maximum values at the same distance.

For the scenario which had the highest HQs at the 500-ft distance (benzene from flowback at NFR), Figure 5-12 shows that approximately 95 percent of all maximum person-day HQs at the 500-ft distance were below 10 (up from 86 percent with the 3-acre pad), though, as shown in Figure 5-11, 100 percent of values at this distance and site were above 1. All maximum person-day benzene HQs during flowback activities at the Garfield County sites were already below 10 at the 500-ft distance, but approximately 22–23 percent of those values were below 1 (up from 17–20 percent with the 3-acre pads).



Notes: X-axis is not to scale. "Person-days" refers to the collection across the hypothetical population of each modeled individual's daily-maximum acute hazard quotients for a year of modeling. The data in this graph refer to the percentage of hazard quotients (in this collection of hazard quotients) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-11. Percentage of Daily-maximum Acute Non-cancer Hazard Quotients for Benzene (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 5-acre Well Pad during Flowback Activities



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HQ = hazard quotient; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-12. Distributions of Daily-maximum Acute Non-cancer Hazard Quotients for Benzene (Across the Hypothetical Population) at Various Distances from the 5-acre Well Pad during Flowback Activities

Overall Maximum Critical-effect-group Hazard Indices by Distance

As with the 3-acre pads, **for combined chemical exposures during development activities on a 5-acre well pad, hematological health effects (driven by benzene exposure; see Appendix B) were of primary concern, followed by neurotoxicity effects (with several VOCs contributing substantially; see Table 5-6).** Maximum critical-effect-group HIs at 500-ft were generally smaller for the 5-acre results relative to the 3-acre results (by less than about 30–60 percent on average across VOCs and O&G activities). The bullets below pertain to the selected receptor at the 500-ft distance.

- Hematological HIs, as with benzene HQs that dominate the hematological HI calculation, reached as high as 12 during flowback activities at the simulated NFR site (down from 18 at

the 3-acre pad). As with the 3-acre pad, at the 5-acre pad they were between 1 and 10 during drilling at the NFR site and during all activities at the Garfield County sites (below 1 during fracking at NFR).

- ◆ The primary contribution of benzene to the hematological HI also can be seen in Figure 5-13, which is analogous to Figure 5-9 in the 3-acre results.
- As with the 3-acre pads, for the 5-acre pads the HIs for neurotoxicity effects were slightly above 1 during all activities at all sites, except for fracking from the NFR site where they were below 1.
 - ◆ The HQs of several chemicals, including toluene, m+p-xylene, n-hexane, and n-decane, contributed substantially to the neurotoxicity HIs, as shown in Figure 5-13.
- Similar to the results on 3-acre pads, at the 5-acre pads all respiratory HIs were below 1.

At the selected receptor at 2,000 ft from the well pad, HIs were between 1 and 10 for

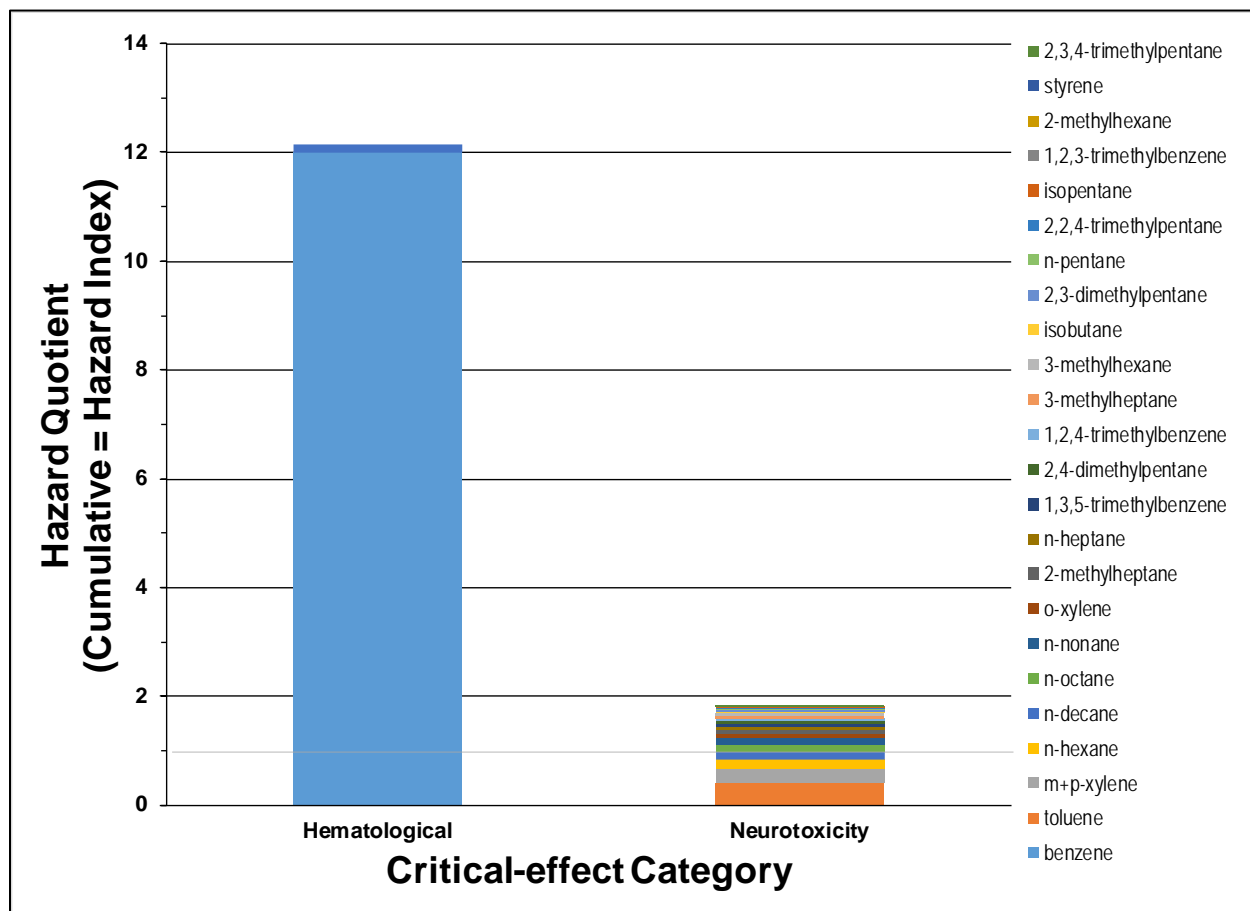
- hematological effects at all three sites (HI=1.7–4.5, rather than 1.7–12 at the 3-acre pads), during all activities except for flowback at the Garfield County valley site and fracking and flowback at the NFR site; and
- neurotoxicity effects during flowback at the Garfield County ridge-top site (HI=1.2, rather than 1.3 at the 3-acre pad), but, contrary to the 3-acre results, not during drilling at the same site or flowback at the NFR site (where 5-acre HQs were below 1).

Note that we were not able to assign some chemicals, including ethyltoluenes, to any acute critical-effect groups (see Appendix B). A more detailed presentation of these HI values can be found in Table E-11, and Table E-12 contains data on the percentage of daily-maximum acute HIs above 1. The same HQ trends with distance discussed above exist also for HIs. Specifically, as distance increased, HIs generally decreased and frequencies of HIs above 1 decreased for all modeled scenarios and critical-effect groups at the 5-acre development well pad.

Table 5-6. Overview of the Largest Acute Non-cancer Hazard Indices during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none		hematological	none		
Between 1 and 10	Drilling	hematological neurotoxicity	hematological neurotoxicity	hematological neurotoxicity	hematological	hematological	hematological
	Fracking	hematological neurotoxicity	hematological neurotoxicity	none	hematological	hematological	none
	Flowback	hematological neurotoxicity	hematological neurotoxicity	neurotoxicity	hematological neurotoxicity	none	hematological
0.1 to 1	Drilling	none			neurotoxicity	neurotoxicity	neurotoxicity
	Fracking	respiratory sensory systemic	respiratory sensory systemic	hematological	neurotoxicity respiratory	neurotoxicity respiratory	hematological
	Flowback	respiratory sensory	respiratory sensory	endocrine respiratory sensory	respiratory sensory	hematological neurotoxicity respiratory sensory	neurotoxicity respiratory

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: Gray line emphasizes hazard quotient/index=1. The order of chemicals listed in the legend matches the order of plotting (e.g., benzene plotted first on the bottom if applicable to that critical-effect group, then toluene, etc.). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-13. Approximate Chemical Contributions to the Largest Hazard Indices of Selected Critical-effect Groups: Acute Non-cancer Assessment for the Highest Exposed Hypothetical Individuals at 500 Feet from the 5-acre Well Pad during Flowback Activities at the Northern Front Range Site

5.3.2. Subchronic Non-cancer Hazards

In this section, we discuss the potential for subchronic (multi-day) exposures above health-criteria levels, due to emissions from individual O&G development activities (see Section 5.5.1 for a discussion on subchronic exposures during development activities in sequence). We discuss the results of each size of well pad separately: 1 acre (Section 5.3.2.1), 3 acre (Section 5.3.2.2), and 5 acre (Section 5.3.2.3). Within each subsection, we stratify the results by O&G activity as well. Recall that all modeled sites are hypothetical.

Emissions of all chemicals during all activities at all sites were at or below subchronic health-criteria levels at distances 500-ft from the well pad and beyond (e.g., Table 5-7, Table 5-9, and Table 5-11). At distances closer than 500 ft from the well pad, exposures to m+p-xylene, n-nonane, and benzene were of primary concern, due to maximum HQs slightly above 1 during fracking and flowback (e.g., Table E-13, Table E-17, and Table E-

21). **At distances out to about 800 ft from the well pad, exposures to trimethylbenzenes were also of concern due to their contributions to maximum neurotoxicity and hematological HI values that were slightly above 1** (e.g., Figure 5-14, Figure 5-18, Figure 5-22, Table E-15, Table E-19, and Table E-23). **HQs and HIs decreased with distance from the well pad** (e.g., Figure 5-15, Figure 5-19, and Figure 5-23), **and for most chemicals the exposures were always well below criteria levels even during the worst simulated conditions.**

While the highest subchronic HQs and HIs were largest at the Garfield County ridge-top site, on average across chemicals/critical-effect groups, distances, and O&G activities the differences in HQs and HIs between that and the other two sites were less than a factor of 3, with values at the NFR site tending to be the lowest. As with the acute assessment, our modeling also indicated **small or negligible differences between simulated individuals in different age groups** in their typical and higher subchronic HQs and HIs, as expected based on the exposure modeling (see Section 3.5.1). Our discussion in this subchronic section does not differentiate results by age group (focusing on ages up to 17 years for convenience), though results stratified by age group can be found in Appendix E.1.2.

Differences in the maximum chemical HQs and critical-effect-group HIs by distance were noticeable when comparing 1-, 3-, and 5-acre well-pad scenarios. We previously noted these differences in terms of air concentrations (Section 2.9.1.5) and subchronic exposures (Section 3.5.4). These comparisons **typically showed smaller subchronic HQs and HIs at 3- and 5-acre pads relative to 1-acre pads. There is mixed comparison of maximum values stratified by distance, between 5- and 3-acre pads:** the 3-acre values were most often larger than the 5-acre values at the NFR site, while the 5-acre values tended to be larger at the Garfield County sites. As with acute HQs and HIs, **these differences tended to be smaller at farther distances from the well pad.** These are average differences, and for individual chemicals/critical-effect groups and activities the differences can be larger in either direction. These variations may be due to several factors, including: the complex interactions between the initial plume and meteorological parameters such as wind flow and turbulence, the focus here on maximum subchronic values rather than averages or medians, and the selection of the target receptor at each distance, which occurred independently by well-pad size.

The HQs and HIs were generally lower in subchronic evaluations compared to acute evaluations due to the effect of averaging hourly exposures (some high and some low, according to hour-by-hour variations in air concentrations) over multiple days (that is, subchronic scenarios are not as “conservative” as acute scenarios, which focus on the highest acute exposures). Though subchronic health criteria values tended to be more stringent (lower) than acute criteria values, the subchronic exposures were low enough so that no subchronic HQs were greater than 10, which was not the case for acute HQs. Similar to the acute assessment, the highest subchronic HQs still reflect narrow subsets of the potentially exposed population during relatively rare exposure scenarios (individuals assumed to live at the highest exposure locations during meteorological conditions favoring high exposures; see Section 5.1). When comparing an individual chemical’s HQs between the acute and subchronic assessment, one must keep in mind these differences in averaging time and criteria value, and also keep in mind that the air concentrations changed between these assessments—hour-by-hour air concentrations in the acute assessment were the maximum values found in the AERMOD Monte Carlo iterations, while those in the subchronic assessment were the mean values of

those iterations. One chemical's maximum emissions may be higher than another's, but the opposite may be true of mean emissions.

As with the above sections on acute results, the subchronic results presented below focus first on the highest simulated exposures (especially at 500 and 2,000 ft from the well pad, and especially those leading to HQs and HIs above 1), and then we put those highest results into context of the full distributions of results. These distributions, at the selected receptor at a given distance from the well, consist of 365 multi-day periods for each of the 1,000 simulated individuals. Each multi-day period begins on a different day of the year and extends through the assumed duration of the O&G activity (see Table 3-3). We generally do not discuss the many chemicals whose maximum HQs were below 0.1. A more detailed presentation of HQs and HIs at various distances can be found in Section E.1.2.

5.3.2.1. 1-acre Well Pad

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

At the selected receptor at 500 ft from the well pad, contrary to the acute results discussed in Section 5.3.1, all VOC HQs were 1 or below (Table 5-7, Table E-13). At 2,000 ft from the pad, only the highest m+p-xylene exposures corresponded to an HQ slightly above 0.1 (all other HQs were below 0.1).

However, HQs for chemicals belonging to the hematological and neurotoxicity critical-effect groups sometimes aggregated to HIs slightly above 1 at the 500-ft distance (Table 5-8, Figure 5-14, Table E-15). **Due to these HQ aggregations, m+p-xylene, n-nonane, benzene, and trimethylbenzenes during fracking operations at the Garfield County sites were of primary concern for subchronic exposures at distances within about 800 ft of 1-acre well pads. All HIs were 1 or below at 900-ft distances and beyond, which was not the case with the acute HIs.** Figure 5-15 illustrates trends with distance in the maximum neurotoxicity HIs at the selected receptors during fracking activities. These HIs fell to 1 or below by the 900-ft distance at the Garfield County sites, and they were always below 1 at the NFR site and fell below the 0.01 level by the 1,400-ft distance. Table E-15 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Comparing HQs and HIs between the three sites, the HQs and HIs averaged across chemicals, activities, and distances were within a factor of 3 between the Garfield County ridge-top site and the NFR site, and within about 15 percent between the two Garfield County sites.

Table 5-7. Overview of the Largest Subchronic Non-cancer Hazard Quotients during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Well Pad

Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none			none		
Between 1 and 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none			none		
0.1 to 1	Drilling	benzene toluene	benzene	benzene	none		
	Fracking	123-TMB 135-TMB benzene m+p-xylene n-nonane	124-TMB 135-TMB benzene n-nonane	none	m+p-xylene	m+p-xylene	none
	Flowback	123-TMB 124-TMB 135-TMB benzene m+p-xylene n-nonane	124-TMB 135-TMB m+p-xylene n-nonane	124-TMB 135-TMB benzene m+p-xylene n-nonane	none		

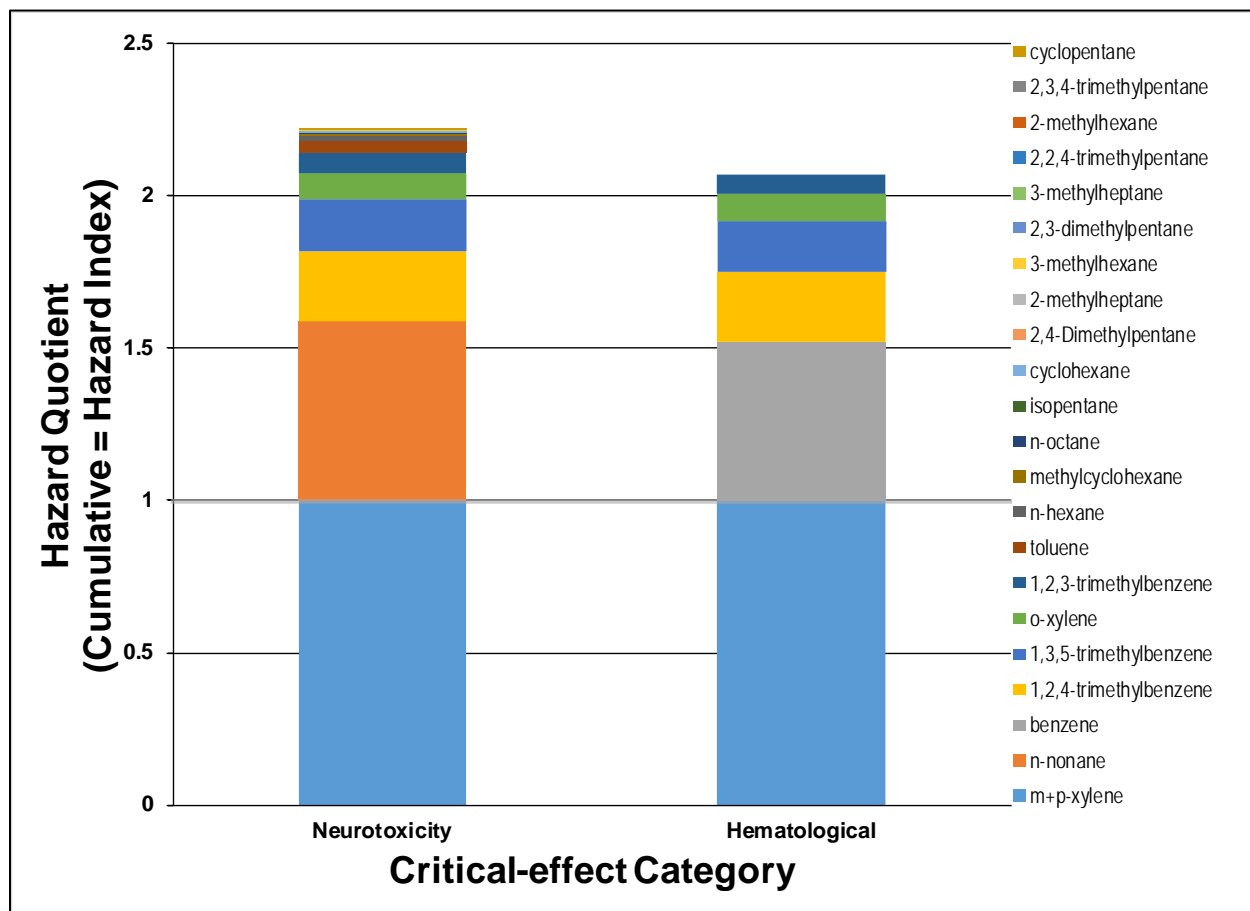
Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Table 5-8. Overview of the Largest Subchronic Non-cancer Hazard Indices during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Well Pad

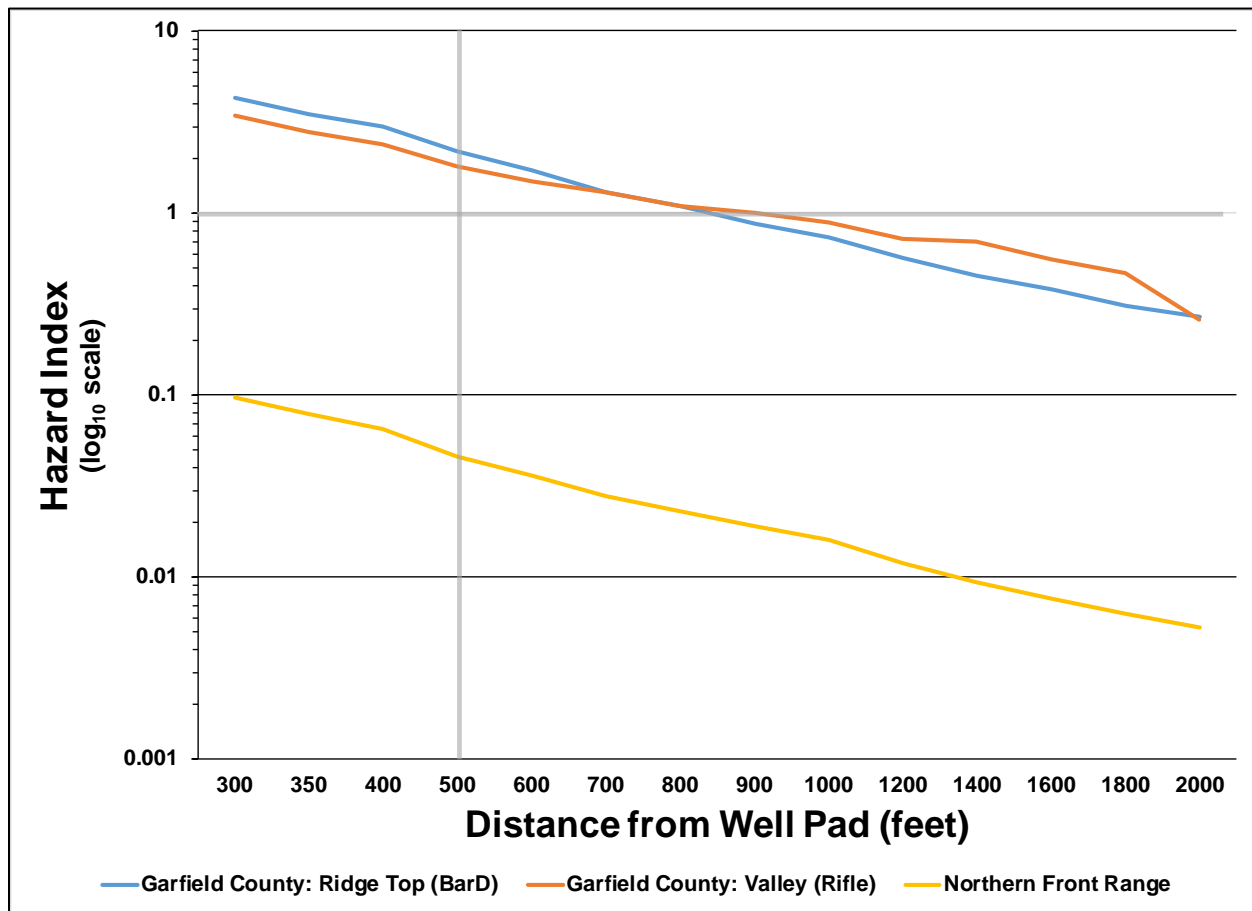
Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none			none		
Between 1 and 10	Drilling	none			none		
	Fracking	hematological neurotoxicity	hematological neurotoxicity	none	none		
	Flowback	none			none		
0.1 to 1	Drilling	hematological neurotoxicity	hematological neurotoxicity	hematological neurotoxicity	none		
	Fracking	respiratory systemic	respiratory	none	hematological neurotoxicity	hematological neurotoxicity	none
	Flowback	hematological neurotoxicity respiratory systemic	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	none	neurotoxicity	hematological

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: Gray line emphasizes hazard quotient/index=1. The order of chemicals listed in the legend matches the order of plotting (e.g., m+p-xylene plotted first on the bottom if applicable to that critical-effect group, then n-nonane, etc.). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-14. Approximate Chemical Contributions to the Largest Hazard Indices of Selected Critical-effect Groups: Subchronic Non-cancer Assessment for the Highest Exposed Hypothetical Individuals at 500 Feet from the 1-acre Well Pad during Fracking Activities at the Garfield County Ridge-top Site



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

Figure 5-15. Largest Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 1-acre Well Pad during Fracking Activities

Analysis of Person-period Critical-effect-group Hazard Indices by Distance

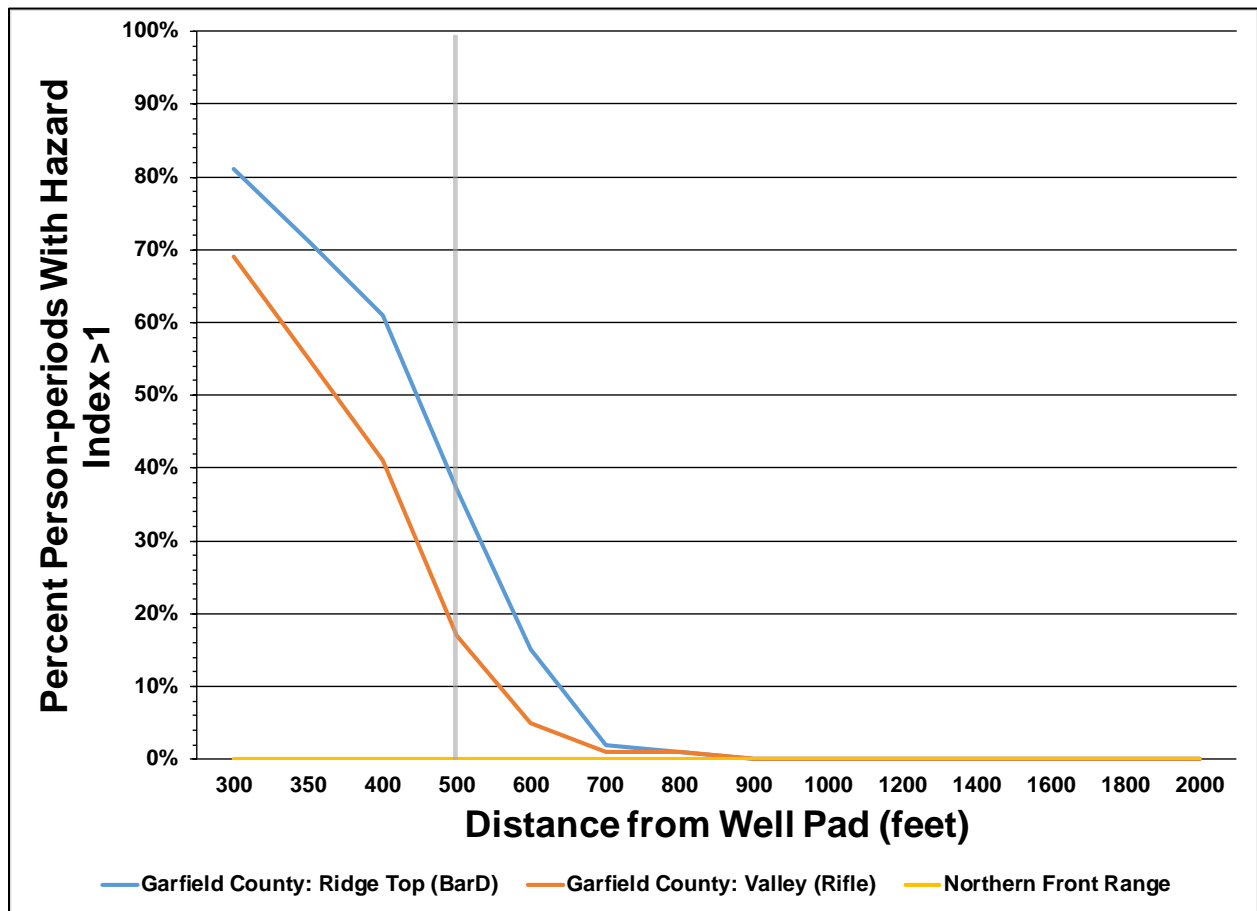
For the same scenarios used in Figure 5-15, in Figure 5-16 we illustrate the frequency of maximum subchronic HIs reaching above a value of 1. These percentages are taken from the collection of each simulated individual's 365 multi-day subchronic HIs (which we term "person-periods"), for 1,000 simulated youths up to 17 years old at each selected downwind receptor. The results for all age groups are nearly identical (see Sections 3.5.1 and E.1). This analysis shows how often (on a multi-day basis) HIs above 1 occurred across a year of modeled subchronic scenarios for development activities at 1-acre well pads. A value of 100 percent would indicate that every simulated individual experienced a subchronic HI above 1 on every multi-day period of the year. A value of 50 percent indicates that, among the 365,000 subchronic HI data points across the population at a receptor, about half of them (about 182,500) were above 1.

In this example, under the conservative exposure assumptions used in this analysis (high emissions and unfavorable meteorology), the model results indicated the characteristics we note below.

- As noted earlier, no neurotoxicity HIs were above 1 during fracking at the NFR site.
- At distances 300–400 ft from the 1-acre pad at the Garfield County ridge-top site, and at 300 ft from the pad at the Garfield County valley site, fracking activities during most multi-day periods of the year produced subchronic neurotoxicity HIs above 1 for most people.
 - ◆ By the 700-ft distance from the Garfield County pads, subchronic neurotoxicity HIs above 1 were rare, and they did not occur by the 900-ft distance (whereas acute neurotoxicity HIs above 1 did occur beyond these distances from the Garfield County pads).

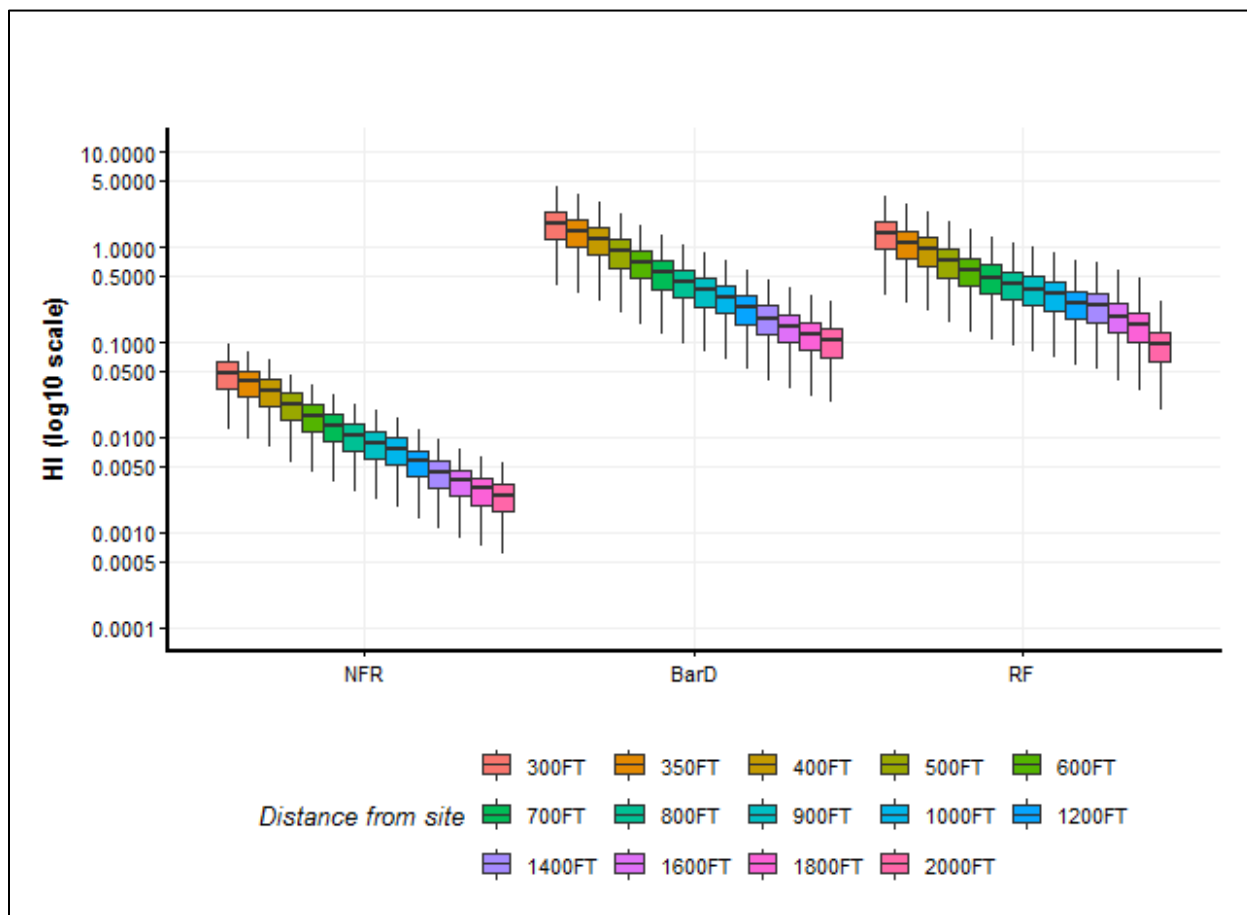
Generally, the rate of decline in these percentages with distance will vary across chemicals/critical-effect groups, sites, and O&G activities, depending on several factors. Table E-16 shows the percentage of person-periods with HI above 1 for all critical-effect groups, including those used to create this graph (see Table E-14 for HQs).

Figure 5-17 contains box-and-whisker plots reflecting the distributions of neurotoxicity HIs during fracking activities, across all person-periods, stratified by O&G site and distance. The 25th-to-75th-percentile ranges of person-period HIs for neurotoxicity at the 500-ft distance were 0.6–1.2, 0.48–0.95, and 0.015–0.029 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively. These were notably lower than the absolute maximum values at that same distance: 2.2, 1.8, and 0.046, respectively. The median neurotoxicity HIs during fracking were 0.9, 0.71, and 0.022 at 500 ft from the three sites respectively, which were factors of 2.1–2.5 smaller than the absolute maximum values at the same distance.



Notes: X-axis is not to scale. "Person-periods" refers to the collection across the hypothetical population of each modeled individual's subchronic hazard indices for a year of modeling (the "rolling averages" referred to in Section 3.3.2.2). The data in this graph refer to the percentage of hazard indices (in this collection of hazard indices) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-16. Percentage of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 1-acre Well Pad during Fracking Activities



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-17. Distributions of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 1-acre Well Pad during Fracking Activities

5.3.2.2. 3-acre Well Pad

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

At the selected receptor at 500 ft from the 3-acre well pad, as with the 1-acre results discussed in Section 5.3.2.1, all VOC HQs were 1 or below (Table 5-9, Table E-17). At 2,000 ft from the 3-acre pad, contrary to the 1-acre pad, all HQs were well below 0.1. Maximum chemical HQs and critical-effect-group HIs at 500 ft were generally smaller for the 3-acre results relative to the 1-acre results (by less than about a factor of 2 on average across VOCs/critical-effect groups, O&G activities, and sites).

However, HQs for chemicals belonging to the hematological and neurotoxicity critical-effect groups sometimes aggregated to HIs slightly above 1 at the 500-ft distance (Table 5-10, Figure 5-18, Table E-19). Note that Figure 5-18 illustrates data from the Garfield County valley site because that is where neurotoxicity HIs at the 500-ft distance were largest (rather than at the Garfield County ridge-top site, which was the case with 1-acre pads). **Due to these HQ aggregations, m+p-xylene, n-nonane, benzene, and trimethylbenzenes during fracking operations at the Garfield County sites were of primary concern for subchronic exposures at distances within about 600 ft of 3-acre well pads (down from within about 800 ft of the 1-acre pads). All HIs were below 1 at 700-ft distances and beyond.** Figure 5-19 illustrates trends with distance in the maximum neurotoxicity HIs at the selected receptors during fracking activities. These HIs fell below 1 by the 700-ft distance at the Garfield County sites, and they were always below 1 at the NFR site and, as with the 1-acre pad, fell below the 0.01 level by the 1,400-ft distance. Table E-19 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Table 5-9. Overview of the Largest Subchronic Non-cancer Hazard Quotients during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Well Pad

Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none			none		
Between 1 and 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none			none		
0.1 to 1	Drilling	benzene	benzene	benzene	none		
	Fracking	124-TMB	124-TMB	none	none		
		benzene	135-TMB				
		m+p-xylene	benzene				
	Flowback	n-nonane	m+p-xylene	benzene	none		
			n-nonane				

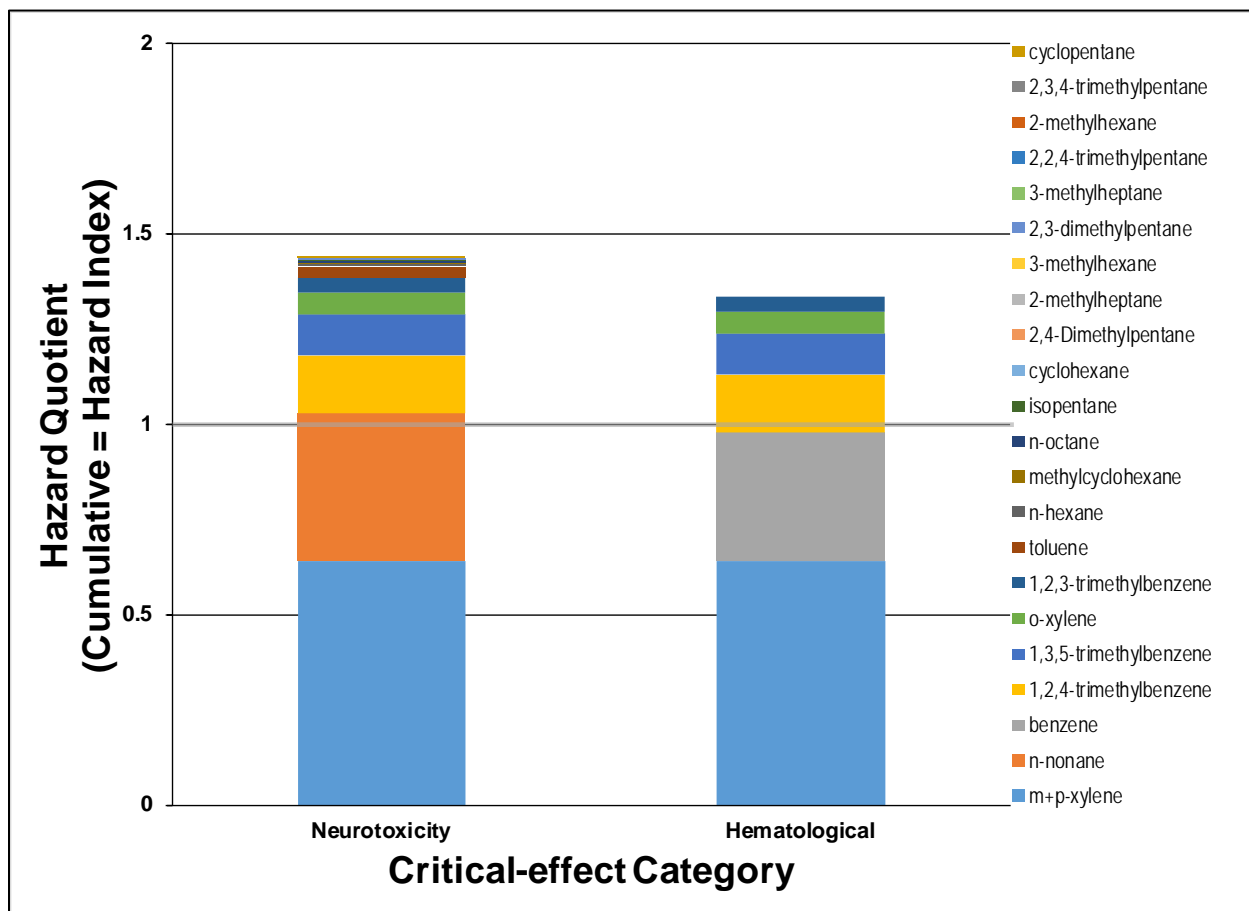
Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Table 5-10. Overview of the Largest Subchronic Non-cancer Hazard Indices during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Well Pad

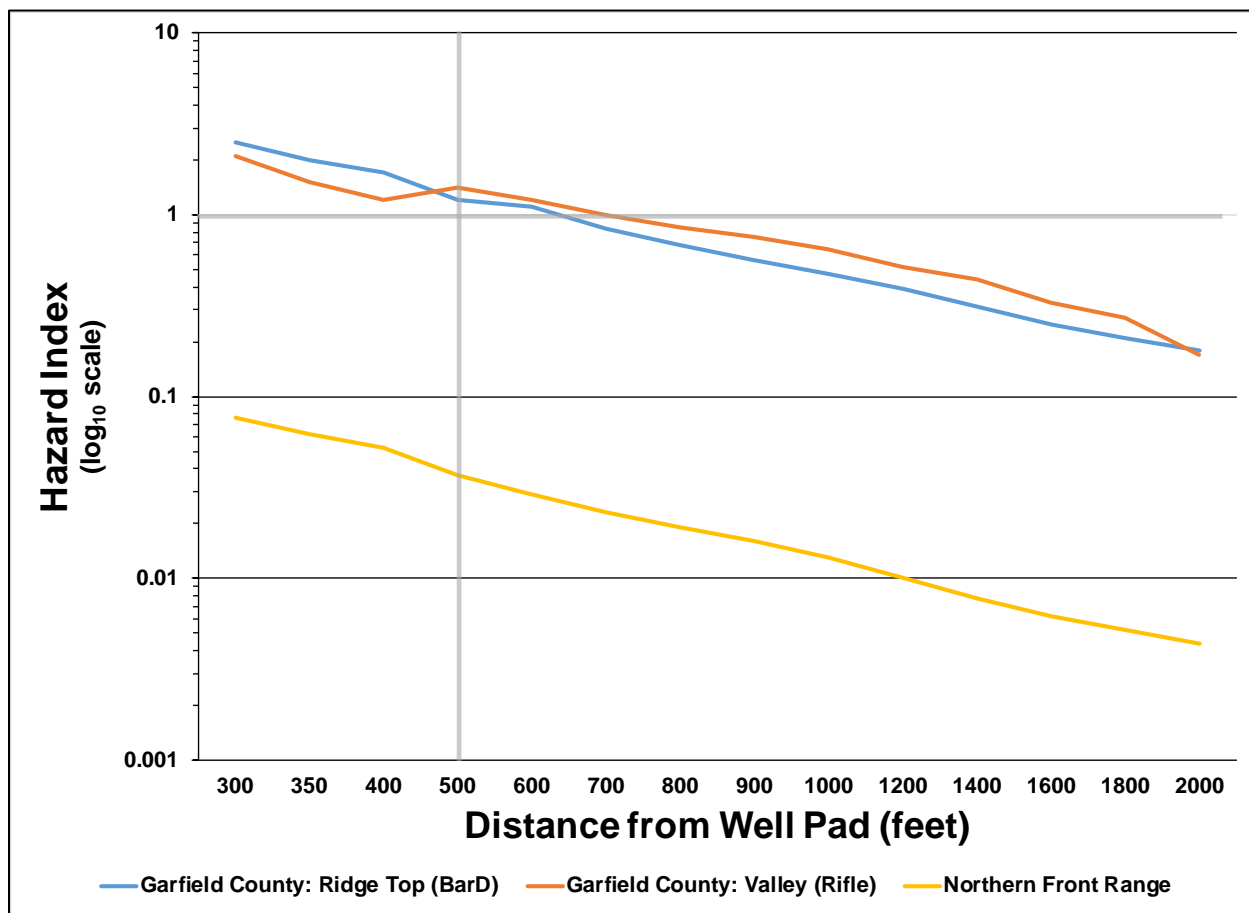
Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	none			none		
Between 1 and 10	Drilling	none			none		
	Fracking	hematological neurotoxicity	hematological neurotoxicity	none	none		
	Flowback	none			none		
0.1 to 1	Drilling	hematological neurotoxicity	hematological	hematological	none		
	Fracking	respiratory	respiratory	none	hematological neurotoxicity	hematological neurotoxicity	none
	Flowback	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	none	neurotoxicity	none

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: Gray line emphasizes hazard quotient/index=1. The order of chemicals listed in the legend matches the order of plotting (e.g., m+p-xylene plotted first on the bottom if applicable to that critical-effect group, then n-nonane, etc.). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-18. Approximate Chemical Contributions to the Largest Hazard Indices of Selected Critical-effect Groups: Subchronic Non-cancer Assessment for the Highest Exposed Hypothetical Individuals at 500 Feet from the 3-acre Well Pad during Fracking Activities at the Garfield County Valley Site



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

Figure 5-19. Largest Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 3-acre Well Pad during Fracking Activities

Analysis of Person-period Critical-effect-group Hazard Indices by Distance

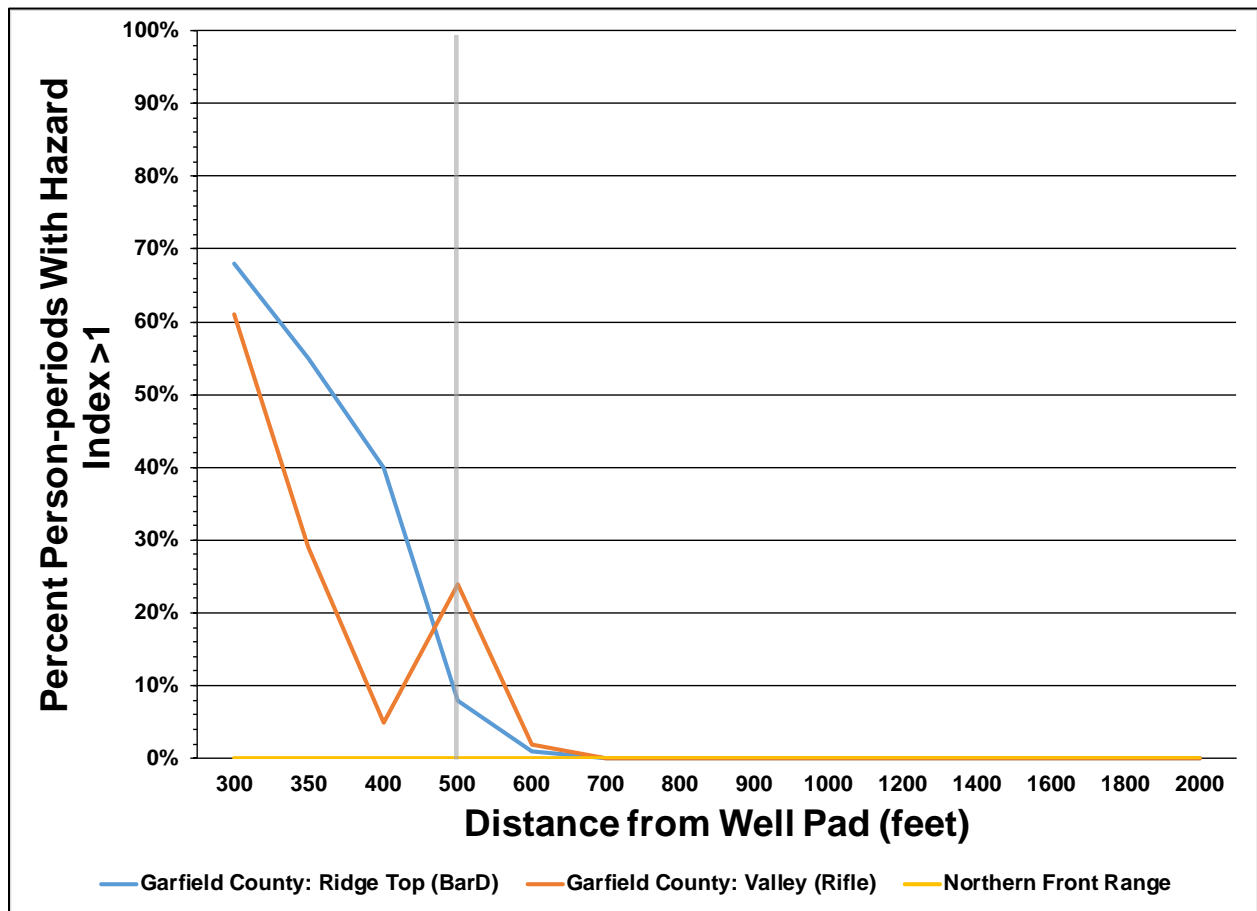
Figure 5-20 is analogous to the 1-acre Figure 5-16 (showing trends with distance in the percentage of population person-periods with neurotoxicity HIs at the selected receptors exceeding 1 during fracking activities).

- As with the 1-acre pad, no neurotoxicity HIs were above 1 during fracking at the 3-acre NFR site.
- Only at the closest distance to the 3-acre Garfield County well pads did fracking activities during most multi-day periods of the year produce subchronic neurotoxicity HIs above 1 for most people (at the 1-acre pad, this extended to 400 ft at the Garfield County ridge-top site).

-
- ◆ By the 600-ft distance from the 3-acre Garfield County pads, subchronic neurotoxicity HIs above 1 were rare (this was at 700 ft at the 1-acre pads), and they did not occur by the 700-ft distance (this was at 900 ft at the 1-acre pads).
 - The spike in percentages at the 500-ft distance from the Garfield County valley site corresponds to the spike seen with the HIs (Figure 5-19), and it also corresponds to spikes in the HQs of the primary chemical constituents of the neurotoxicity critical-effect group for the same site and distance (m+p-xylene, n-nonane, and trimethylbenzenes; see Table E-17). This reflects interactions between the 3-acre Garfield County valley pad and the local meteorological conditions particular to that site, and note that HIs continue to decrease beyond 500 ft.

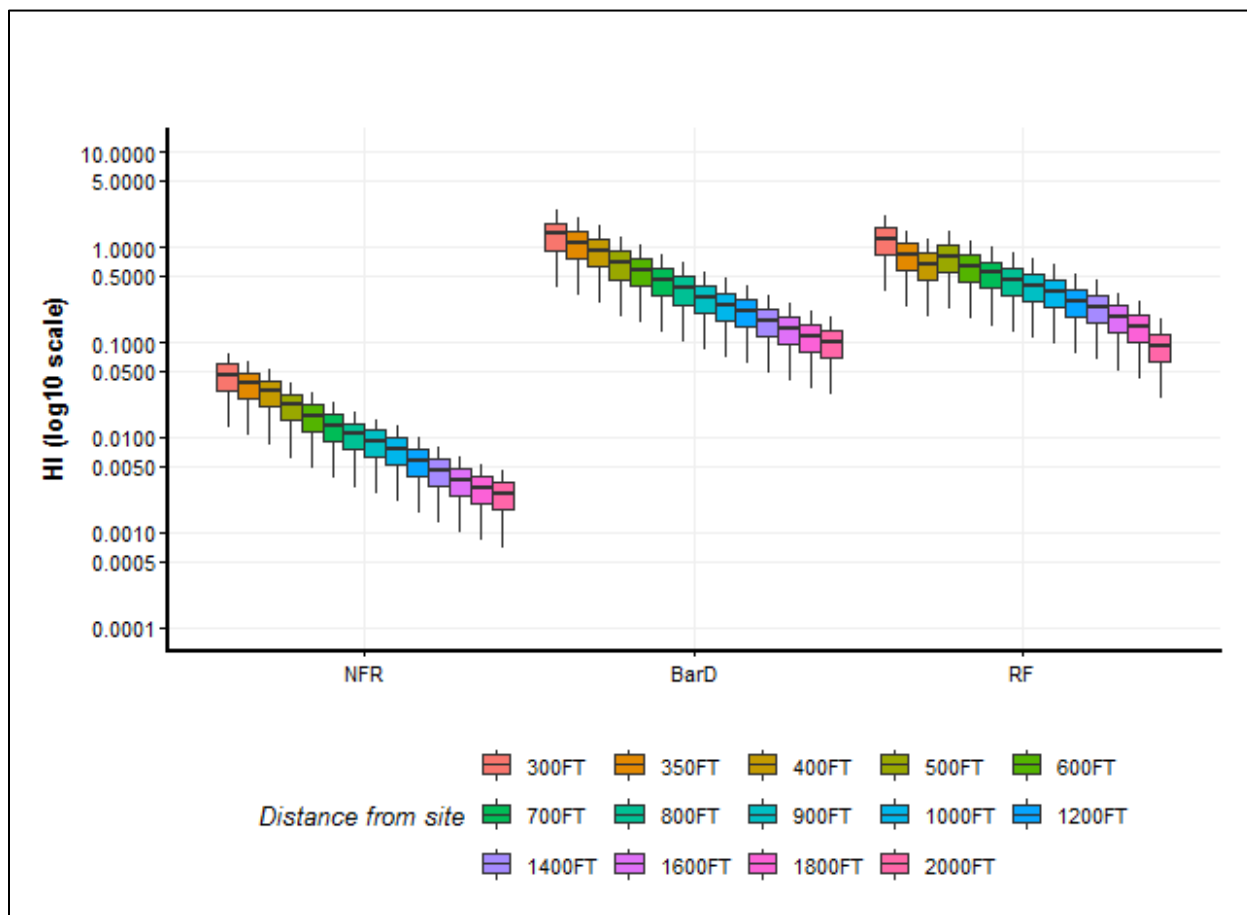
Generally, the rate of decline in these percentages with distance will vary across chemicals/critical-effect groups, sites, and O&G activities, depending on several factors. Table E-20 shows the percentage of person-periods with HI above 1 for all critical-effect groups, including those used to create this graph (see Table E-18 for HQs).

Figure 5-21 is analogous to Figure 5-17 in the 1-acre results, showing distributions of neurotoxicity HIs during fracking activities, across all person-periods. The 25th-to-75th-percentile ranges of person-period HIs for neurotoxicity at the 500-ft distance were 0.45–0.89, 0.53–1, and 0.015–0.029 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively (rather than 0.6–1.2, 0.48–0.95, and 0.015–0.029 at the 1-acre pads). These were lower than the absolute maximum values at that same distance: 1.2, 1.4, and 0.037, respectively. The median neurotoxicity HIs during fracking were 0.67, 0.78, and 0.022 at 500 ft from the three sites respectively (rather than 0.9, 0.71, and 0.022 at the 1-acre well pads), which were factors of 1.7–1.8 smaller than the absolute maximum values at the same distance.



Notes: X-axis is not to scale. "Person-periods" refers to the collection across the hypothetical population of each modeled individual's subchronic hazard indices for a year of modeling (the "rolling averages" referred to in Section 3.3.2.2). The data in this graph refer to the percentage of hazard indices (in this collection of hazard indices) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-20. Percentage of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 3-acre Well Pad during Fracking Activities



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-21. Distributions of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 3-acre Well Pad during Fracking Activities

5.3.2.3. 5-acre Well Pad

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

At the selected receptor at 500 ft from the 5-acre well pad, as with the 1- and 3-acre results discussed in Sections 5.3.2.1 and 5.3.2.2, all VOC HQs were 1 or below (Table 5-11, Table E-21). At 2,000 ft from the 5-acre pad, as with the 3-acre pad, all HQs were well below 0.1. Maximum chemical HQs and critical-effect-group HIs at 500 ft were generally smaller for the 5-acre results relative to the 3-acre results at the NFR and Garfield County valley sites (by less than about 70 percent on average across VOCs and O&G activities), but were generally

larger for the 5-acre results at the Garfield County ridge-top site (by less than about 20 percent on average across VOCs/critical-effect groups, O&G activities, and sites).

However, HQs for chemicals belonging to the hematological and neurotoxicity critical-effect groups sometimes aggregated to HIs slightly above 1 at the 500-ft distance (Table 5-12, Figure 5-22, Table E-23). Note that Figure 5-22 illustrates data from the Garfield County ridge-top site because that is where neurotoxicity HIs at the 500-ft distance were largest (rather than at the Garfield County valley site, which was the case with 3-acre pads). **Due to these HQ aggregations, m+p-xylene, n-nonane, benzene, and trimethylbenzenes during fracking operations at the Garfield County sites were of primary concern for subchronic exposures at distances within about 600 ft of 5-acre well pads (similar to the 3-acre pads). All HIs were below 1 at 700-ft distances and beyond.** Figure 5-23 illustrates trends with distance in the maximum neurotoxicity HIs at the selected receptors during fracking activities. These HIs fell below 1 by the 700-ft distance at the Garfield County sites, and they were always below 1 at the NFR site and fell below the 0.01 level by the 1,200-ft distance (rather than at 1,400 ft from the 3-acre pad). Table E-23 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Table 5-11. Overview of the Largest Subchronic Non-cancer Hazard Quotients during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	N/A	N/A	none	N/A	N/A	none
Between 1 and 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	N/A	N/A	none	N/A	N/A	none
0.1 to 1	Drilling	benzene	benzene	benzene	none		
	Fracking	124-TMB	benzene		none		
		135-TMB	m+p-xylene				
		benzene	n-nonane				
	Flowback	N/A	N/A	benzene m+p-xylene n-nonane	N/A	N/A	none

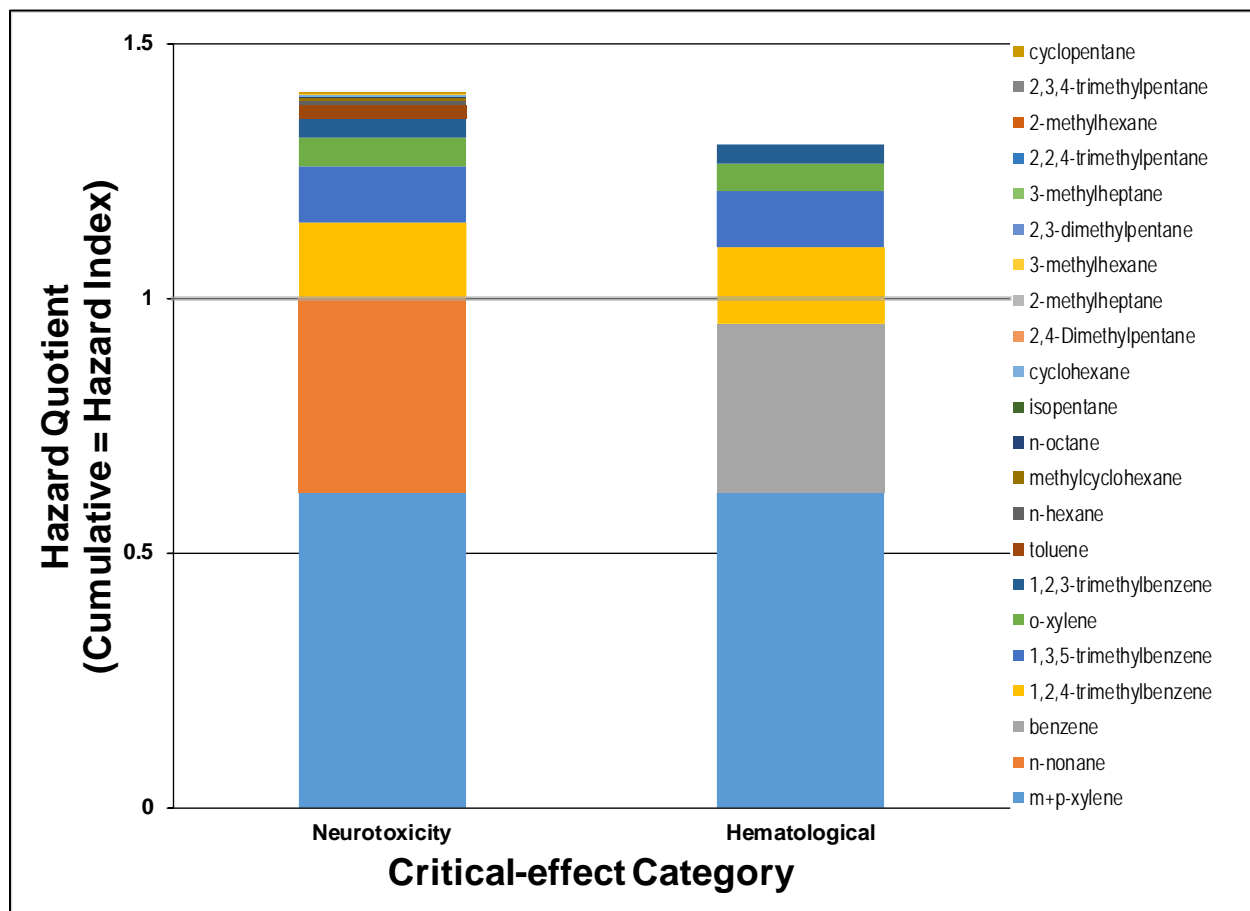
Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical). Flowback is "N/A" for Garfield County because it lasts more than 1 year in the 5-acre scenario with many wells being developed (so we defer to a chronic assessment).

TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Table 5-12. Overview of the Largest Subchronic Non-cancer Hazard Indices during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

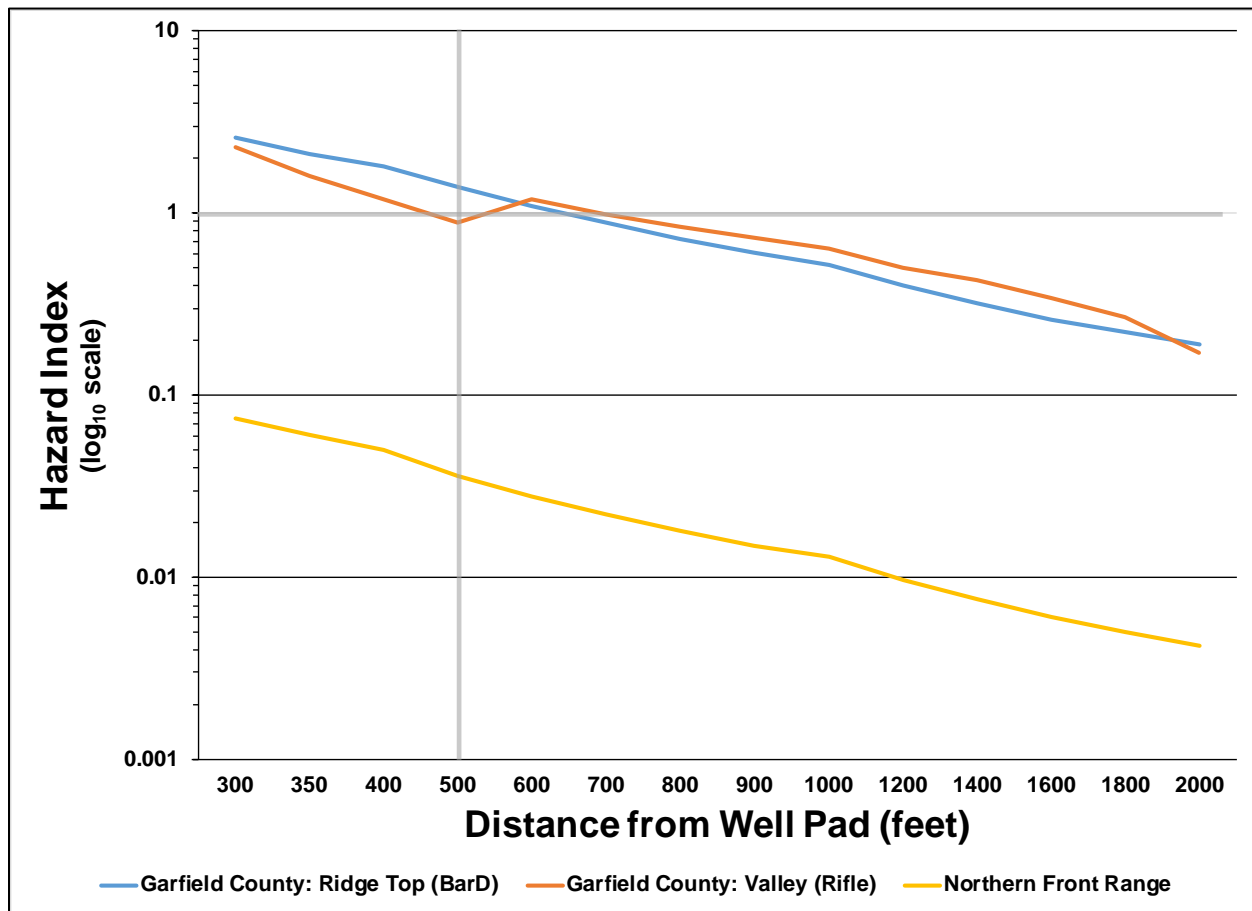
Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	none			none		
	Fracking	none			none		
	Flowback	N/A	N/A	none	N/A	N/A	none
Between 1 and 10	Drilling	none			none		
	Fracking	hematological neurotoxicity	none		none		
	Flowback	N/A	N/A	none	N/A	N/A	none
0.1 to 1	Drilling	hematological neurotoxicity	hematological	hematological	none		
	Fracking	respiratory	hematological neurotoxicity respiratory	none	hematological neurotoxicity	hematological neurotoxicity	none
	Flowback	N/A	N/A	hematological neurotoxicity respiratory	N/A	N/A	none

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical). Flowback is "N/A" for Garfield County because it lasts more than 1 year in the 5-acre scenario with many wells being developed (so we defer to a chronic assessment).



Notes: Gray line emphasizes hazard quotient/index=1. The order of chemicals listed in the legend matches the order of plotting (e.g., m+p-xylene plotted first on the bottom if applicable to that critical-effect group, then n-nonane, etc.). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-22. Approximate Chemical Contributions to the Largest Hazard Indices of Selected Critical-effect Groups: Subchronic Non-cancer Assessment for the Highest Exposed Hypothetical Individuals at 500 Feet from the 5-acre Well Pad during Fracking Activities at the Garfield County Ridge-top Site



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

Figure 5-23. Largest Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 5-acre Well Pad during Fracking Activities

Analysis of Person-period Critical-effect-group Hazard Indices by Distance

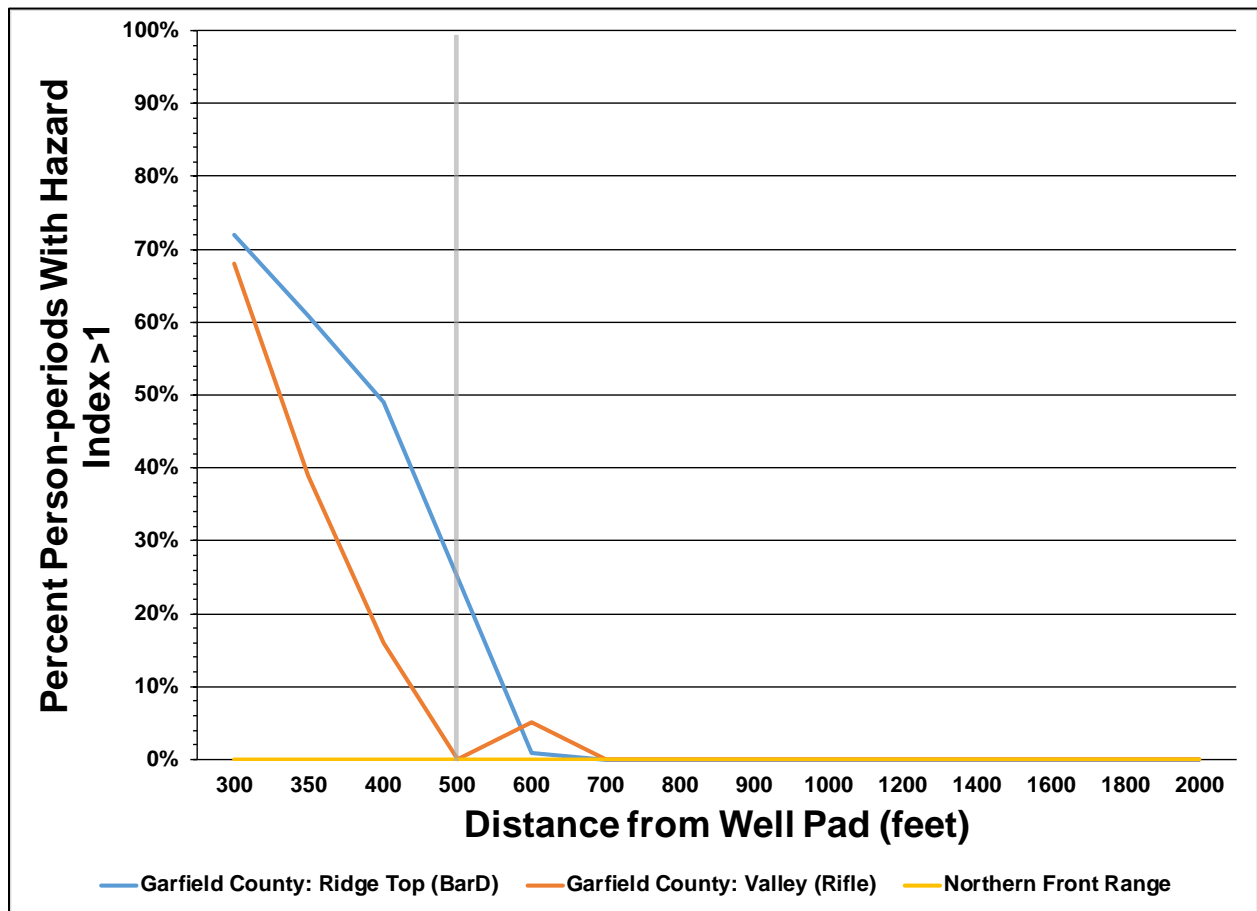
Figure 5-24 is analogous to the 3-acre Figure 5-20 (showing trends with distance in the percentage of population person-periods with neurotoxicity HIs at the selected receptors exceeding 1 during fracking activities).

- As with the 3-acre pad, no neurotoxicity HIs were above 1 during fracking at the 5-acre NFR site.
- Only at the 300-ft distance from the Garfield County 5-acre well pads (and at 350 ft for the ridge-top site) did fracking activities during most multi-day periods of the year produce subchronic neurotoxicity HIs above 1 for most people (at the 3-acre pad, this was only at the 300-ft distance).

-
- ◆ By the 600-ft distance from the 5-acre Garfield County pads, subchronic neurotoxicity HIs above 1 were rare, and they did not occur by the 700-ft distance (same as with 3-acre pads).
 - The spike in percentages at the 600-ft distance from the Garfield County valley site corresponds to spikes seen with the HIs (Figure 5-23), and it also corresponds to spikes in the HQs of the primary chemical constituents of the neurotoxicity critical-effect group for the same site and distance (m+p-xylene, n-nonane, and trimethylbenzenes; see Table E-21). This reflects interactions between the 5-acre Garfield County valley pad and the local meteorological conditions particular to that site, and note that HIs continue to decrease beyond 500 ft. This spike occurred at 500 ft from the 3-acre pad.

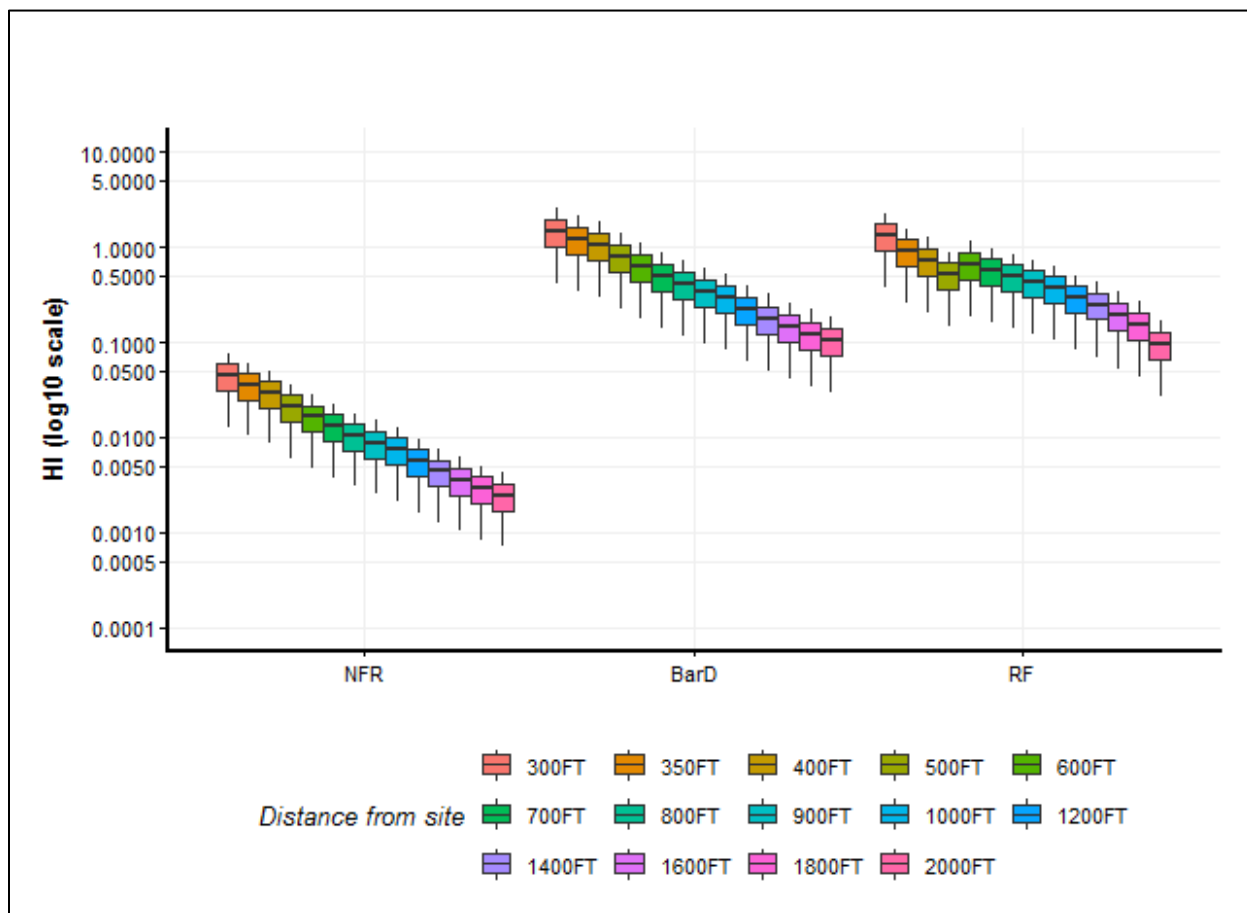
Generally, the rate of decline in these percentages with distance will vary across chemicals/critical-effect groups, sites, and O&G activities, depending on several factors. Table E-24 shows the percentage of person-periods with HI above 1 for all critical-effect groups, including those used to create this graph (see Table E-22 for HQs).

Figure 5-25 is analogous to Figure 5-21 in the 3-acre results, showing distributions of neurotoxicity HIs during fracking activities, across all person-periods. The 25th-to-75th-percentile ranges of person-period HIs for neurotoxicity at the 500-ft distance were 0.53–1, 0.35–0.68, and 0.014–0.028 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively (rather than 0.45–0.89, 0.53–1, and 0.015–0.029 at the 3-acre pads). These were lower than the absolute maximum values at that same distance: 1.4, 0.89, and 0.036, respectively. The median neurotoxicity HQs during fracking were 0.79, 0.52, and 0.021 at 500 ft from the three sites respectively (rather than 0.67, 0.78, and 0.022 at the 3-acre well pads), which were factors of 1.7–1.8 smaller than the absolute maximum values at the same distance.



Notes: X-axis is not to scale. "Person-periods" refers to the collection across the hypothetical population of each modeled individual's subchronic hazard indices for a year of modeling (the "rolling averages" referred to in Section 3.3.2.2). The data in this graph refer to the percentage of hazard indices (in this collection of hazard indices) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-24. Percentage of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 5-acre Well Pad during Fracking Activities



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-25. Distributions of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 5-acre Well Pad during Fracking Activities

5.3.3. Chronic Non-cancer Hazards

In this section, we discuss the potential for chronic exposures (more than 365 days) above health-protective non-cancer criteria levels, due to emissions from individual O&G development activities. Due to the limited duration of most development activities, at most well pads, chronic health hazards are most strongly related to production activities, which are assumed to continue for 30 years (we discuss production-related chronic exposures later in Section 5.4). Due to the nature of assumptions described in Section 3.3.2.3, **the only individual development scenarios reaching chronic-level duration are for flowback activities at 5-acre Garfield County sites where 32 wells are developed sequentially** (see Section 5.5 for a discussion on development activities in sequence).

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

Contrary to the acute results, emissions of all chemicals at the Garfield County sites were at or below chronic health-criteria levels at 500-ft from the 5-acre well pad during flowback activities (Table 5-13), although HQs for n-nonane rose to slightly above 1 at 600 and 900 ft from the valley pad (Table E-25). At 2,000 ft from the 5-acre pads, contrary to the acute results, all HQs were well below 1. The generally lower values with this chronic assessment, relative to the acute assessment, is largely a result of longer averaging times for exposure (hundreds of days versus one hour). There is no direct comparison to be made between subchronic and chronic HQs and HIs during flowback activities at the 5-acre Garfield County well pads (as they surpass subchronic duration, leading to chronic calculations only); however, it was true that all subchronic HQs and HIs at 500-ft from the well pads were 1 or below (for all pad sizes and O&G activities).

While all HIs were well below 1 at 2,000-ft from the 5-acre pads, HQs for some chemicals belonging to the neurotoxicity and hematological critical-effect groups sometimes aggregated to HIs slightly above 1 at the 500-ft distance (Table 5-14, Figure 5-26, Table E-27). **Due to these HQ aggregations, n-nonane, benzene, m+p-xylene, and trimethylbenzenes during flowback activities were of primary concern for chronic exposures at distances within about 1,400 ft of the 5-acre well pad at the Garfield County valley site (800 ft for the ridge-top site)**, beyond which all HIs were 1 or below (Figure 5-27). As sometimes seen at other sites for other exposure durations (see previous sections), there can be deviations in the downward trend of chronic HQs and HIs with increasing distance from the well pad (see Section 2.9.1.1), caused by the particular modeled dispersion patterns at a site and how those relate to the precise location of the selected receptor at each distance (see Section 2.7.3). Table E-27 shows all modeled HIs for each site and critical-effect group, including those used to create this graph (see Table E-25 for HQs).

The HQs and HIs averaged across chemicals, activities, and distances at the Garfield County valley site were about 45 percent larger than at the ridge-top site.

Table 5-13. Overview of the Largest Chronic Non-cancer Hazard Quotients during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

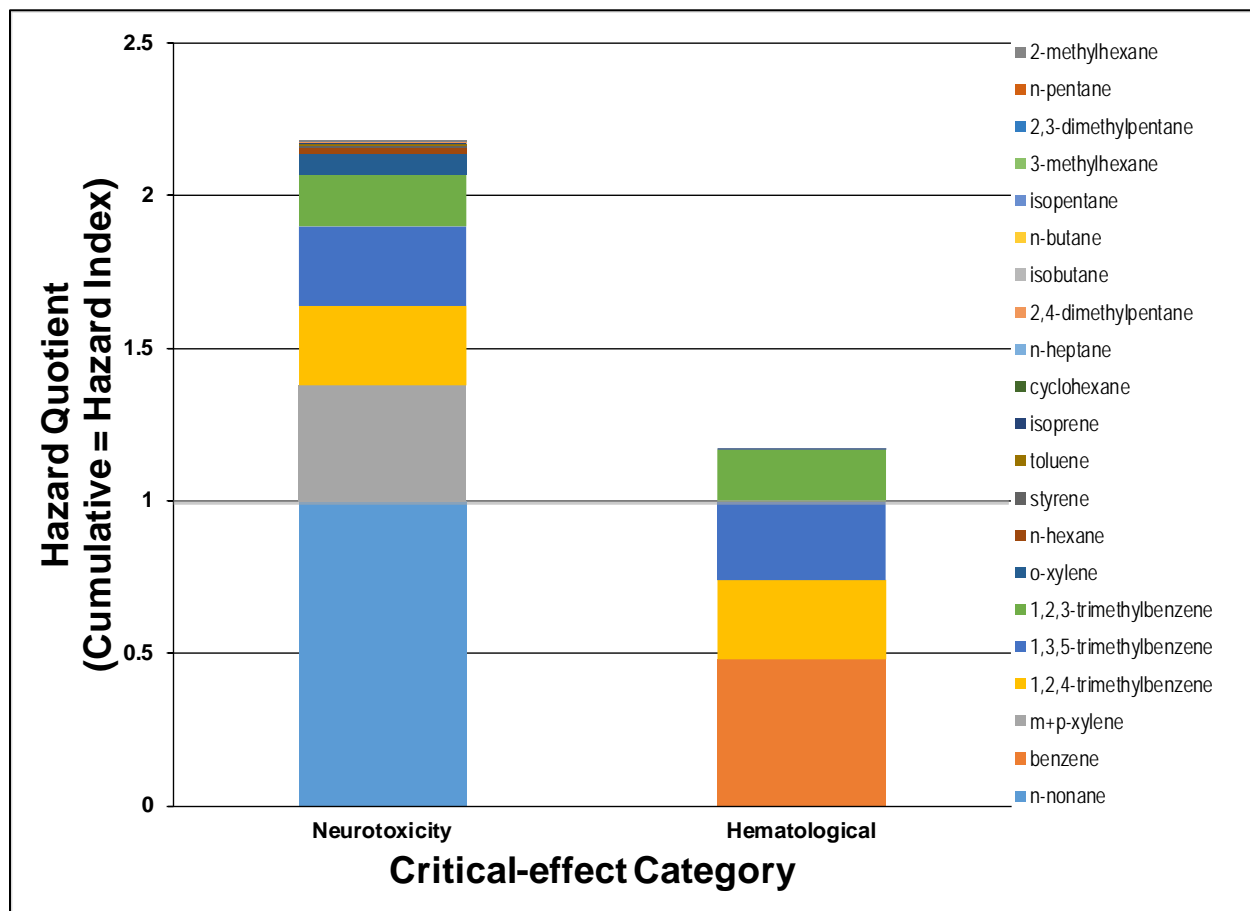
Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	N/A			N/A		
	Fracking	N/A			N/A		
	Flowback	none		N/A	none		N/A
Between 1 and 10	Drilling	N/A			N/A		
	Fracking	N/A			N/A		
	Flowback	none		N/A	none		N/A
0.1 to 1	Drilling	N/A			N/A		
	Fracking	N/A			N/A		
	Flowback	123-TMB	123-TMB	N/A	n-nonane	benzene	N/A
		124-TMB	124-TMB			n-nonane	
		135-TMB	135-TMB				
		2-ET	2-ET				
		benzene	benzene				
		m+p-xylene	m+p-xylene				
		n-nonane	n-nonane				

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical). Drilling and fracking at the Garfield County sites, and all development activities at the Northern Front Range site, are "N/A" because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment). ET = ethyltoluene; TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Table 5-14. Overview of the Largest Chronic Non-cancer Hazard Indices during Development Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

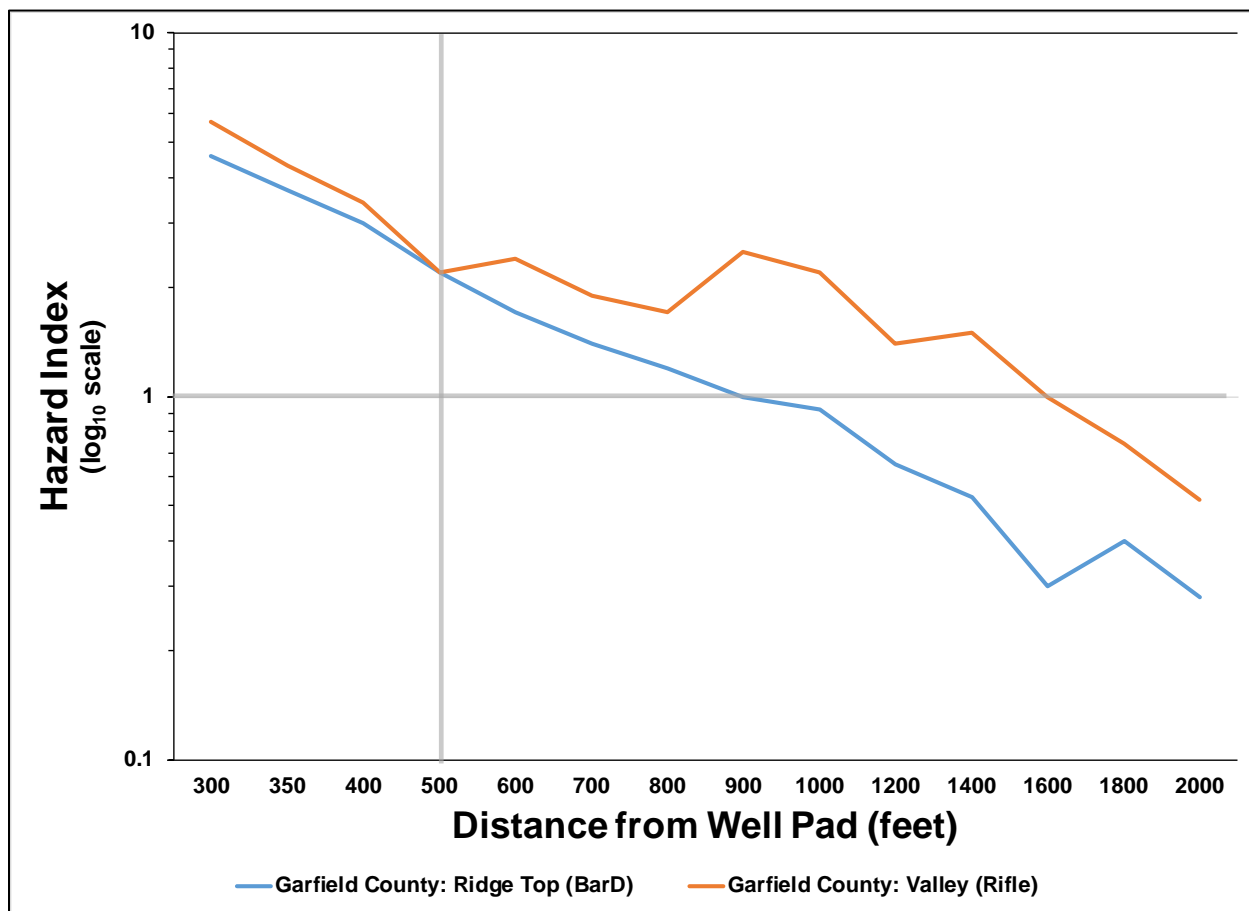
Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Drilling	N/A			N/A		
	Fracking	N/A			N/A		
	Flowback	none		N/A	none		N/A
Between 1 and 10	Drilling	N/A			N/A		
	Fracking	N/A			N/A		
	Flowback	hematological neurotoxicity	hematological neurotoxicity	N/A	none		N/A
0.1 to 1	Drilling	N/A			N/A		
	Fracking	N/A			N/A		
	Flowback	respiratory systemic	respiratory systemic	N/A	hematological neurotoxicity	hematological neurotoxicity respiratory	N/A

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical). Drilling and fracking at the Garfield County sites, and all development activities at the Northern Front Range site, are "N/A" because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment).



Notes: Gray line emphasizes hazard quotient/index=1. The order of chemicals listed in the legend matches the order of plotting (e.g., n-nonane plotted first on the bottom if applicable to that critical-effect group, then benzene, etc.). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-26. Approximate Chemical Contributions to the Largest Hazard Indices of Selected Critical-effect Groups: Chronic Non-cancer Assessment for the Highest Exposed Hypothetical Individuals at 500 Feet from the 5-acre Well Pad during Flowback Activities at the Garfield County Ridge-top Site



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

Figure 5-27. Largest Chronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 5-acre Well Pad during Flowback Activities

Analysis of Critical-effect-group Hazard Indices by Distance

For the same scenarios used in Figure 5-27, in Figure 5-28 we illustrate the frequency of maximum chronic HIs reaching above a value of 1. These percentages are taken from the collection of each simulated individual's chronic HI, for 1,000 simulated youths up to 17 years old at each selected downwind receptor. The results for all age groups are nearly identical (see Sections 3.5.1 and E.1). This analysis shows how many simulated individuals have chronic HIs above 1 for flowback activities at 5-acre well pads.

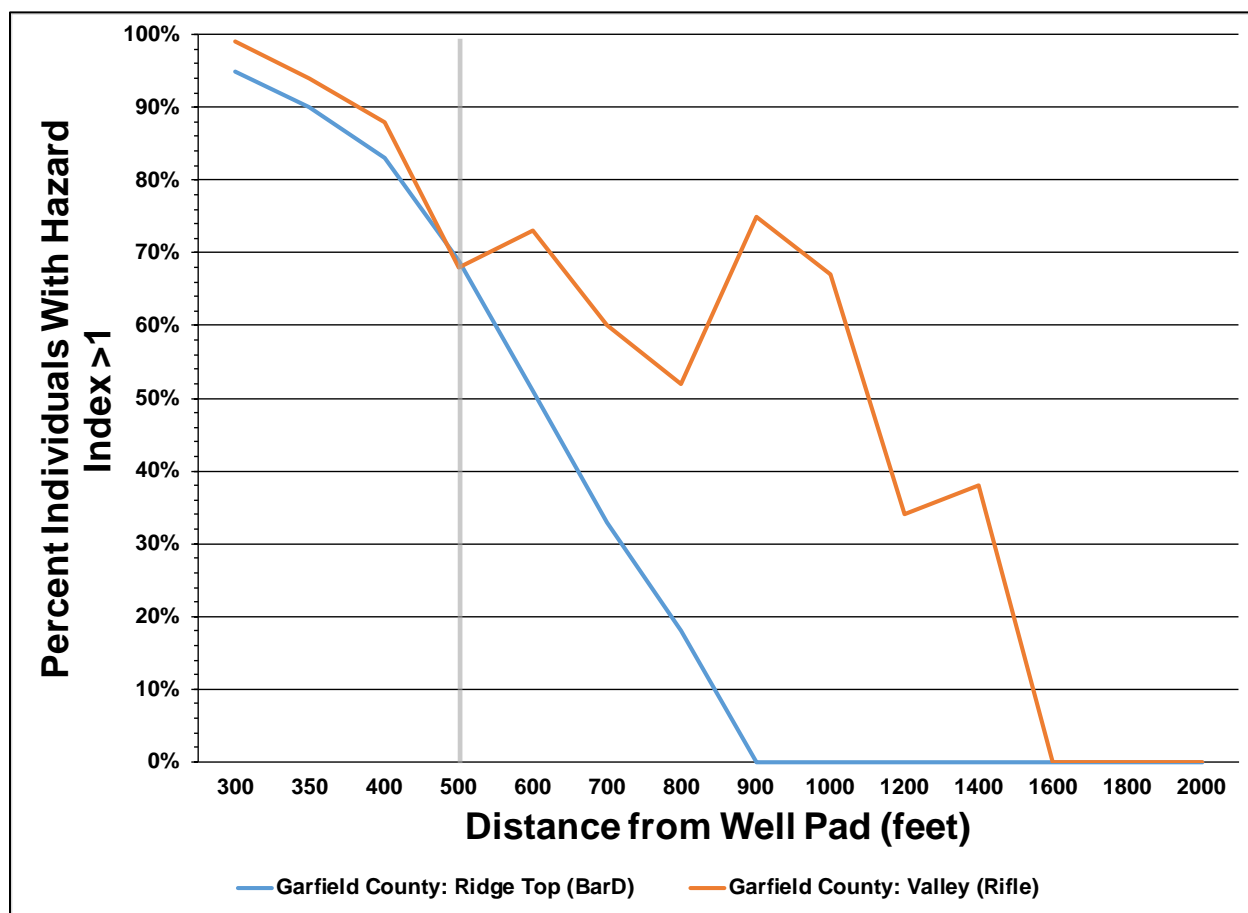
In this example, the model results indicated the characteristics we note below.

- At distances 300–500 ft from the 5-acre pad at the Garfield County ridge-top site, and at 300–1,000 ft from the pad at the Garfield County valley site, flowback activities produced chronic neurotoxicity HIs above 1 for most people. Note a spike in the 600-ft value at the

valley site, which was also seen with subchronic values from fracking activities at the same 5-acre site, and which corresponds to a spike in HIs at the same location (Figure 5-27).

- ◆ By 900 ft from the Garfield County ridge-top site, and by 1,600 ft from the valley site, no individuals had chronic neurotoxicity HIs above 1.

Generally, the rate of decline in these percentages with distance will vary across chemicals/critical-effect groups and sites, depending on several factors. Table E-28 shows the percentage of individuals with HI above 1 for all critical-effect groups, including those used to create this graph (see Table E-26 for HQs).

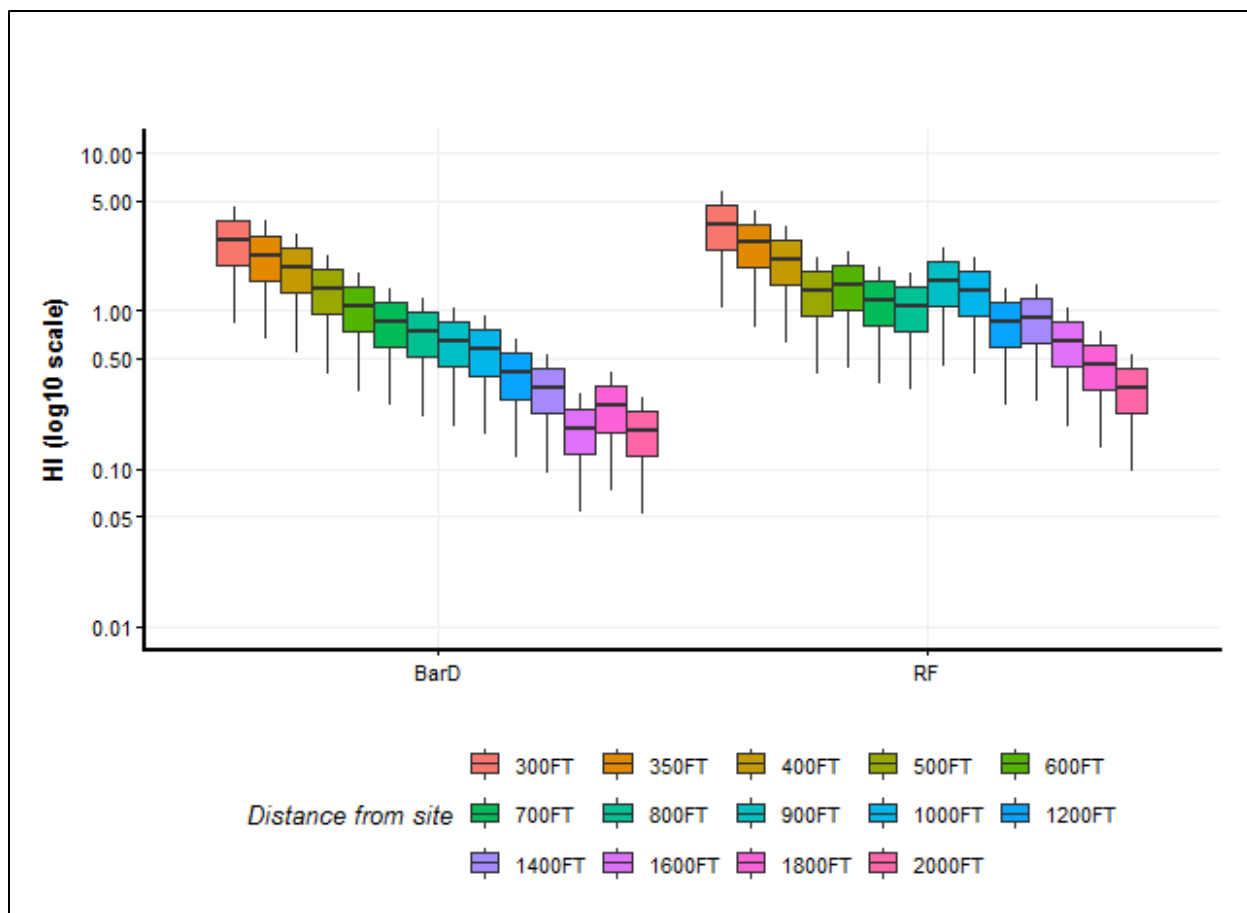


Notes: X-axis is not to scale. The data in this graph refer to the percentage of hazard indices (across all modeled individuals) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-28. Percentage of Chronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 5-acre Well Pad during Flowback Activities

Figure 5-29 contains box-and-whisker plots reflecting the distributions of neurotoxicity chronic HIs during flowback activities, across all individuals, stratified by O&G site and distance. The 25th-to-75th-percentile ranges of chronic HIs for neurotoxicity at the 500-ft distance were 0.93–1.8 at both Garfield County sites. These were lower than the absolute maximum values at that same distance: 2.2 at both sites. The median neurotoxicity HIs during flowback were 1.3–1.4 at

500 ft from the Garfield County sites, which were a factor of 1.6–1.7 smaller than the absolute maximum values at the same distance.



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-29. Distributions of Chronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 5-acre Well Pad during Flowback Activities

5.4. Oil and Gas Production

In the subsections below, we discuss estimates for acute and chronic non-cancer HQs and HIs for emissions during O&G production. We focus particularly on the highest simulated potential values of these HQs and HIs but we also discuss the range of potential values. We also discuss estimates of incremental lifetime cancer risk from O&G production emissions, focusing on the average potential risk at the locations of highest average air concentrations.

As discussed in Section 2.4, we only simulated 1-acre well pads for production, as this was the approximate average well-pad size for sites sampled for emissions during production activities. As mentioned in Section 3.3.2.2, we did not estimate subchronic exposures for production activities since the duration of production activities is 30 years. Note also that the production simulations included two receptors with smaller distances from the well pad than those used in the development simulations (at 150 and 250 ft from the center of the pad).

Finally, recall (as discussed in Section 3.3.1) that we constructed the time series of air concentrations utilized in the production modeling in a different and simpler manner than those utilized in the development modeling. Whereas the development time series comprised values from randomly selected Monte Carlo AERMOD iterations (maximum iteration values for acute assessment, mean iteration values for subchronic and chronic assessments), the production time series were a simpler construction of randomly selected production emission rates paired with each hour of AERMOD outputs run at unit emission rates. These differences between the development and production air-concentration time series (aside from differences in the emission rates themselves) will result in differences in the ranges of values seen in the risk estimates. This is likely particularly in the acute assessment where the maximum reasonable acute HQs and HIs are less likely to be captured in the production assessment relative to the development assessment (as noted in Section 3.3.1.2), and where lower acute values may also more frequently be captured in the production assessment. For these reasons, use caution in comparing distributions of HQs and HIs between the development and production assessments.

We provide additional quantifications of HQs and HIs, both maximum values as well as frequencies of HQs and HIs above a value of 1, in Appendix E.2. We generally present the same types of tables and figures (the same basic content and purpose) in each individual subsection here, with the exception of Section 5.4.3 discussing cancer risk. We provided the most comprehensive description of content and intent of these tables and figures in the first subsection of the O&G development results (Section 5.3.1.1, which are acute non-cancer hazards related to a 1-acre development well pad). In the following sections, we provide less description in order to reduce repetition; please reference the Section 5.3.1.1 descriptions as needed for interpretation. Note that we do not present the stacked bar charts indicating chemical contributions to some of the HIs (e.g., Figure 5-5 in Section 5.3.1.1) because chronic HIs during production did not exceed a value of 1 at the 500-ft distance, and because acute HIs during production only slightly exceeded 1 for one critical-effect group at 500 ft; HQs for each chemical constituent of each critical-effect group can still be found in Appendix E.2.

As noted in the subsections below, **estimated HQs and HIs during production were much lower than those during development activities. Benzene generally was the only chemical of concern during production activities, and only for the acute assessment** where maximum HQs were slightly above 1 at the selected downwind receptors 500 ft from the well pads. These slightly higher benzene acute HQs led to **maximum hematological acute HIs slightly above 1 at the same locations**. By contrast, benzene, 2-ethyltoluene, and the hematological critical-effect group sometimes had acute HQs and HIs above 10 at the same locations in the development assessment, and several other VOCs and critical-effect groups had maximum acute values above 1. While the chronic assessment during flowback development activities (Section 5.3.3) is not entirely comparable to the chronic assessment during production (due to the 5-acre pad utilized in the chronic flowback assessment versus the 1-acre pad utilized in the production assessment), we also note that chronic HQs and HIs for n-

nonane and the neurotoxicity and hematological critical-effect groups were sometimes above 1 at 500+ ft from the development pads but not the production pads.

Also as noted below, **estimated incremental lifetime cancer risks from long-term exposure to benzene from the production pads were 4-in-one million or less for average hypothetical individuals at the selected downwind receptors 500 ft from the pads (less than 7-in-one million for the maximum-exposed individuals)**. Regardless of the IUR utilized and regardless of the individual's modeled exposure, estimated benzene risks were below 1-in-one million by 2,000 ft from the pads.

5.4.1. Acute Non-cancer Hazards

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

Benzene was of primary concern, showing acute HQs slightly above 1 at selected receptors 500-ft downwind during production activities (HQ=1.6 at NFR; Table 5-15, Table E-29). At 2,000 ft from the pad, all HQs were well below 1, and benzene was the only VOC with values above 0.1. The benzene HQs slightly above 1 also led to **hematological HIs slightly above 1 at the 500-ft distance** (HI=1.6 at NFR), but well below 1 by 2,000 ft (Table 5-16, Table E-31). Figure 5-30 illustrates trends with distance in the maximum benzene HQs at the selected receptors. These HQs fell below 1 by 600 ft from the Garfield County pads and by 1,200 ft from the NFR pad.

These acute HQs and HIs during production were much lower than those during development activities, where multiple chemicals and critical-effect groups had maximum values above 10 at 500 ft and above 1 at 2,000 ft. Comparing HQs and HIs between the three sites, the chronic values averaged across chemicals, activities, and distances differed by up to about 20 percent between the Garfield sites, and by up to about 70 percent between those sites and the NFR site (with the NFR site tending to have the largest values).

Table 5-15. Overview of the Largest Acute Non-cancer Hazard Quotients during Production Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the Well Pad

Range of Hazard Quotients	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	benzene	benzene	benzene	none		
0.1 to 1	2-ET toluene	2-ET toluene	2-ET toluene	benzene	benzene	benzene

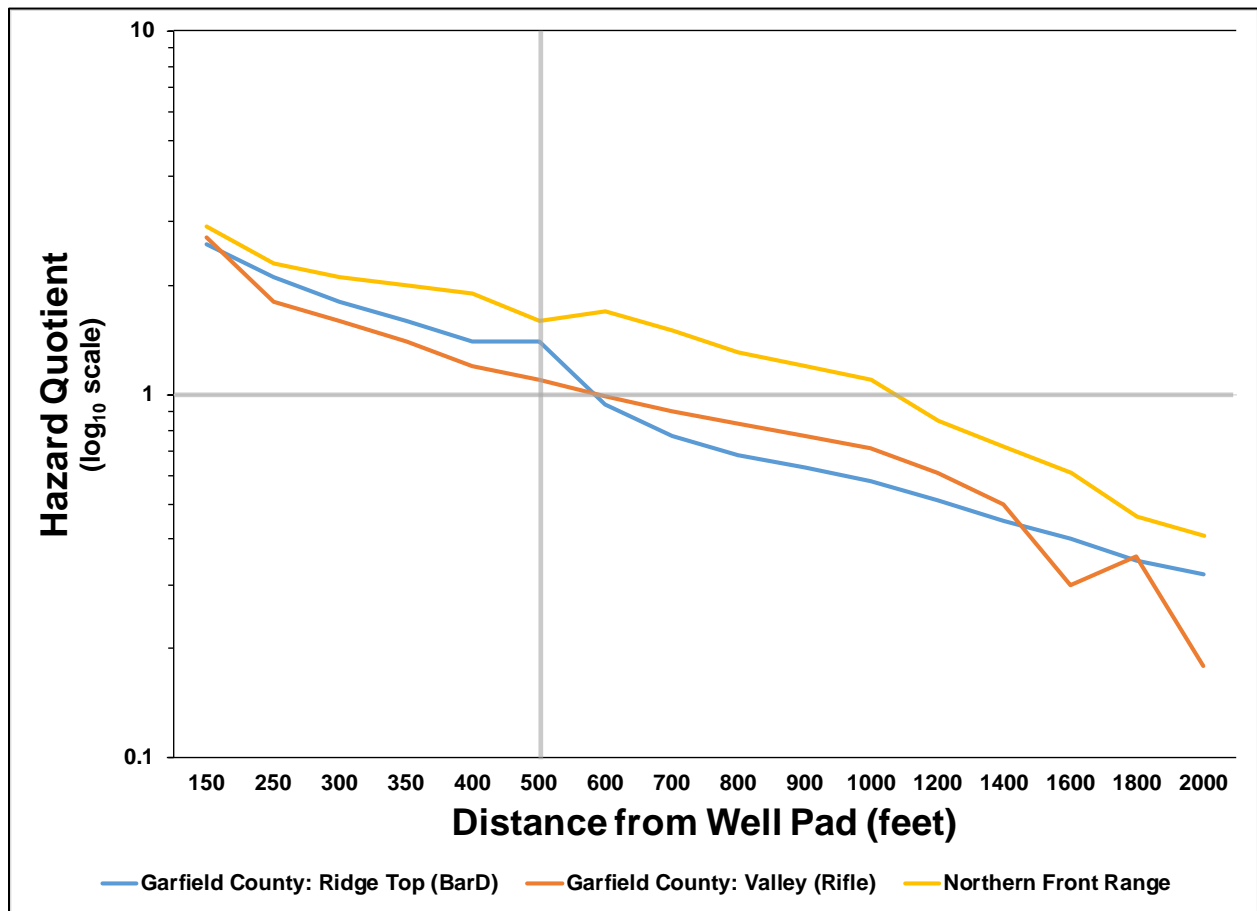
Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

ET = ethyltoluene.

Table 5-16. Overview of the Largest Acute Non-cancer Hazard Indices during Production Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the Well Pad

Range of Hazard Indices	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	hematological	hematological	hematological	none		
0.1 to 1	neurotoxicity	neurotoxicity	neurotoxicity respiratory systemic	hematological	hematological	hematological

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any acute critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard quotient=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

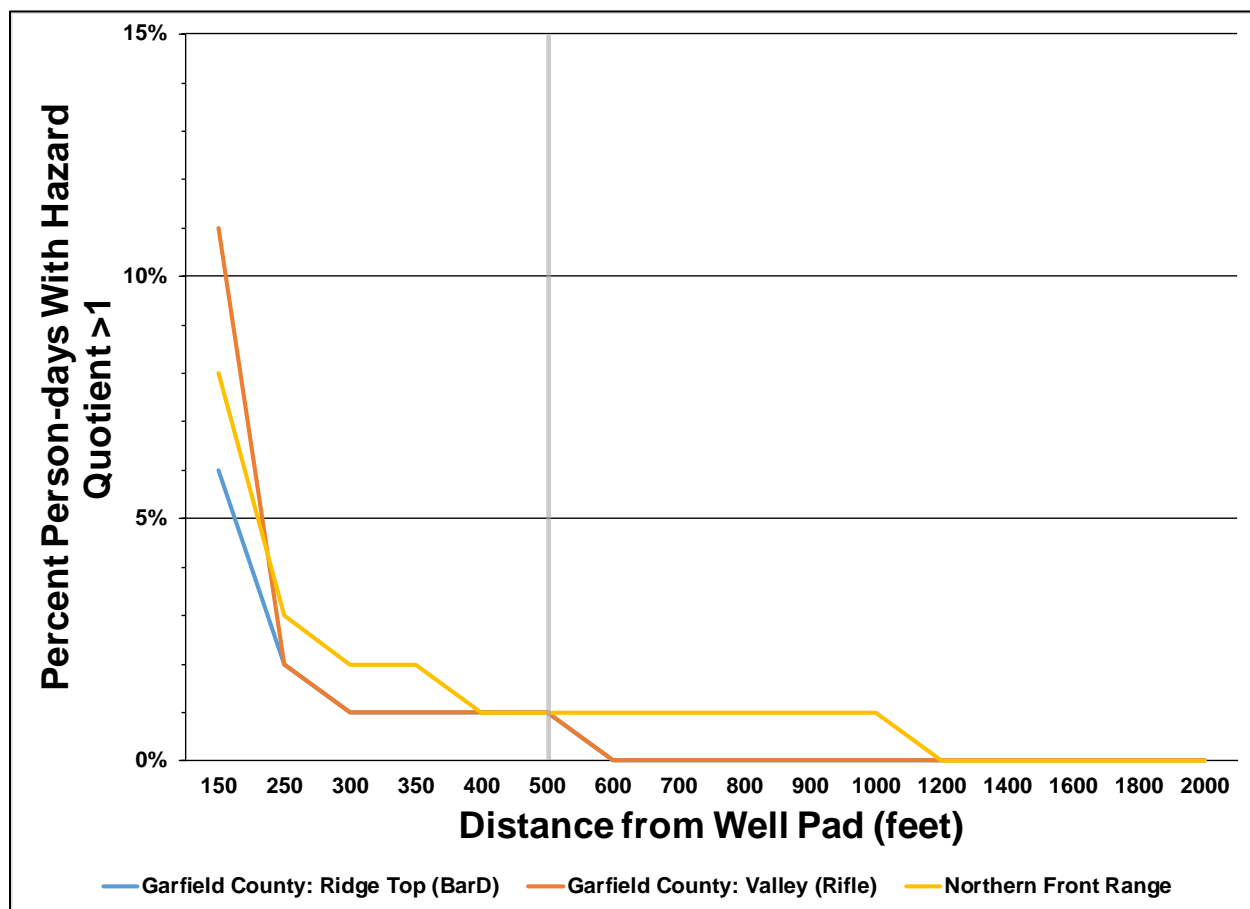
Figure 5-30. Largest Acute Non-cancer Benzene Hazard Quotients for the Highest Exposed Hypothetical Individuals at Various Distances from the Well Pad during Production Activities

Analysis of Person-period Critical-effect-group Hazard Indices by Distance

For the same scenarios used in Figure 5-30, in Figure 5-31 we illustrate the frequency of maximum acute HQs reaching above a value of 1 (analogous to Figure 5-3 for acute HQs during development, which showed much higher frequencies of HQs above 1 than during production). In this example, the model results indicated the characteristics we note below.

- For most people on most days, the maximum HQ is below 1.
- By the 250-ft distance from the well pad, occurrences of daily-maximum HQs above 1 are rare, dropping to a 1-percent frequency at all sites by the 400-ft distance.
- HQs are below 1 for all simulated individuals on all days by the 600-ft distance at the Garfield County sites, and by the 1,200-ft distance at the NFR site, as noted earlier.

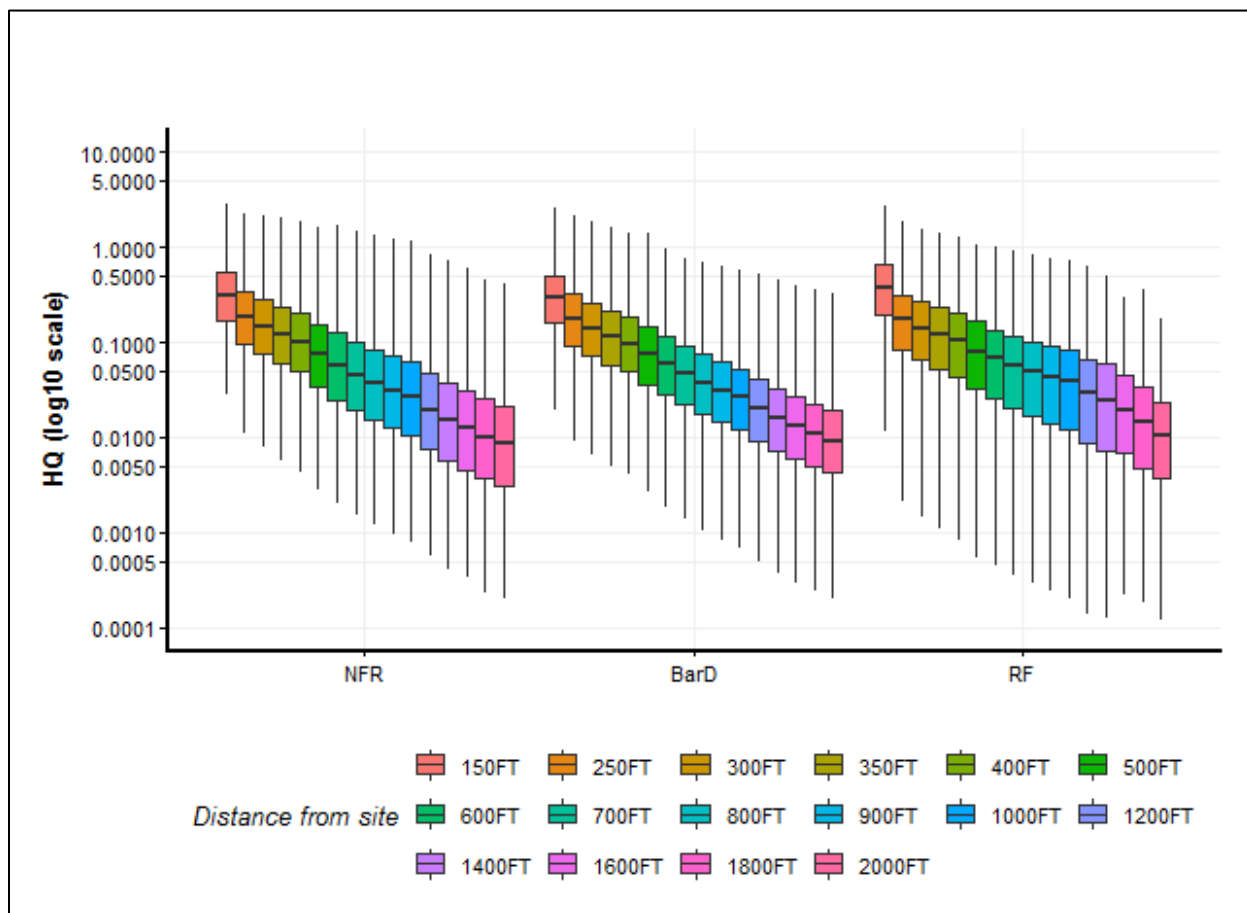
Generally, the rate of decline in these percentages with distance will vary across chemicals/critical-effect groups, sites, and O&G activities, depending on several factors. Table E-30 shows the percentage of person-days with maximum HQs above 1 for all chemicals, including those used to create this graph (see Table E-32 for HIs).



Notes: X-axis is not to scale. "Person-days" refers to the collection across the hypothetical population of each modeled individual's daily-maximum acute hazard quotients for a year of modeling. The data in this graph refer to the percentage of hazard quotients (in this collection of hazard quotients) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-31. Percentage of Daily-maximum Acute Non-cancer Benzene Hazard Quotients (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the Well Pad During Production Activities

Figure 5-32 contains box-and-whisker plots reflecting distributions of benzene HQs during production activities, across all person-days, stratified by O&G site and distance. For acute benzene HQs at the 500-ft distance, the 25th-percentile values were 0.031–0.035 and the 75th-percentiles were 0.15–0.16 at the three sites. These were notably lower than the absolute maximum values at that same distance: 1.4, 1.1, and 1.6 at the Garfield County ridge-top site, Garfield County valley site, and NFR site, respectively. The median benzene HQs during production were 0.074, 0.079, and 0.073 at 500 ft from the three sites respectively, which were a factor of 14–22 lower than the absolute maximum values at the same distance.



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HQ = hazard quotient; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-32. Distributions of Daily-maximum Acute Non-cancer Benzene Hazard Quotients (Across the Hypothetical Population) at Various Distances from the Well Pad during Production Activities

5.4.2. Chronic Non-cancer Hazards

Contrary to the acute results, emissions of all chemicals were below chronic health-criteria levels at 500-ft from the 1-acre production well pad (Table 5-17), although HQs for benzene were to slightly above 1 at the 150-ft distance for 4 percent of simulated individuals at the Garfield County ridge-top site and for 19 percent at the valley site (Table E-33, Table E-34). At 2,000 ft from the pads, all HQs were well below 0.1, including for benzene (which was not the case with the acute results).

His followed this same pattern, with no values above 1 at the 250-ft distance and beyond (Table 5-18, Figure 5-33, Table E-35), **benzene helping to produce hematological His slightly above 1 at the 150-ft distance at all three sites** (for 33–53 percent of the modeled individuals, depending on the site; Figure 5-34, Table E-36), **and the aggregation of**

trimethylbenzenes, n-nonane, and xylenes helping to produce neurotoxicity HIs slightly above 1 also at the 150-ft distance at the Garfield County sites (for 10–24 percent of the modeled individuals, depending on the site; Table E-36).

Figure 5-35 contains box-and-whisker plots reflecting the distributions of hematological chronic HIs during production activities, across all individuals, stratified by O&G site and distance. The 25th-to-75th-percentile ranges of chronic HIs for hematological at the 500-ft distance were 0.14–0.29, 0.12–0.25, and 0.12–0.24 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively. These were lower than the absolute maximum values at the same distance: 0.37, 0.31, and 0.3, respectively. The median hematological HIs during production were 0.22, 0.18, and 0.18 at 500 ft from the three sites respectively, which were a factor of 1.7 smaller than the absolute maximum values at the same distance. Figure 5-35 shows that approximately 14–18 percent of all individuals had hematological HIs below 0.1 at the 500-ft distance, depending on the site.

The HQs and HIs averaged across chemicals, activities, and distances were about 8 percent larger at the Garfield County ridge-top site relative to the valley site, and about 19 percent larger at the ridge-top site than the NFR site. The generally lower values with this chronic assessment, relative to the acute assessment, is largely a result of longer averaging times for exposure (hundreds of days versus one hour). These chronic HQs and HIs during production activities at 1-acre pads are also generally lower than those during flowback development activities at 5-acre pads, due to generally lower emissions during production.

Table 5-17. Overview of the Largest Chronic Non-cancer Hazard Quotients during Production Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the Well Pad

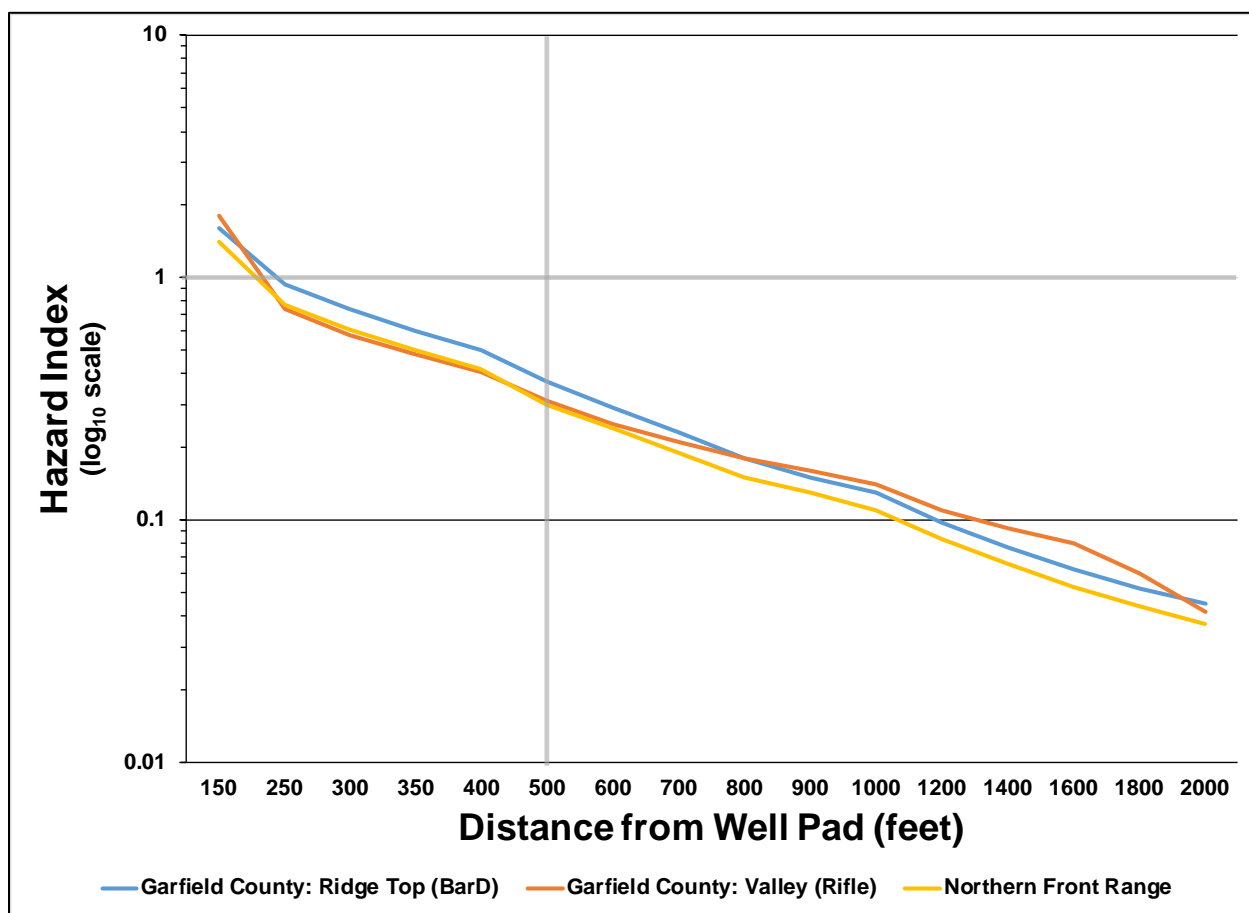
Range of Hazard Quotients	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	benzene	benzene	benzene	none		

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Table 5-18. Overview of the Largest Chronic Non-cancer Hazard Indices during Production Activities for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the Well Pad

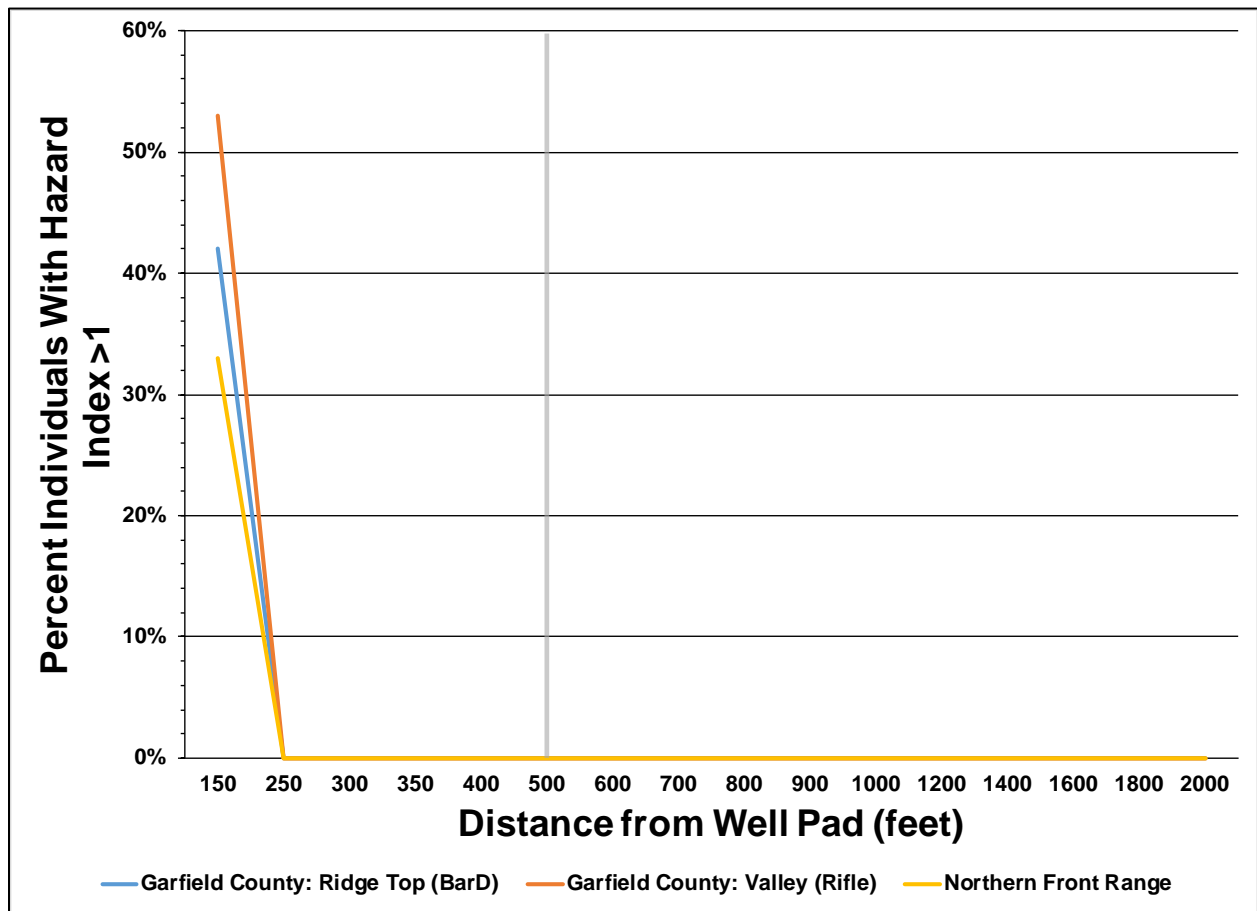
Range of Hazard Indices	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	none		

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



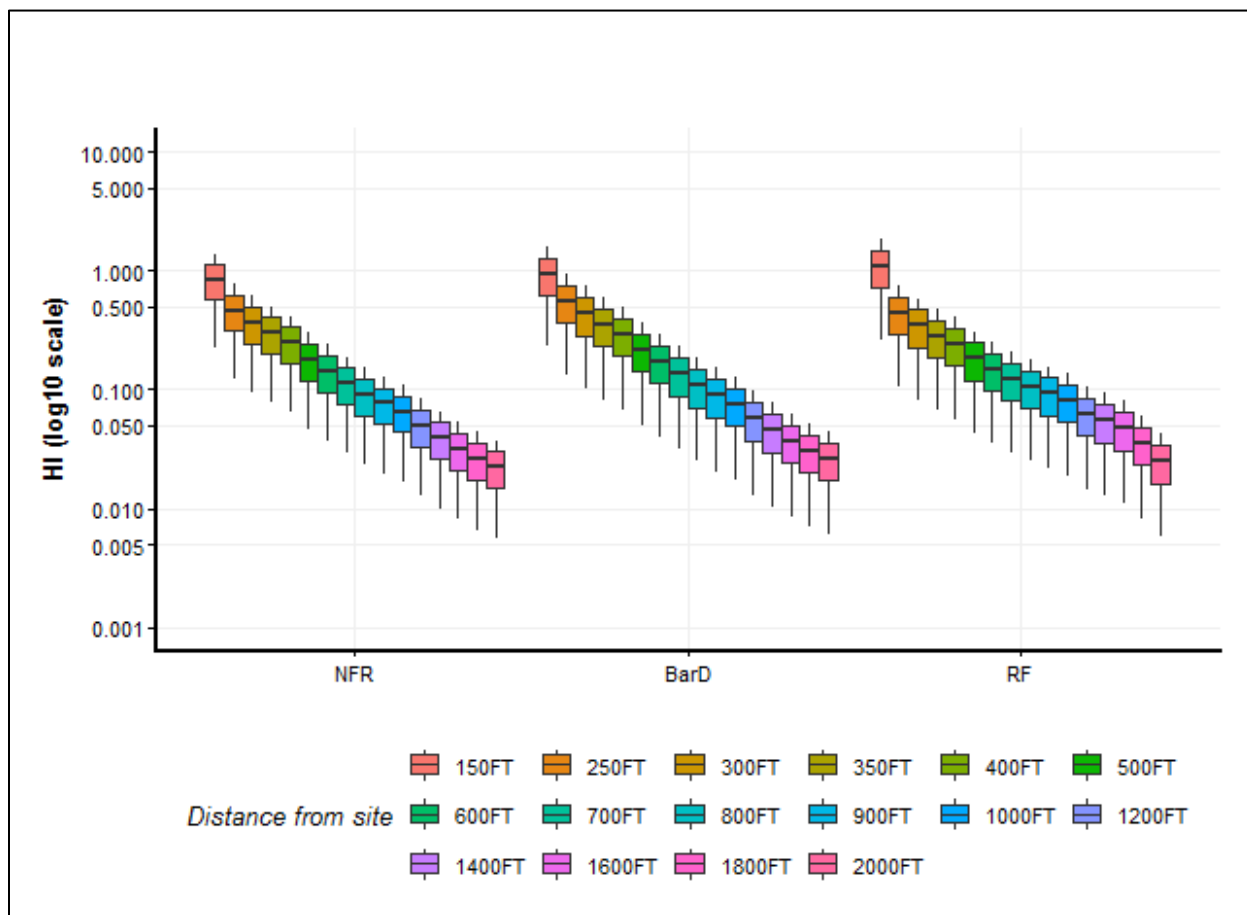
Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. The data in this graph refer to the percentage of hazard indices (across all modeled individuals) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

Figure 5-33. Largest Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the Well Pad during Production Activities



Notes: X-axis is not to scale. The data in this graph refer to the percentage of hazard quotients (in this collection of hazard quotients) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-34. Percentage of Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the Well Pad during Production Activities



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-35. Distributions of Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group (Across the Hypothetical Population) at Various Distances from the Well Pad during Production Activities

5.4.3. Chronic Cancer Risks

We assessed incremental lifetime cancer risks for exposure to the VOC for which strong evidence of carcinogenicity was available (benzene; Section 4.3).¹³ As discussed in Section 4.3, we focused our cancer assessment on O&G activities or sequences of activities lasting more

¹³ The quantitative estimates of cancer risk only considers benzene, due to lack of reliable dose-response information for other VOCs which we evaluated in these HHRAs and which may increase cancer risks in humans. As discussed in Section 4.3, it was not possible to derive cancer risk estimates for several chemicals with emissions data (ethylbenzene, styrene, and isoprene) that are suspected to cause cancer in human. In addition (see Section 5.6), emissions data were not available for several chemicals (formaldehyde, acetaldehyde) that are suspected of increasing human cancer risks and which have been detected in the air near other O&G operations.

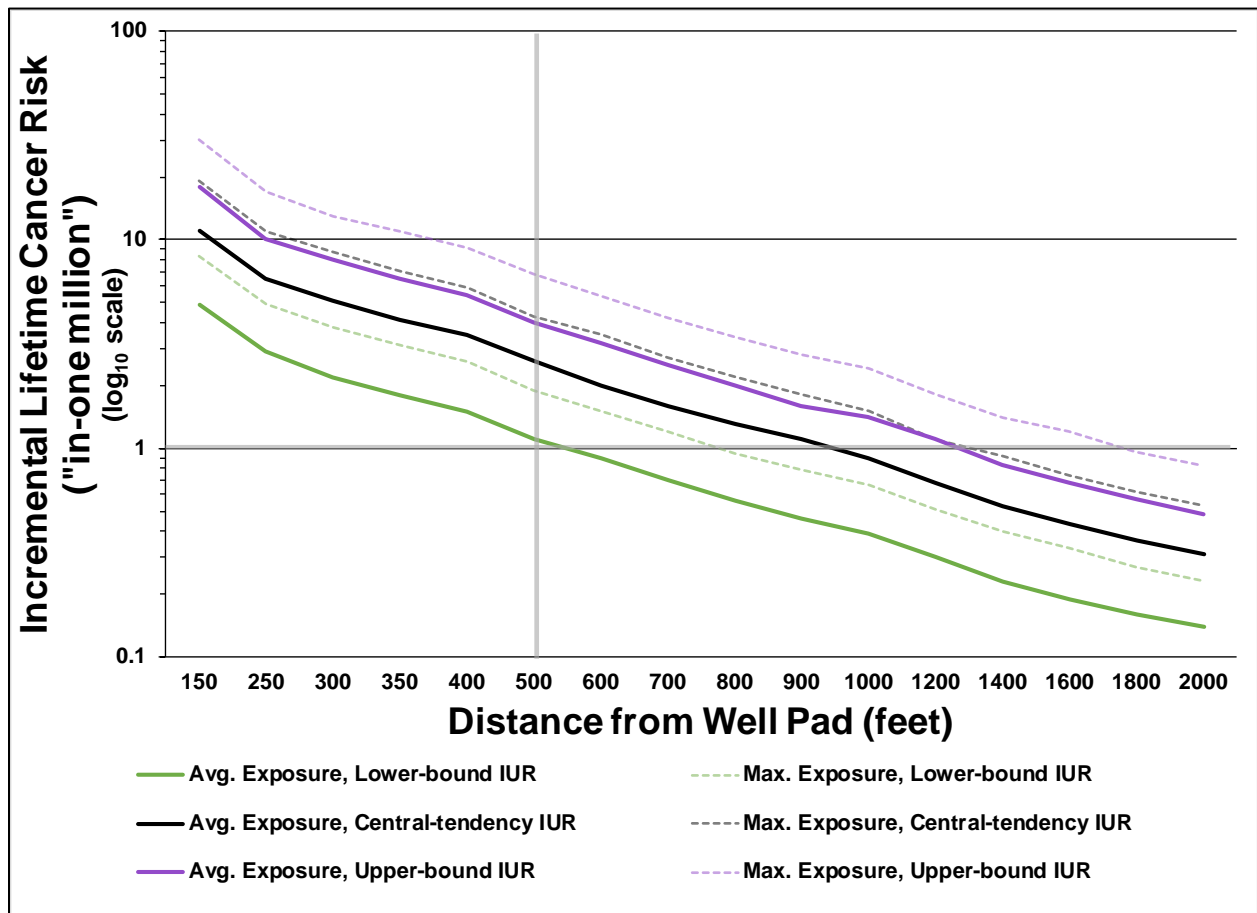
than several years—the 30-year production activity (discussed here), and the 30–32-year sequences of development and production activities (discussed later in Section 5.5.3).

As discussed below, **simulated cancer risks to the average simulated individuals were below 1-in-one million at distances 1,400+ ft from the well pads** at all sites (at 2,000 ft for the maximum-exposed individuals). Risks to average individuals were below 10-in-one million at 300+ ft from the pads (400+ ft for the maximum-exposed individuals). **At the 500-ft distance, risks to average individuals were 4-in-one million or less (less than 7-in-one million for the maximum-exposed individuals).**

In Figure 5-36, we plot the incremental lifetime cancer risks associated with benzene exposures at the selected receptors at the Garfield County ridge-top site. The main focus of the plot is the risk to the average simulated individual (the solid lines) based on the two EPA IURs as well as the midpoint between them (“central tendency”), but for supplemental analysis we also plot the risk to the maximum-exposed simulated individual (the dashed lines). In all of these scenarios (average vs. maximum-exposed individual; upper- and lower-bound IUR and central-tendency), the simulated risk to all individuals was well below 10-in-one million at the selected downwind 500-ft receptor—between 1.1- and 4-in-one million for the average individual (depending on the IUR) and between 1.9- and 6.8-in-one million for the maximum-exposed individual. All risks for the average individual fell below 1-in-one million by 1,400 ft from the well pad utilizing the upper-bound IUR (by 600 ft utilizing the lower-bound IUR). For the maximum-exposed individual, those distances respectively were 1,800 and 800 ft. Risks closer to the well pad were sometimes above 10-in-one million, up to 18-in-one million for the average individual at 150 ft from the pad utilizing the upper-bound IUR (30-in-one million for the maximum-exposed individual at the same distance), though both individuals were below 10-in-one million utilizing the lower-bound IUR. All simulated risks were below 10-in-one million by the 400-ft distance.

Similarly, in Figure 5-37 we plot the incremental lifetime cancer risks associated with benzene exposures at the selected receptors at the Garfield County valley site. The results were similar to those of the ridge-top site. Depending on the IUR and simulated individual, simulated risks were sometimes above 10-in-one million at distances 300 ft from the well pad and closer (values up to 20-in-one million for the average individual, 34-in-one million for the maximum-exposed individual, at the 150-ft distance utilizing the upper-bound IUR; risks below 10-in-one million utilizing the lower-bound IUR). However, risks at the 500-ft distance were no larger than 3.4-in-one million for the average individual (5.7 for the maximum-exposed individual), and risks dropped below 1-in-one million by the 1,400-ft distance for the average individual (2,000-ft distance for the maximum-exposed individual).

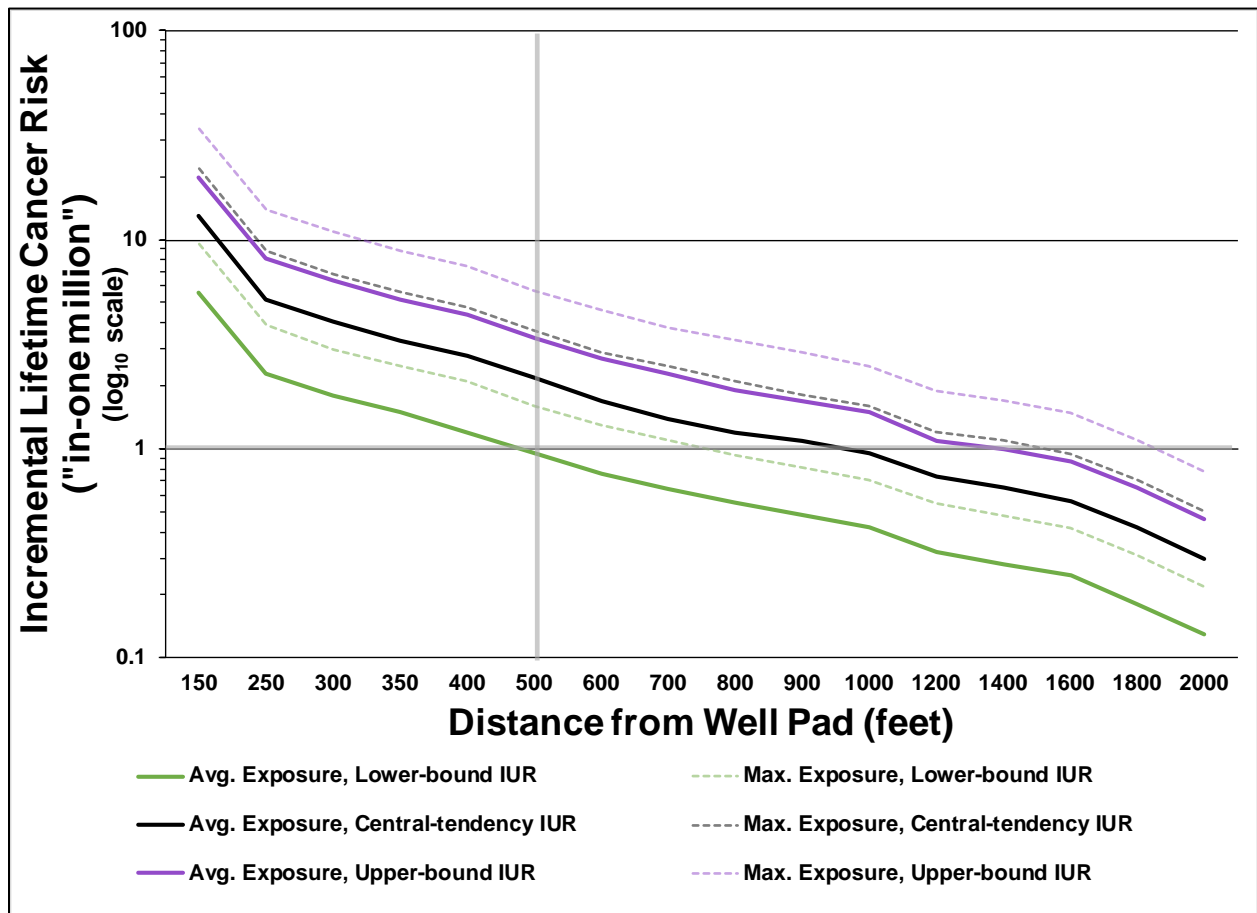
Finally, in Figure 5-38 we plot the incremental lifetime cancer risks associated with benzene exposures at the selected receptors at the NFR site. The results were similar to those of the Garfield County sites. Depending on the IUR and simulated individual, simulated risks were sometimes above 10-in-one million at distances 300 ft from the well pad and closer (values up to 15-in-one million for the average individual, 26-in-one million for the maximum-exposed individual, at the 150-ft distance utilizing the upper-bound IUR; risks below 10-in-one million utilizing the lower-bound IUR). However, risks at the 500-ft distance were no larger than 3.3-in-one million for the average individual (5.6 for the maximum-exposed individual), and risks dropped below 1-in-one million by the 1,200-ft distance for the average individual (1,600-ft distance for the maximum-exposed individual).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log₁₀ = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

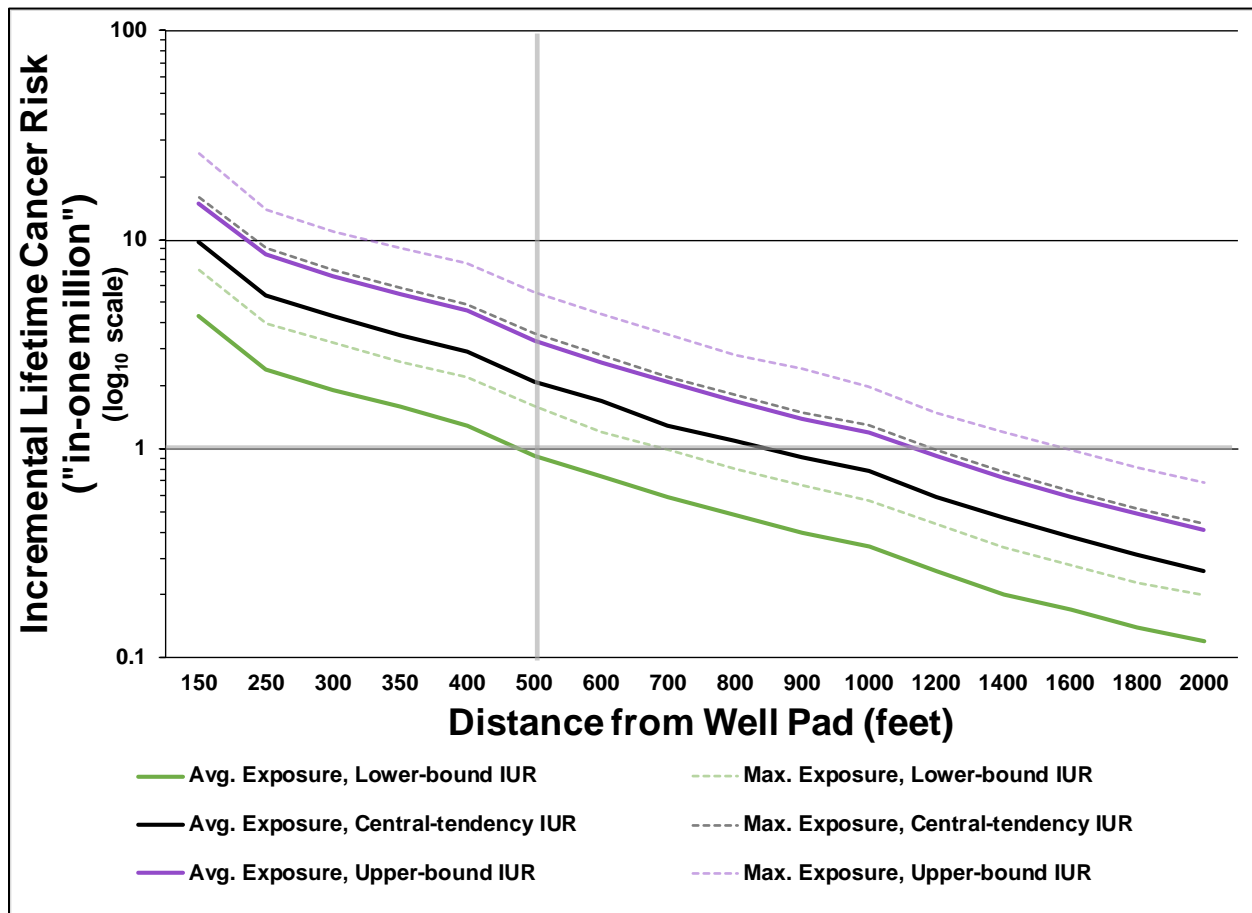
Figure 5-36. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during Production Activities at the Garfield County Ridge-top Site



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log₁₀ = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

Figure 5-37. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during Production Activities at the Garfield County Valley Site



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log₁₀ = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

Figure 5-38. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during Production Activities at the Northern Front Range Site

5.5. Sequential Oil and Gas Activities

In the subsections below, we discuss estimates for subchronic and chronic non-cancer HQs and HIs for sequential patterns of O&G development and production activities, covering drilling, fracking, and flowback together as an overall "development" exposure scenario, and covering development and production together as an overall "development+production" scenario. We discuss the context for these sequential activities further in Section 3.3.2. **Compared with assessing individual O&G activities, these assessments of sequential activities are more holistic because residential exposures likely are not isolated to just the drilling phase, just the fracking phase, etc.** However, the sequential assessment is also less conservative than assessments of individual O&G activities because the higher exposures during some activities will be averaged with lower exposures of other activities. Therefore, **the higher HQs**

and HIs in the sequential assessment will be lower than the higher HQs and HIs in the assessment of individual activities.

We focus particularly on the highest simulated potential values of HQs and HIs, but we also discuss the range of potential values. We also discuss estimates for incremental lifetime cancer risk for the multi-decade exposures of development+production activities, focusing on the average risk at the locations of highest average air concentrations.

All sequences of development activities (except for the 5-acre scenario at Garfield County) last less than 365 days in total, so we calculated only subchronic results for those scenarios. However, when we add production activities to the sequential development activities, the duration of exposures are more than 365 days and so we calculated chronic results for all such scenarios.

We provide additional quantifications of HQs and HIs, both maximum values as well as percentages of values above 1, in Appendix E.3. We generally present the same types of tables and figures (the same basic content and purpose) in each individual subsection here. We provide the most comprehensive description of these tables and figures in the first subsection of the O&G development results above (Section 5.3.1.1, which are acute non-cancer hazards related to a 1-acre development well pad). We provide less description here in order to reduce repetition; please reference the Section 5.3.1.1 descriptions as needed for interpretation.

5.5.1. Subchronic Non-cancer Hazards

In this section, we discuss the potential for subchronic (multi-day) exposures above health-criteria levels, due to emissions from O&G development activities that occur sequentially (covering drilling, fracking, and flowback together). We discuss the results of each size of well pad separately: 1 acre (Section 5.5.1.1), 3 acre (Section 5.5.1.2), and 5 acre (Section 5.5.1.3).

As noted in the subsections below, **the higher estimated subchronic HQs and HIs during development activities in sequence were generally lower than those during individual development activities.** This is due to the longer-term averaging of the generally higher fracking and flowback HQs and HIs with generally lower drilling HQs and HIs. **All subchronic HQs were below 1 at all distances from all well pads, and all subchronic HIs were below 1 at 500+ ft from the well pads.** Only with the Garfield County ridge-top 1-acre pad were subchronic neurotoxicity and hematological HIs above 1, and only at less than 500 ft from the pad (driven primarily by emissions of benzene, m+p-xylene, trimethylbenzenes, and n-nonane).

5.5.1.1. 1-acre Well Pad

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

Similar to the subchronic results presented in Section 5.3.2 for individual development activities, **when assessing the development activities in sequence all VOC HQs were below 1 at the selected receptors 500 ft from the 1-acre well pads** (Table 5-19, Table E-37). During development activities in sequence, **all HQs were below 0.1 at the selected 2,000-ft**

receptors (whereas some subchronic m+p-xylene HQs were slightly above 0.1 at the same locations during individual development activities).

Whereas some subchronic HIs were slightly above 1 at the selected 500-ft receptors during individual development activities at 1-acre pads (Section 5.3.2), during sequential development activities **all subchronic HIs were below 1 at 500 ft and at or below 0.1 at 2,000 ft** (Table 5-20, Table E-38). Figure 5-39 illustrates trends with distance in the maximum neurotoxicity HIs at the selected receptors (the critical-effect group with the highest maximum HIs in this 1-acre scenario of development activities in sequence). These HIs were always 1 or below at the Garfield County valley and NFR sites. At the ridge-top site, while these HIs were slightly above 1 at 300 ft from the well pads, they fell below 1 by the 500-ft distance. Maximum hematological HIs were also slightly above 1 at distances close to the ridge-top and NFR well pads (not shown in this figure). **These HIs slightly above 1 at close distances to the well pad were driven primarily by benzene, m+p-xylene, trimethylbenzenes, and n-nonane.** These HIs remained at or above 0.1 at the valley site at all selected receptors (all distances), while at the ridge-top site the HIs dropped below 0.1 by 1,600 ft (by 1,400 ft at the NFR site). Table E-38 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Comparing HQs and HIs between the three sites, the HQs and HIs averaged across chemicals and distances were within about 25 percent between the two Garfield County sites (higher at ridge-top site), while the values at the Garfield County sites were up to a factor of 2 higher than those at the NFR site.

Table 5-19. Overview of the Largest Subchronic Non-cancer Hazard Quotients during Development Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Well Pad

Range of Hazard Quotients	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (Bard)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (Bard)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	123-TMB 124-TMB 135-TMB benzene m+p-xylene n-nonane	benzene m+p-xylene n-nonane	benzene n-nonane	none		

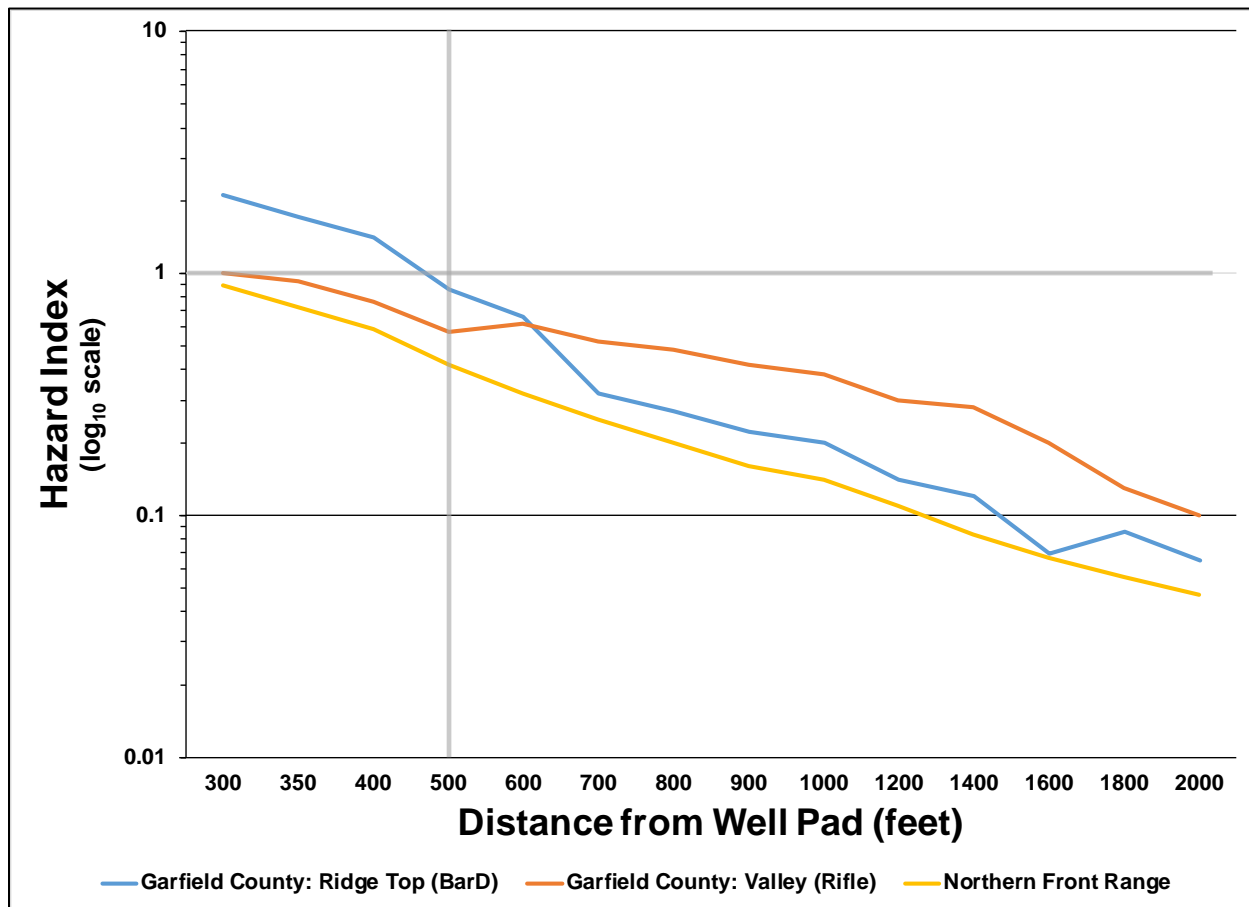
Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Table 5-20. Overview of the Largest Subchronic Non-cancer Hazard Indices during Development Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Well Pad

Range of Hazard Indices	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	hematological neurotoxicity respiratory systemic	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	none	neurotoxicity	none

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

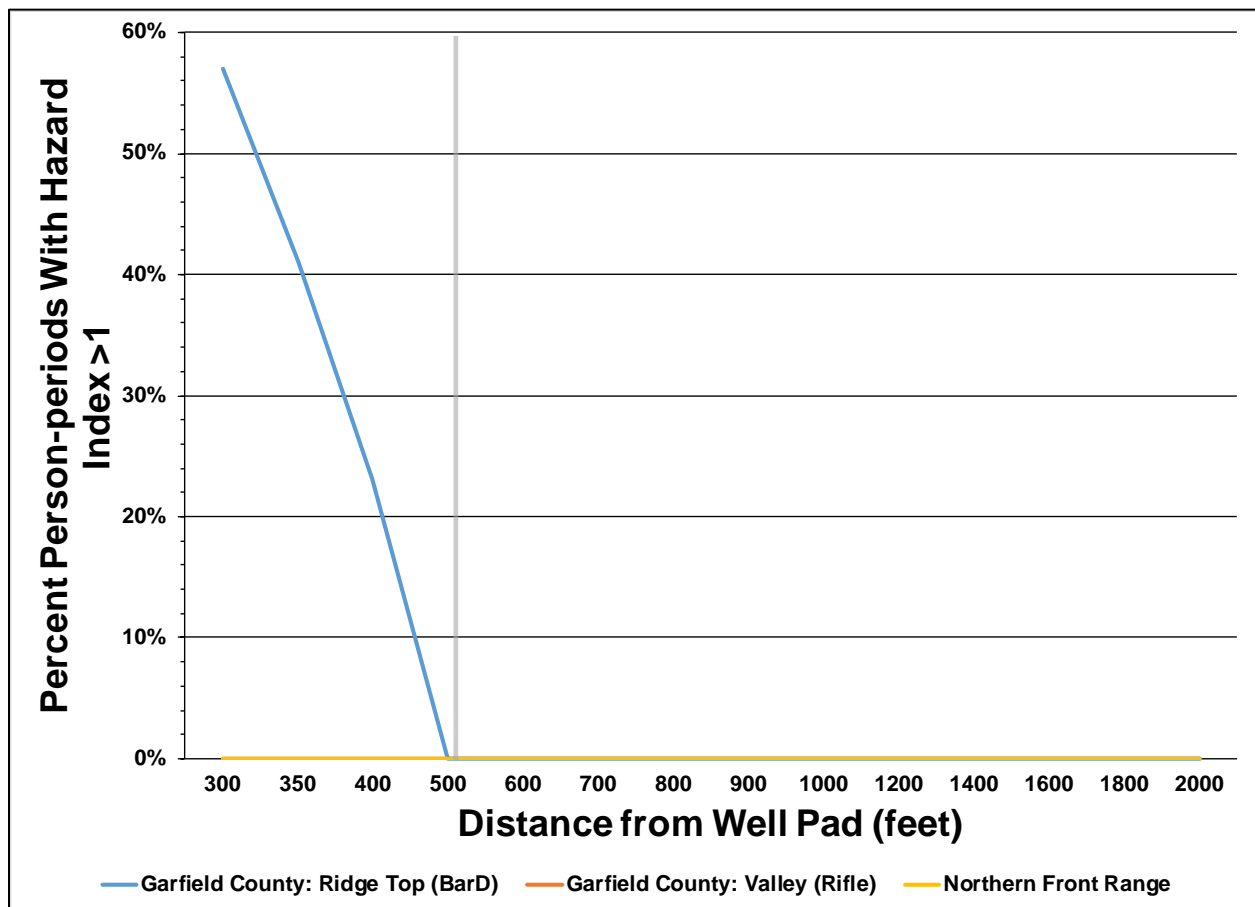
log10 = logarithm base 10.

Figure 5-39. Largest Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 1-acre Well Pad during Development Activities in Sequence

Analysis of Person-period Critical-effect-group Hazard Indices by Distance

For the same scenarios used in Figure 5-39, in Figure 5-40 we illustrate the frequency of maximum subchronic HIs reaching above a value of 1. This figure is analogous to Figure 5-16 in Section 5.3.2.1, and it shows that only at the closest distance to the Garfield County ridge-top pad did development activities in sequence produce subchronic neurotoxicity HIs above 1 for the majority of people on the majority of multi-day periods of the year. By the 500-ft distance, HIs above 1 occurred for no simulated individuals.

Generally, the rate of decline in these percentages with distance will vary across chemicals/critical-effect groups and sites, depending on several factors. Table E-39 shows the percentage of person-periods with HI above 1 for all critical-effect groups, including those used to create this graph (we do not show a similar table for HQs because all HQs were below 1).

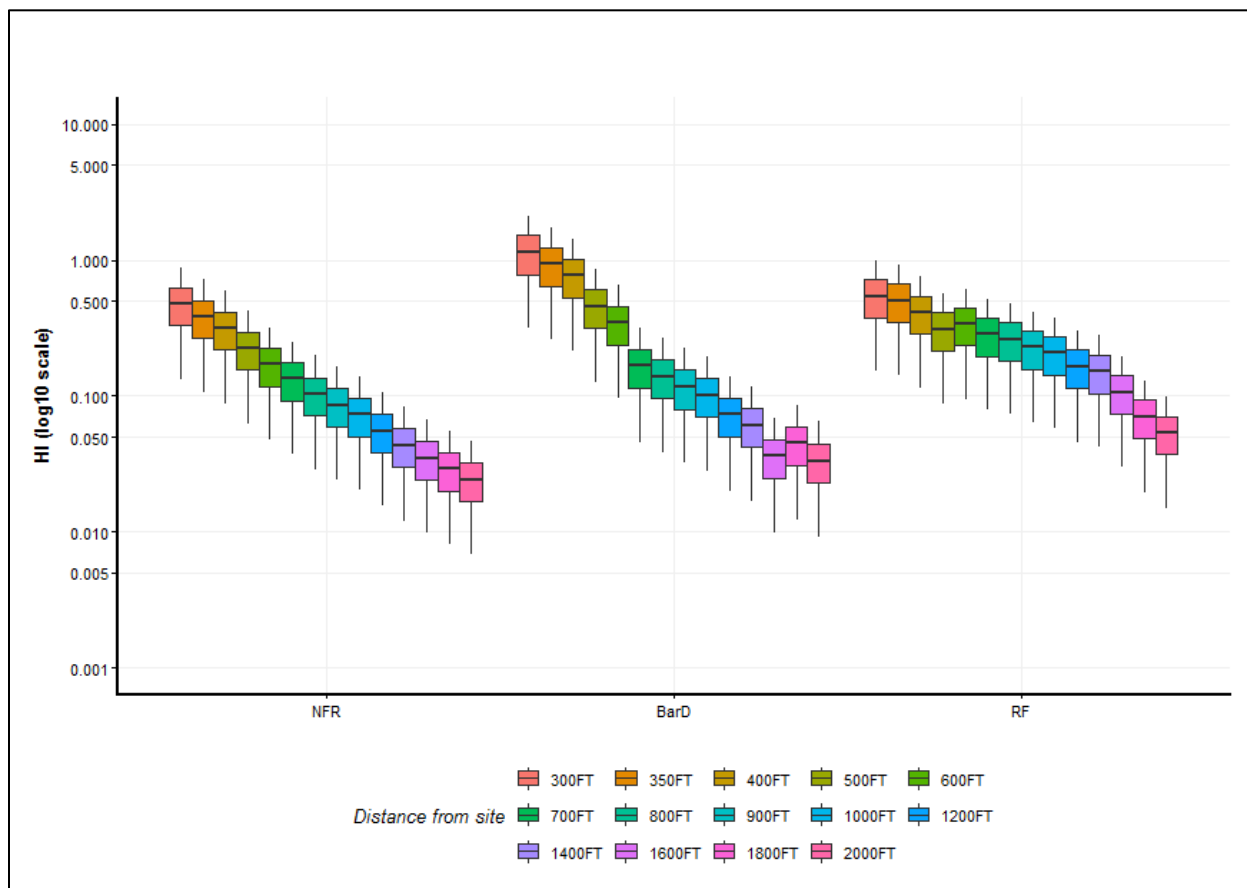


Notes: X-axis is not to scale. "Person-periods" refers to the collection across the hypothetical population of each modeled individual's subchronic hazard indices for a year of modeling (the "rolling averages" referred to in Section 3.3.2.2). The data in this graph refer to the percentage of hazard indices (in this collection of hazard indices) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-40. Percentage of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 1-acre Well Pad during Development Activities in Sequence

Figure 5-41 is analogous to Figure 5-17 in Section 5.3.2.1, showing distributions of neurotoxicity HIs during development activities in sequence, across all person-periods. The 25th-to-75th-percentile ranges of subchronic HIs for neurotoxicity at the 500-ft distance were 0.31–0.61, 0.21–0.41, and 0.15–0.3 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively. These were lower than the absolute maximum values at the same distance: 0.86, 0.57, and 0.42, respectively. The median neurotoxicity HIs during development activities in sequence were 0.46, 0.31, and 0.22 at 500 ft from the three sites respectively, which were factors of 1.8–1.9 smaller than the absolute maximum values at the same distance.

For the scenario which had the highest HIs at the 500-ft distance (neurotoxicity HIs at the Garfield County ridge-top site), Figure 5-41 shows that approximately 57 percent of all person-period HIs at the 500-ft distance were below 0.5 (97 percent for the valley site, 100 percent for the NFR site).



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-41. Distributions of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 1-acre Well Pad during Development Activities in Sequence

5.5.1.2. 3-acre Well Pad

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

Maximum chemical HQs and critical-effect-group HIs at 500 ft were smaller for the 3-acre results relative to the 1-acre results (by less than about a factor of 2 on average across VOCs/critical-effect groups and sites).

As with the 1-acre results presented in Section 5.5.1.1, **when assessing the development activities in sequence all VOC subchronic HQs were below 1 at the selected receptors 500 ft from the 3-acre well pads, and all HQs were below 0.1 at the selected 2,000-ft receptors** (Table 5-21, Table E-40). Also similar to the 1-acre results, at 3-acre pads **all subchronic HIs were below 1 at 500 ft and below 0.1 at 2,000 ft** (Table 5-22, Table E-41). Figure 5-42 illustrates trends with distance in the maximum neurotoxicity HIs at the selected receptors (the critical-effect group with the highest maximum HIs in this 3-acre scenario of development activities in sequence). All HIs for all critical-effect groups were always below 1 at all three sites, contrary to the 1-acre results where neurotoxicity and hematological HIs were slightly above 1 at 300–400 ft from the pad at one or more sites. These HIs remained above 0.1 out to 1,000–1,800 ft from the well pads, depending on the site. Table E-41 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Comparing HQs and HIs between the three sites, the HQs and HIs averaged across chemicals and distances were within about 30 percent between the two Garfield County sites and within about 45 percent between all three sites (highest at the valley site).

Table 5-21. Overview of the Largest Subchronic Non-cancer Hazard Quotients during Development Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Well Pad

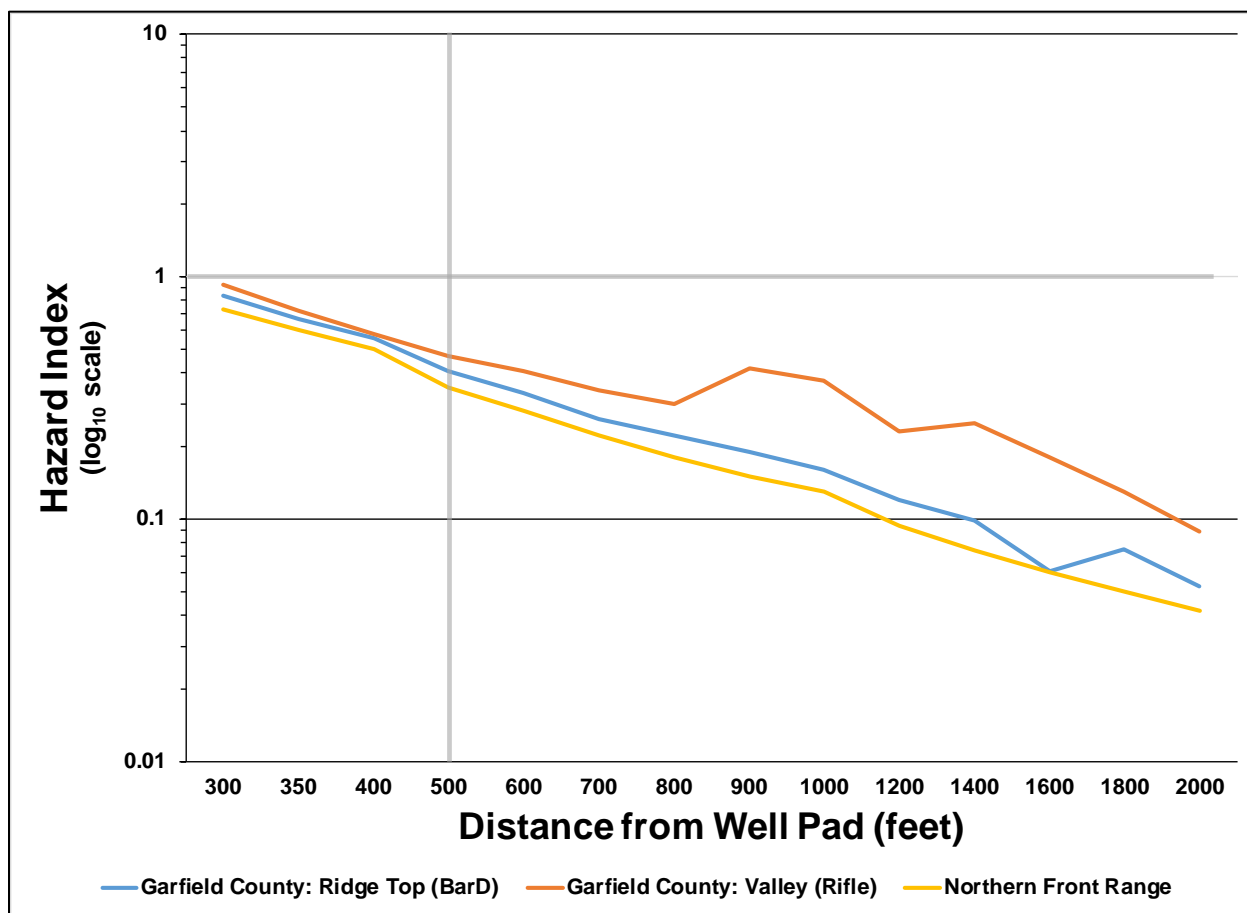
Range of Hazard Quotients	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	benzene m+p-xylene	benzene m+p-xylene n-nonane	benzene n-nonane	none		

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Table 5-22. Overview of the Largest Subchronic Non-cancer Hazard Indices during Development Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Well Pad

Range of Hazard Indices	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	hematological neurotoxicity	none		

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

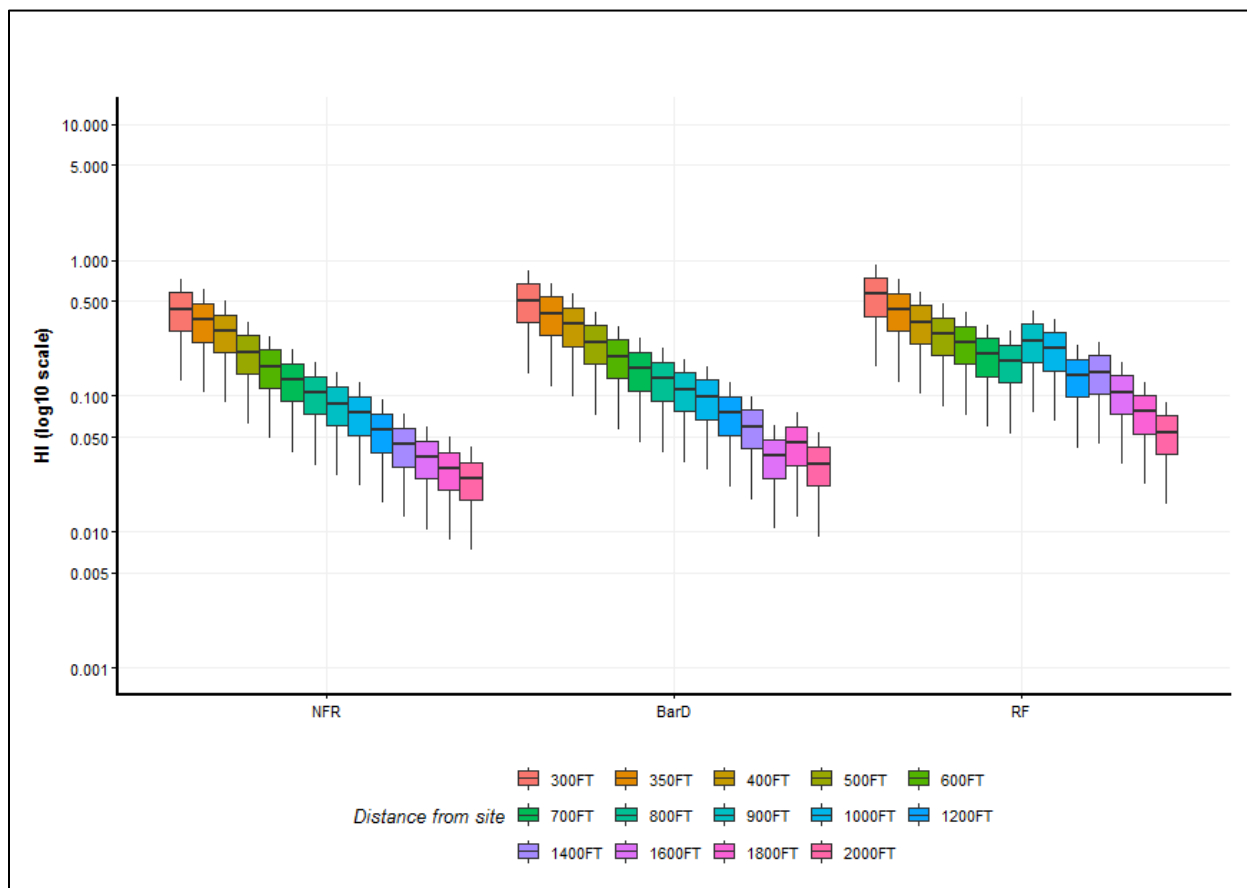
Figure 5-42. Largest Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 3-acre Well Pad during Development Activities in Sequence

Analysis of Person-period Critical-effect-group Hazard Indices by Distance

Whereas in the 1-acre results some modeled individuals at the selected downwind receptors 300–500 ft from the Garfield County ridge-top pad had simulated HIs above 1, with the 3-acre results all HIs were below 1. Therefore, we do not present here a figure analogous to Figure 5-40 in Section 5.5.1.1.

Figure 5-43 is analogous to Figure 5-41 in the 1-acre results, showing distributions of neurotoxicity HIs during development activities in sequence, across all person-periods. The 25th-to-75th-percentile ranges of subchronic HIs for neurotoxicity at the 500-ft distance were 0.17–0.33, 0.2–0.38, and 0.14–0.28 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively (0.31–0.61, 0.21–0.41, and 0.15–0.3 at the 1-acre pads). These were lower than the absolute maximum values at the same distance: 0.41, 0.47, and 0.35, respectively. The median neurotoxicity HIs during development activities in sequence were 0.25, 0.29, and 0.21 at 500 ft from the three sites respectively (rather than 0.46, 0.31, and 0.22 at the 1-acre well pad), which were a factor of 1.6–1.7 smaller than the absolute maximum values at the same distance.

For the scenario which had the highest HIs at the 500-ft distance (neurotoxicity HIs at the Garfield County valley site), Figure 5-43 shows that approximately 3 percent of all person-period HIs at the 500-ft distance were below 0.1 (7 percent for the ridge-top site, 10 percent for the NFR site).



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-43. Distributions of Subchronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 3-acre Well Pad during Development Activities in Sequence

5.5.1.3. 5-acre Well Pad

At the 5-acre pads during development activities in sequence, we analyzed subchronic exposures only at the NFR site where the total duration of development activities was less than 365 days (at the other sites, the total duration exceeded 365 days and so we conducted only chronic assessments there).

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

Maximum chemical HQs and critical-effect-group HIs at 500 ft were smaller for the 5-acre NFR results relative to the 3-acre NFR results (by less than about 5 percent on average across VOCs/critical-effect groups).

As with the 3-acre results presented in Section 5.5.1.2, **when assessing the development activities in sequence all subchronic VOC HQs were below 1 at the selected receptors 500 ft from the 5-acre NFR well pad, and all HQs were below 0.1 at the selected 2,000-ft receptor** (Table 5-23, Table E-42). Also similar to the 3-acre results, at 5-acre pads **all subchronic HIs were below 1 at 500 ft and below 0.1 at 2,000 ft** (Table 5-24, Table E-43). Figure 5-44 illustrates trends with distance in the maximum hematological HIs at the selected receptors (the critical-effect group with the highest maximum HIs in this 5-acre scenario of development activities in sequence at the NFR site), along with the two critical-effect groups with the next-highest maximum HIs (neurotoxicity and respiratory). Like with the 3-acre results, all HIs for all critical-effect groups were always below 1 at the 5-acre NFR site. These HIs remained above 0.1 out to 1,200 ft from the well pad for the hematological group (1,000 and 400 ft for the neurotoxicity and respiratory groups, respectively). Table E-43 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Table 5-23. Overview of the Largest Subchronic Non-cancer Hazard Quotients during Development Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

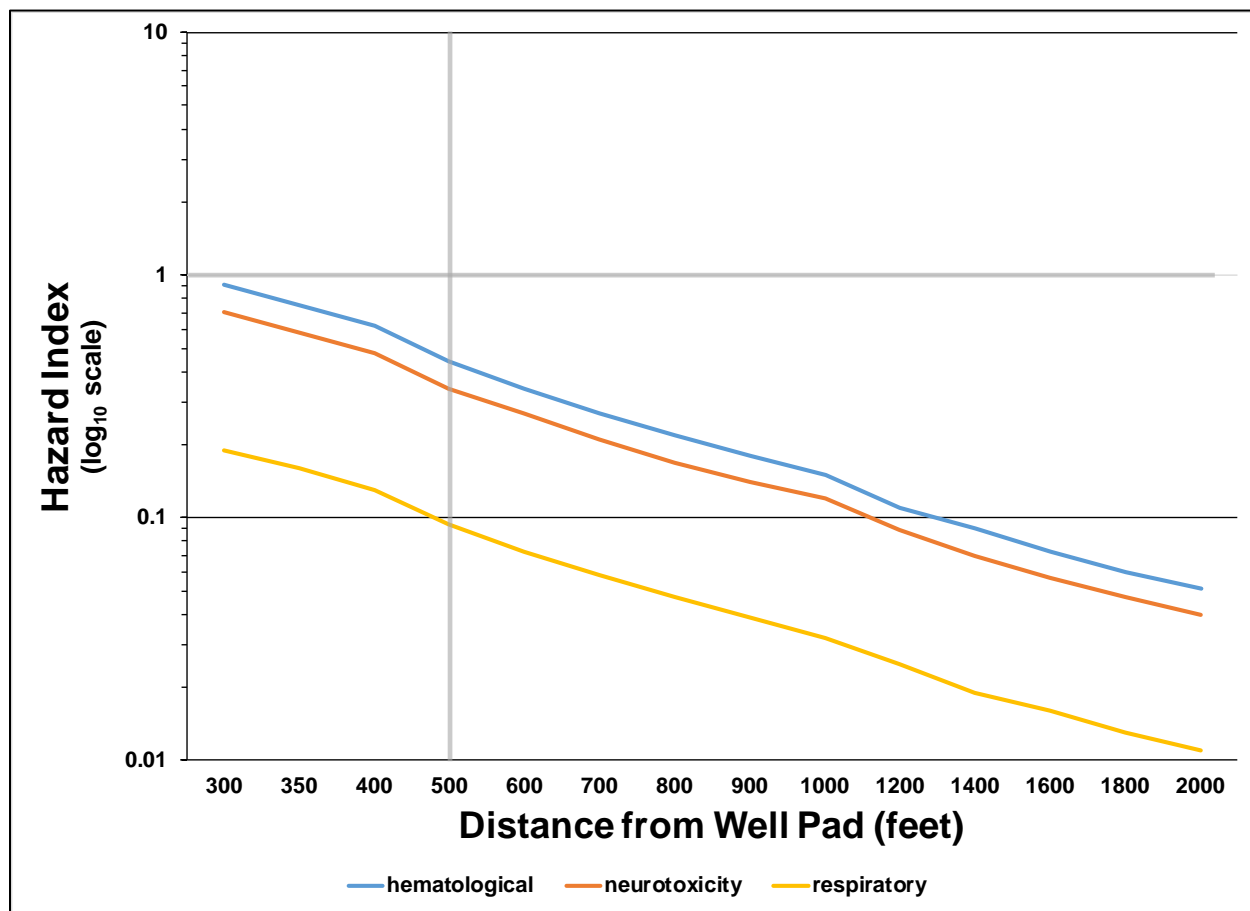
Range of Hazard Quotients	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	N/A	N/A	none	N/A	N/A	none
Between 1 and 10	N/A	N/A	none	N/A	N/A	none
0.1 to 1	N/A	N/A	benzene n-nonane	N/A	N/A	none

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical). Entries for Garfield County sites are "N/A" because development activities in sequence there last a total of more than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a chronic assessment).

Table 5-24. Overview of the Largest Subchronic Non-cancer Hazard Indices during Development Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Well Pad

Range of Hazard Indices	300 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	N/A	N/A	none	N/A	N/A	none
Between 1 and 10	N/A	N/A	none	N/A	N/A	none
0.1 to 1	N/A	N/A	hematological neurotoxicity	N/A	N/A	none

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical). Entries for Garfield County sites are "N/A" because development activities in sequence there last a total of more than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a chronic assessment).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

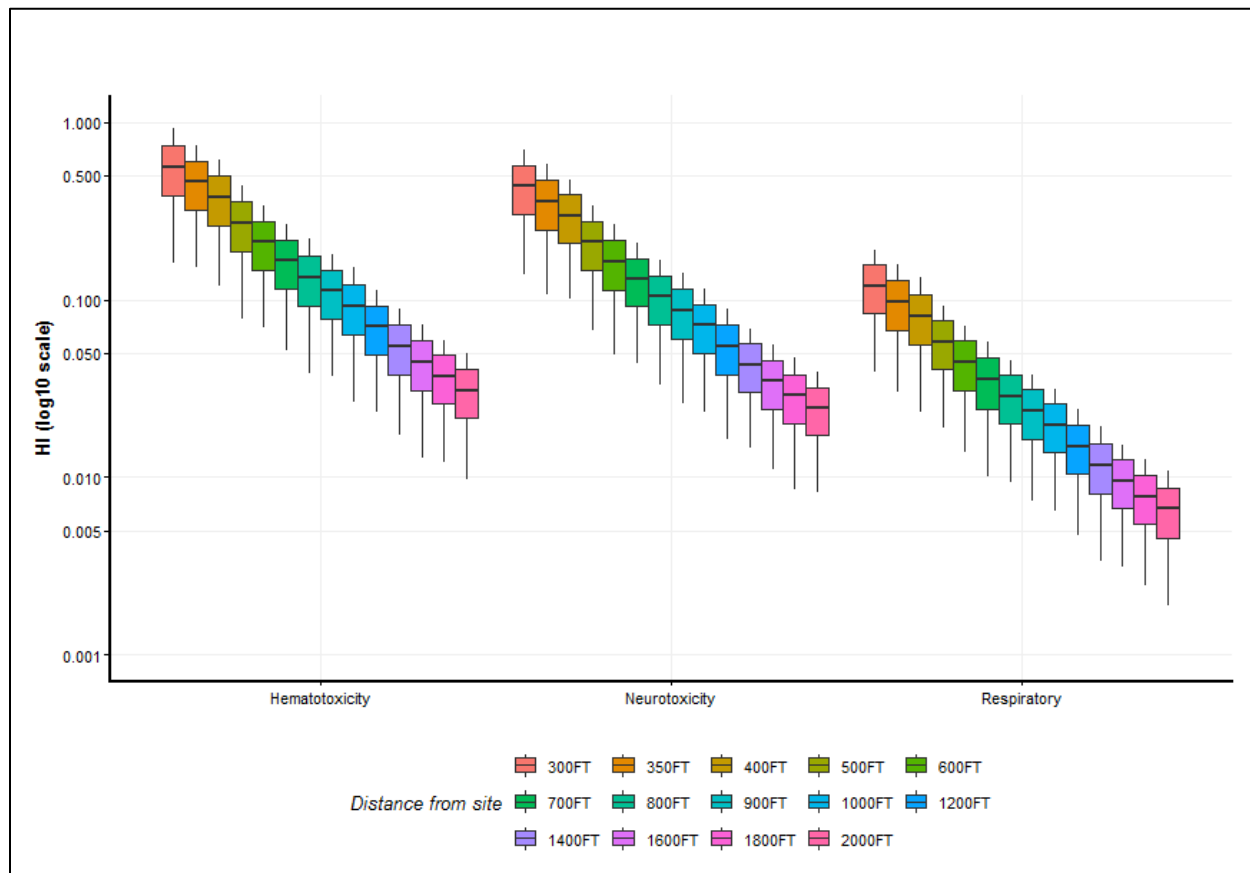
Figure 5-44. Largest Subchronic Non-cancer Hazard Indices for the Hematological, Neurotoxicity, and Respiratory Critical-effect Groups, for the Highest Exposed Hypothetical Individuals at Various Distances from the 5-acre Well Pad during Development Activities in Sequence at the Northern Front Range Site

Analysis of Person-period Critical-effect-group Hazard Indices by Distance

As with the 3-acre results, all HIs were below 1 at the 5-acre NFR well pad. Therefore, we do not present here a figure analogous to Figure 5-40 in Section 5.5.1.1.

Figure 5-45 is analogous to Figure 5-43 in the 3-acre results, however here we show distributions of hematological, neurotoxicity, and respiratory HIs during development activities in sequence at the NFR site, across all person-periods (matching what we show in Figure 5-44). The 25th-to-75th-percentile ranges of subchronic HIs at the 500-ft distance were 0.18–0.35, 0.14–0.28, and 0.039–0.076 for the hematological, neurotoxicity, and respiratory groups, respectively (0.18–0.36, 0.14–0.28, and 0.039–0.076 at the 3-acre pads). These were lower than the absolute maximum values at the same distance: 0.44, 0.34, and 0.094, respectively. The median hematological, neurotoxicity, and respiratory HIs during development activities in sequence were 0.27, 0.21, and 0.058 at 500 ft from the three sites respectively, which were a

factor of 1.6 smaller than the absolute maximum values. As shown in Figure 5-45, approximately 5 percent of all person-period HIs at the 500-ft distance were below 0.1 for the hematological group (10 percent for neurotoxicity, 100 percent for respiratory).



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range.

Figure 5-45. Distributions of Subchronic Non-cancer Hazard Indices for the Hematological, Neurotoxicity, and Respiratory Critical-effect Groups (Across the Hypothetical Population) at Various Distances from the 5-acre Well Pad during Development Activities in Sequence at the Northern Front Range Site

5.5.2. Chronic Non-cancer Hazards

In this section, we discuss the potential for chronic exposures above health-criteria levels, due to emissions from O&G development activities that occur sequentially (covering drilling, fracking, and flowback together), followed by production. We discuss the results of each size of development well pad separately: 1 acre (Section 5.5.2.1), 3 acre (Section 5.5.2.2), and 5 acre (Section 5.5.2.3).

As discussed in Section 5.4, production activities were estimated for 1-acre well pads only, so all development+production scenarios assume a 1-acre well pad for production. The 150- and 250-ft receptor distances only exist in the modeling during the production phase, so for these combined development+production calculations we show receptor distances of 300 ft and beyond. Note that we are utilizing exposures during development activities from the receptors selected for the development assessments discussed earlier (and in Section 2.7.3), and exposures during the production activity from the receptors selected for the production assessments discussed earlier (and in Section 2.8). This means that the exposure concentrations we utilize in our calculations may come from one 300-ft receptor for development activities (a location that tended to produce the highest average 1-hour concentrations during development) and a different 300-ft receptor during production activities (a location that tended to produce the highest annual-average concentration during production).

More than 96 percent of the total period of exposure during all activities in sequence was during production activities (see Table 3-3); because of this, the chronic HQs and HIs discussed here for all activities in sequence were very similar to those discussed in Section 5.4.2 for production alone. **All such HQs and HIs were below 1 at 500 ft from the well pads and below 0.1 at 2,000 ft.** At the 5-acre Garfield County Sites where flowback operations reach chronic duration, more than 70 percent of the total period of exposure during development activities in sequence at those sites was during flowback activities; because of this, the chronic HQs and HIs discussed here for development activities in sequence at 5-acre sites were very similar to those discussed in Section 5.3.3 for flowback alone. **All such HQs were below 1 at 500 ft from the well pads, and hematological and neurotoxicity HIs were slightly above 1 at the same locations.**

5.5.2.1. 1-acre Development Well Pad (1-acre Production Pad)

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

Similar to the chronic results for production activities presented in Section 5.4.2, **when assessing the all O&G activities in sequence all VOC HQs were below 1 at the selected receptors 500 ft from the 1-acre well pads and below 0.1 at 2,000 ft** (Table 5-25, Table E-44). **All chronic HIs were also below 1 at 500 ft and below 0.1 at 2,000 ft** (Table 5-26, Table E-45). Figure 5-46 illustrates trends with distance in the maximum hematological HIs at the selected receptors (the critical-effect group with the highest maximum HIs in this scenario of all activities in sequence). Differences in HIs were small between the three sites, with values falling below 0.1 by 1,200 ft from the Garfield County ridge-top site and the NFR site, and by 1,400 ft from the Garfield County valley site. Table E-45 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Comparing HQs and HIs between the three sites, the HQs and HIs averaged across chemicals and distances were about 15 percent larger at the Garfield County ridge-top site compared with the valley site, and about 20 percent larger at the ridge-top site compared with the NFR site.

Table 5-25. Overview of the Largest Chronic Non-cancer Hazard Quotients during All Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Development Well Pad/1-acre Production Pad

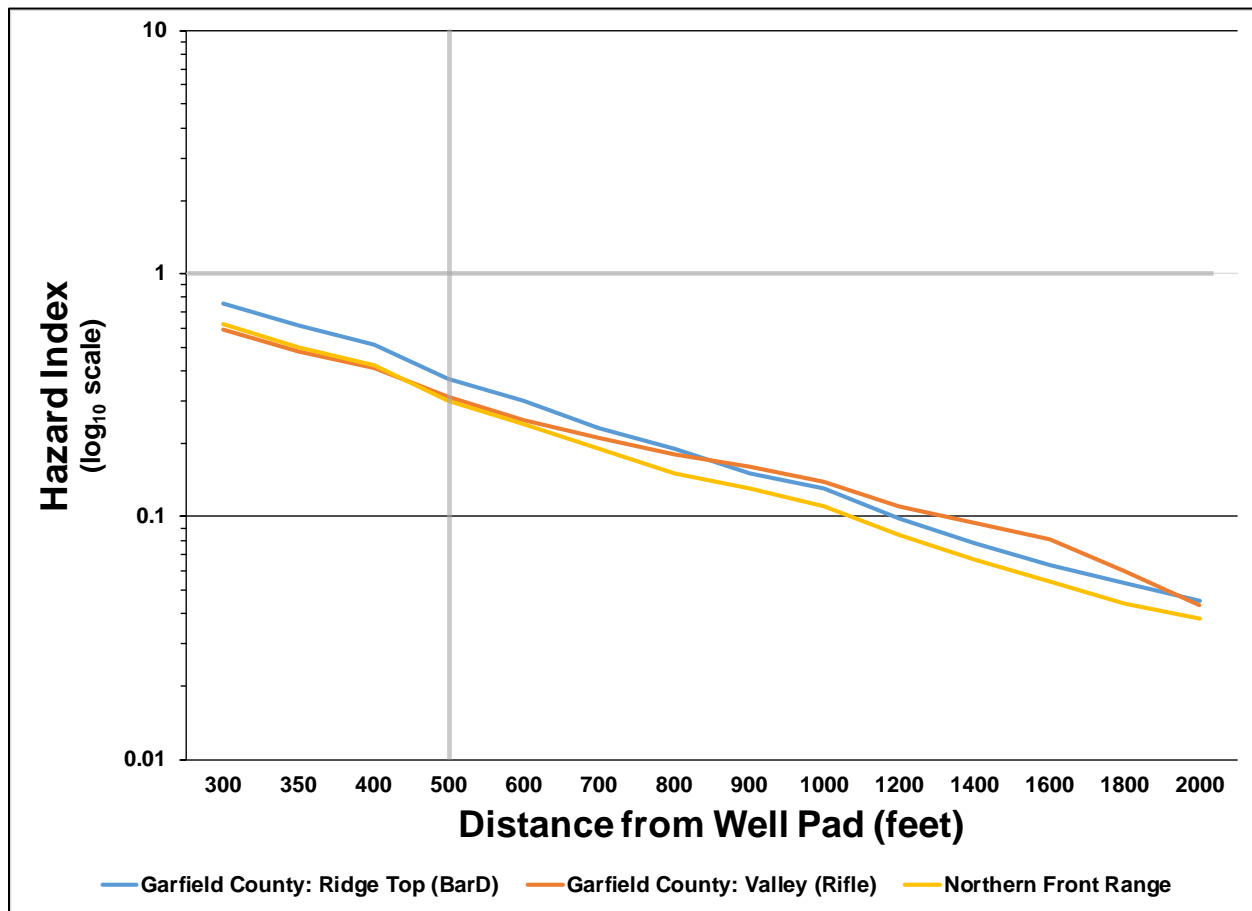
Range of Hazard Quotients	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	benzene	benzene	benzene	none		

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Table 5-26. Overview of the Largest Chronic Non-cancer Hazard Indices during All Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 1-acre Development Well Pad/1-acre Production Pad

Range of Hazard Indices	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	none		

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

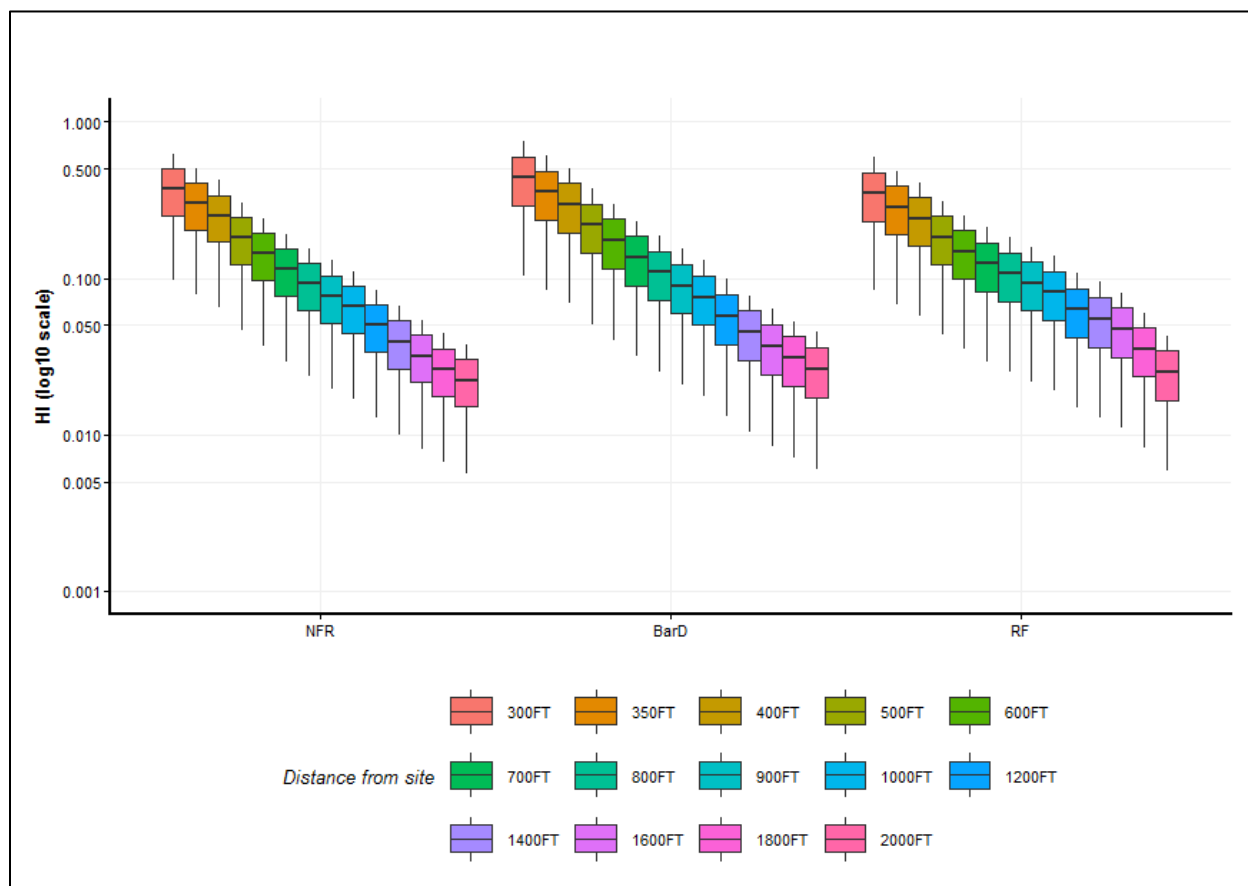
Figure 5-46. Largest Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 1-acre Development Well Pad/1-acre Production Pad during All Activities in Sequence

Analysis of Critical-effect-group Hazard Indices by Distance

All HQs and HIs were below 1; therefore, we do not present here a figure analogous to Figure 5-34 in Section 5.4.2.

Figure 5-47 is analogous to Figure 5-35 in Section 5.4.2, showing distributions of hematological HIs during all activities in sequence, across all modeled individuals. The 25th-to-75th-percentile ranges of chronic HIs for hematological at the 500-ft distance were 0.14–0.3, 0.12–0.25, and 0.12–0.24 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively. These were lower than the absolute maximum values at the same distance: 0.37, 0.31, and 0.3, respectively. The median hematological HIs during all activities in sequence were 0.22, 0.18, and 0.18 at 500 ft from the three sites respectively, which were a factor of 1.7 smaller than the absolute maximum values at the same distance.

For the scenario which had the highest HIs at the 500-ft distance (hematological HIs at the Garfield County ridge-top site), Figure 5-47 shows that approximately 14 percent of all chronic HIs at the 500-ft distance were below 0.1 (18 percent for the valley site, 18 percent for the NFR site).



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-47. Distributions of Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 1-acre Development Well Pad/1-acre Production Pad during All Activities in Sequence

5.5.2.2. 3-acre Development Well Pad (1-acre Production Pad)

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

Maximum chemical HQs and critical-effect-group HIs at 500 ft were larger for these results (3-acre development pad/1-acre production pad) relative to the results in the previous subsection

(1-acre development pad/1-acre production pad). The difference was less than about 10 percent on average across VOCs/critical-effect groups and sites.

As with the results for the 1-acre development pad/1-acre production pad presented in the previous subsection (Section 5.5.2.1), **when assessing all O&G activities in sequence all VOC HQs were below 1 at the selected receptors 500 ft from the 1-acre well pads and below 0.1 at 2,000 ft** (Table 5-27, Table E-46). **All chronic HIs were also below 1 at 500 ft and below 0.1 at 2,000 ft** (Table 5-28, Table E-47). Figure 5-48 illustrates trends with distance in the maximum hematological HIs at the selected receptors (the critical-effect group with the highest maximum HIs in this scenario of all activities in sequence). As with the results in the previous subsection, differences in HIs were small between the three sites, with values falling below 0.1 by 1,200 ft from the NFR site, by 1,400 ft from the Garfield County ridge-top site, and by 1,600 ft from the Garfield County valley site. Table E-47 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Comparing HQs and HIs between the three sites, the HQs and HIs averaged across chemicals and distances were about 8 percent larger at the Garfield County ridge-top site compared with the valley site, and about 30 percent larger at the ridge-top site compared with the NFR site.

Table 5-27. Overview of the Largest Chronic Non-cancer Hazard Quotients during All Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Development Well Pad/1-acre Production Pad

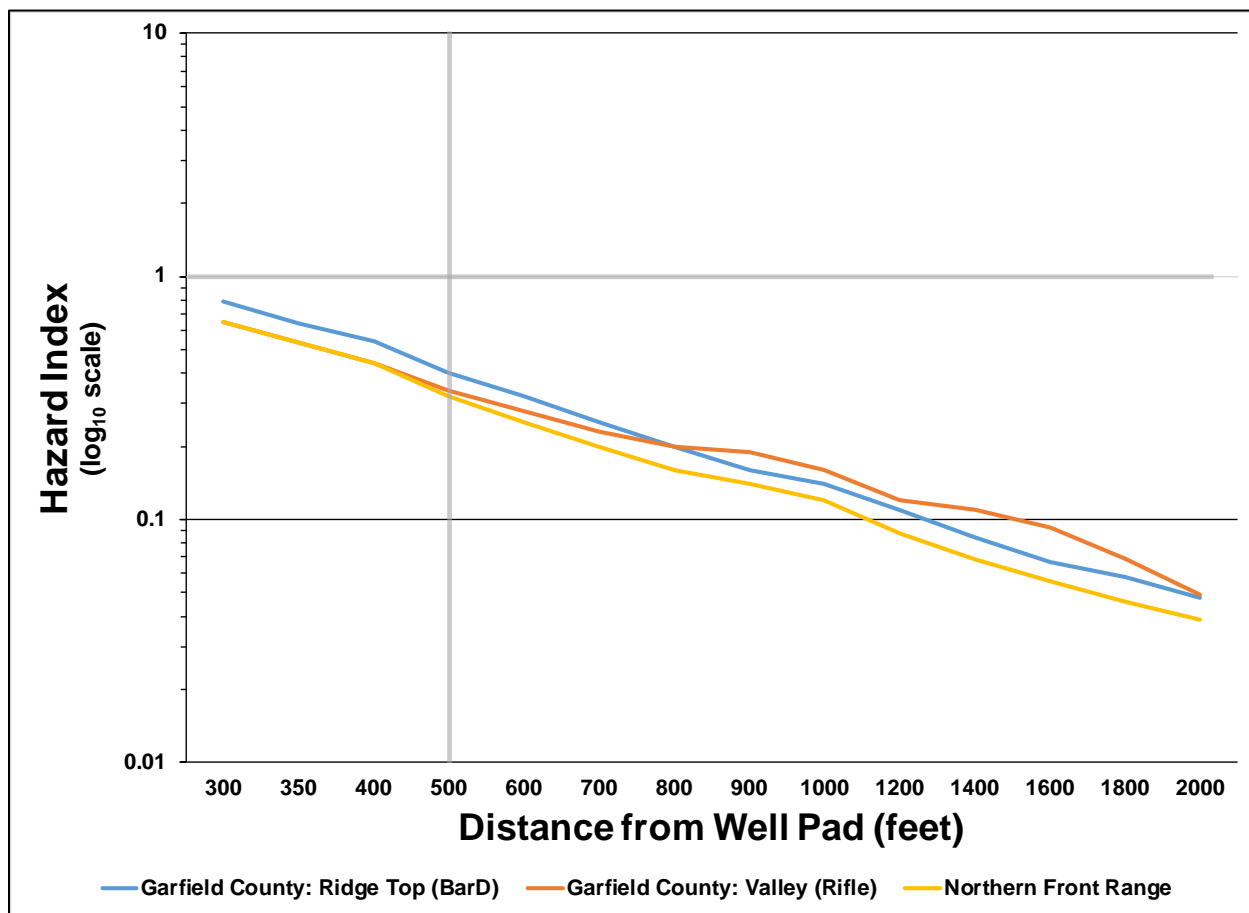
Range of Hazard Quotients	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	benzene	benzene	benzene	none		

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Table 5-28. Overview of the Largest Chronic Non-cancer Hazard Indices during All Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 3-acre Development Well Pad/1-acre Production Pad

Range of Hazard Indices	500 feet from Well Pad			2,000 feet from Well Pad		
	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	none			none		
Between 1 and 10	none			none		
0.1 to 1	hematological	hematological	hematological	none		
	neurotoxicity	neurotoxicity	neurotoxicity			
	respiratory	respiratory	respiratory			

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).
log10 = logarithm base 10.

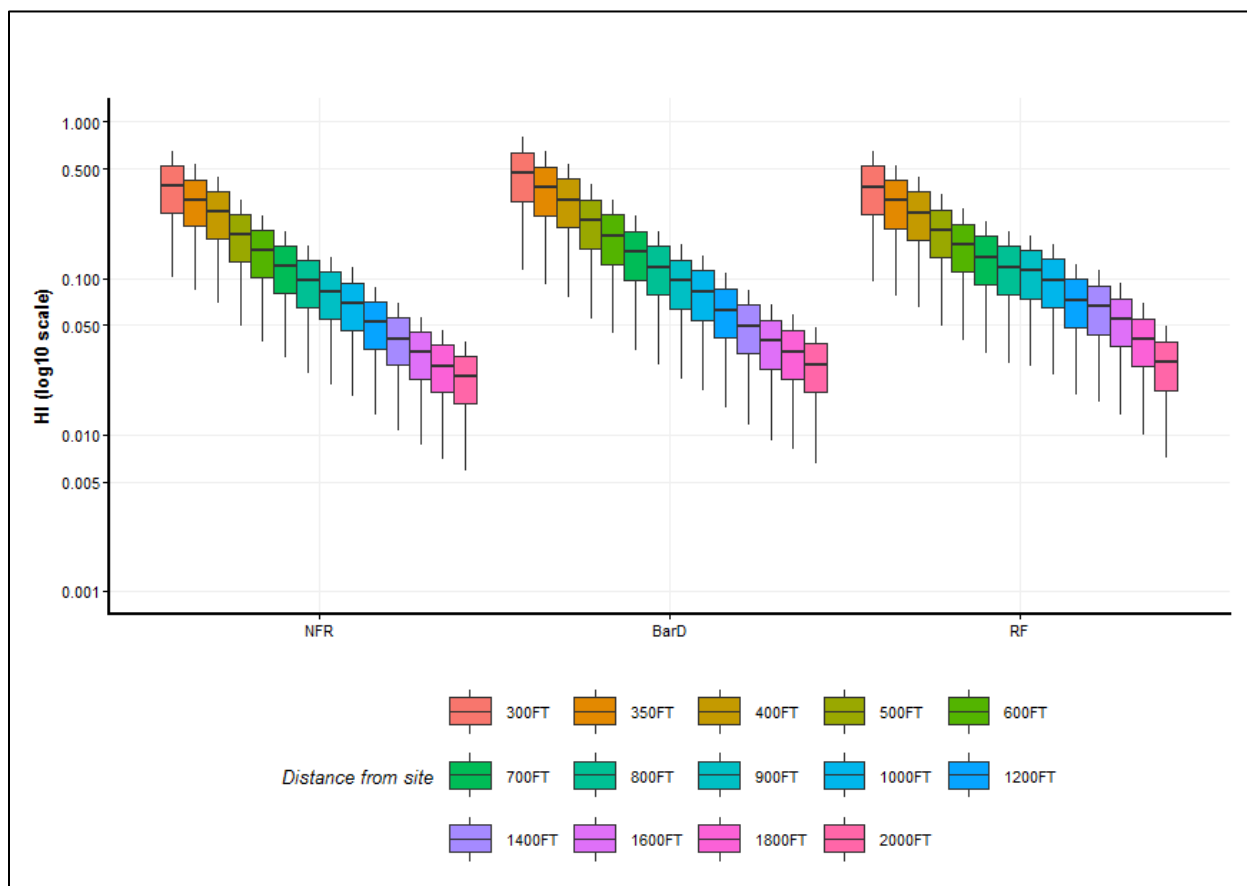
Figure 5-48. Largest Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 3-acre Development Well Pad/1-acre Production Pad during All Activities in Sequence

Analysis of Critical-effect-group Hazard Indices by Distance

All HQs and HIs were below 1; therefore, we do not present here a figure analogous to Figure 5-34 in Section 5.4.2.

Figure 5-49 is analogous to Figure 5-47 in the previous subsection, showing distributions of hematological HIs during all activities in sequence, across all modeled individuals. The 25th-to-75th-percentile ranges of chronic HIs for hematological at the 500-ft distance were 0.15–0.32, 0.13–0.27, and 0.13–0.26 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively (compared with 0.14–0.3, 0.12–0.25, and 0.12–0.24 with all activities in sequence where development occurs on a 1-acre well pad). These were lower than the absolute maximum values at the same distance: 0.4, 0.34, and 0.32, respectively. The median hematological HIs during all activities in sequence were 0.23, 0.2, and 0.19 at 500 ft from the three sites respectively (rather than 0.22, 0.18, and 0.18 at the 1-acre well pads), which were a

factor of 1.7 smaller than the absolute maximum values at the same distance. For the scenario which had the highest HIs at the 500-ft distance (hematological HIs at the Garfield County ridge-top site), Figure 5-49 shows that approximately 12 percent of all chronic HIs at the 500-ft distance were below 0.1 (16 percent for the valley site, 16 percent for the NFR site).



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-49. Distributions of Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 3-acre Development Well Pad/1-acre Production Pad during All Activities in Sequence

5.5.2.3. 5-acre Development Well Pad (1-acre Production Pad)

Overall Maximum Chemical Hazard Quotients and Critical-effect-group Hazard Indices by Distance

For all activities in sequence, maximum chemical HQs and critical-effect-group HIs at 500 ft were larger for these results (5-acre development pad/1-acre production pad) relative to the results in the previous subsection (3-acre development pad/1-acre production pad). The

difference was less than about 10 percent on average across VOCs/critical-effect groups and sites.

Development activities in sequence also reach chronic duration at the 5-acre development pads at the Garfield County sites, due to long flowback durations (see Table 3-3). The chronic results presented in Section 5.3.3 only include exposure to flowback emissions, while the chronic development results presented in this section also include exposure to drilling and fracking emissions in a calculation of total exposure. Because flowback accounts for about 75 percent of the total duration of development activities in these scenarios, the chronic results of development activities presented here are similar to those presented just for flowback in Section 5.3.3.

As with the results for the 3-acre development pad/1-acre production pad presented in the previous subsection (Section 5.5.2.2), **when assessing all O&G activities in sequence all VOC HQs were below 1 at the selected receptors 500 ft from the 1-acre well pads and below 0.1 at 2,000 ft** (Table 5-29, Table E-48). **All chronic HIs were also below 1 at 500 ft and below 0.1 at 2,000 ft** (Table 5-30, Table E-50). Figure 5-50 illustrates trends with distance in the maximum hematological HIs at the selected receptors (the critical-effect group with the highest maximum HIs in this scenario of all activities in sequence). Similar to the results in the previous subsection, differences in HIs were small between the three sites, with values falling below 0.1 by 1,400 ft from the NFR and Garfield County ridge-top sites, and by 1,800 ft from the Garfield County valley site. Table E-50 shows all modeled values for each site and critical-effect group, including those used to create this graph.

Comparing HQs and HIs between the three sites, for all activities in sequence the HQs and HIs averaged across chemicals and distances were about 3 percent larger at the Garfield County ridge-top site compared with the valley site, and about 25 percent larger at the ridge-top site compared with the NFR site.

Table 5-29. Overview of the Largest Chronic Non-cancer Hazard Quotients during Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Development Well Pad/1-acre Production Pad

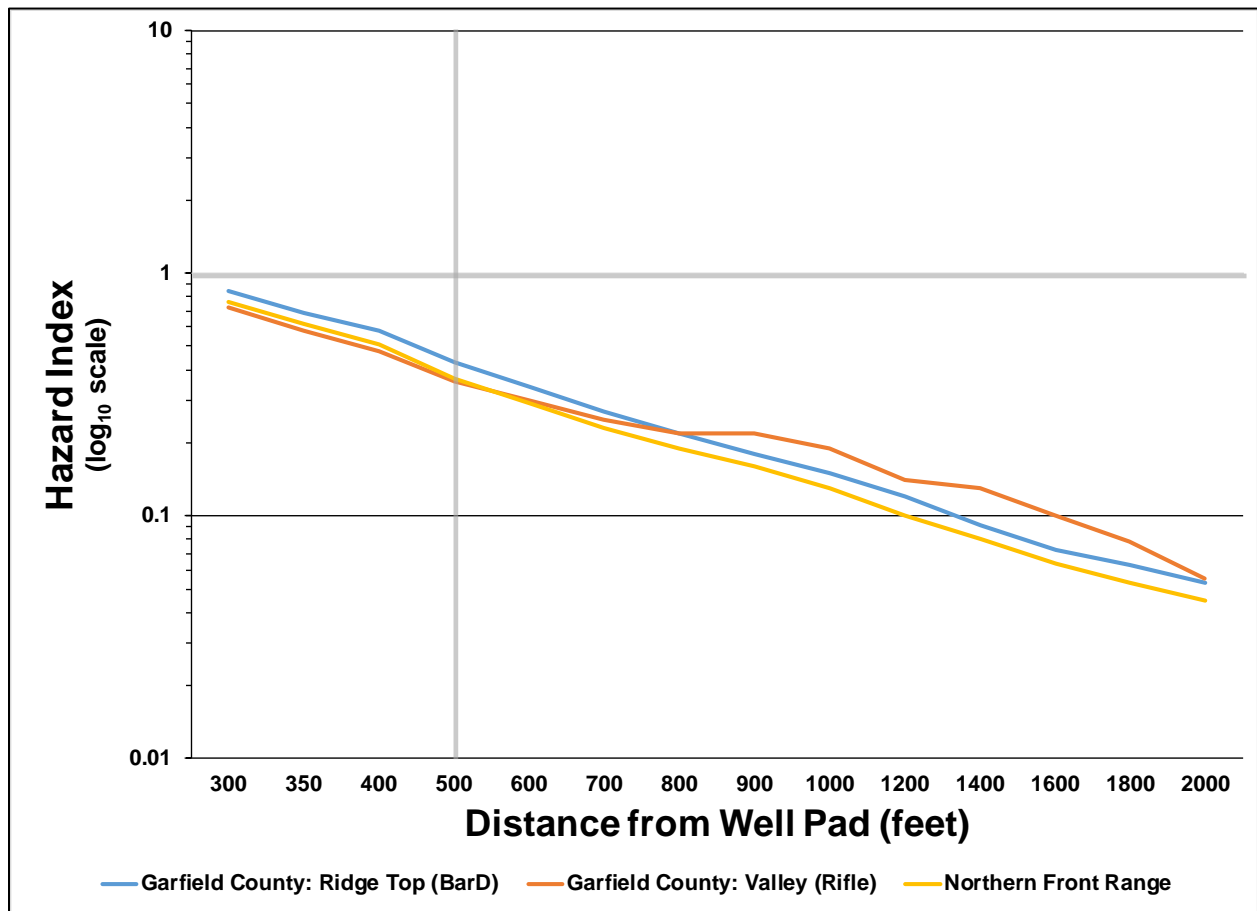
Range of Hazard Quotients	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Development	none		N/A	none		N/A
	All	none			none		
Between 1 and 10	Development	none		N/A	none		N/A
	All	none			none		
0.1 to 1	Development	123-TMB 124-TMB 135-TMB 2-ET benzene m+p-xylene n-nonane	123-TMB 124-TMB 135-TMB 2-ET benzene m+p-xylene n-nonane	N/A	benzene n-nonane	benzene n-nonane	N/A
	All	benzene n-nonane	benzene n-nonane	benzene	none		

Notes: Not showing chemicals with hazard quotients less than 0.1. Corresponds to ages 17 and younger (results for other age groups are nearly identical). Development activities in sequence at the Northern Front Range site are "N/A" because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment).
ET = ethyltoluene; TMB = trimethylbenzene; 123 = 1,2,3 and 124 = 1,2,4 and so on.

Table 5-30. Overview of the Largest Chronic Non-cancer Hazard Indices during Activities in Sequence, for the Highest Exposed Hypothetical Individuals at 500 and 2,000 Feet from the 5-acre Development Well Pad/1-acre Production Pad

Range of Hazard Indices	Activity	500 feet from Well Pad			2,000 feet from Well Pad		
		Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range	Garfield County: Ridge Top (BarD)	Garfield County: Valley (Rifle)	Northern Front Range
≥ 10	Development	none		N/A	none		N/A
	All	none			none		
Between 1 and 10	Development	hematological neurotoxicity	hematological neurotoxicity	N/A	none		N/A
	All	none			none		
0.1 to 1	Development	respiratory systemic	respiratory systemic	N/A	hematological neurotoxicity	hematological neurotoxicity respiratory	N/A
	All	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	hematological neurotoxicity respiratory	none		

Notes: Not showing critical-effect groups with hazard indices less than 0.1. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Corresponds to ages 17 and younger (results for other age groups are nearly identical). Development activities in sequence at the Northern Front Range site are "N/A" because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment).



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Thick lines emphasize hazard index=1 and the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10.

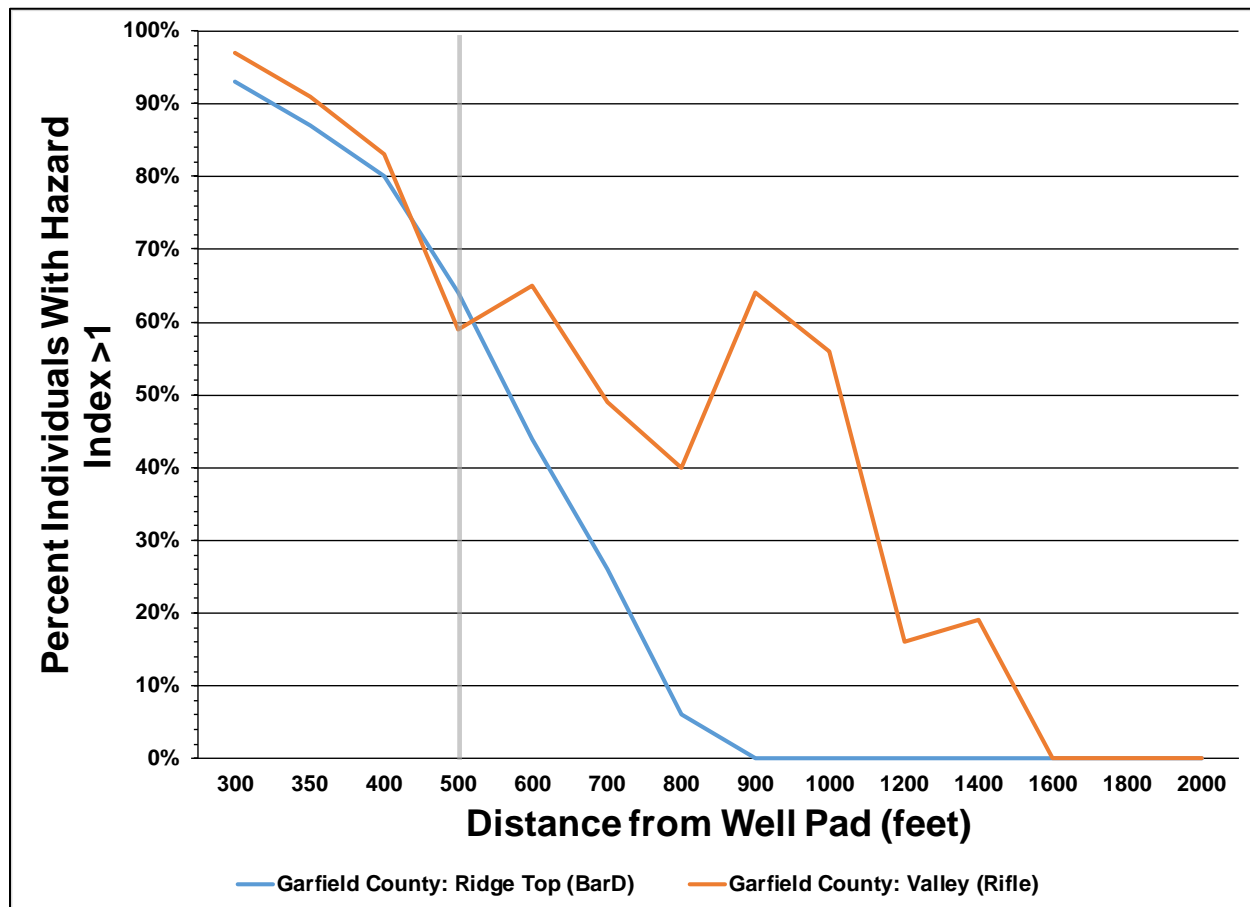
Figure 5-50. Largest Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group, for the Highest Exposed Hypothetical Individuals at Various Distances from the 5-acre Development Well Pad/1-acre Production Pad during All Activities in Sequence

Analysis of Critical-effect-group Hazard Indices by Distance

While all HQs and HIs were below 1 for all activities in sequence, some HIs were above 1 for development activities in sequence. In Figure 5-51 we illustrate the frequency of maximum chronic HIs reaching above a value of 1 for development activities in sequence. These percentages are taken from the collection of each simulated individual's chronic HI, for 1,000 simulated youths up to 17 years old at each selected downwind receptor. The results for all age groups are nearly identical (see Sections 3.5.1 and E.3.2.3). This analysis shows how many simulated individuals have chronic HIs above 1 for development activities in sequence at 5-acre well pads.

The averaging over time of drilling, fracking, and flowback exposures at the Garfield County sites creates lower chronic HQs and HIs relative to only the flowback exposures. This can be seen in comparing the frequencies of neurotoxicity HIs above 1 during flowback alone (Figure

5-28 in Section 5.3.3) to those during all development activities in sequence (Figure 5-51 below). Table E-51 shows the percentage of individuals with HI above 1 for all critical-effect groups, including those used to create this graph (see Table E-49 for HQs).

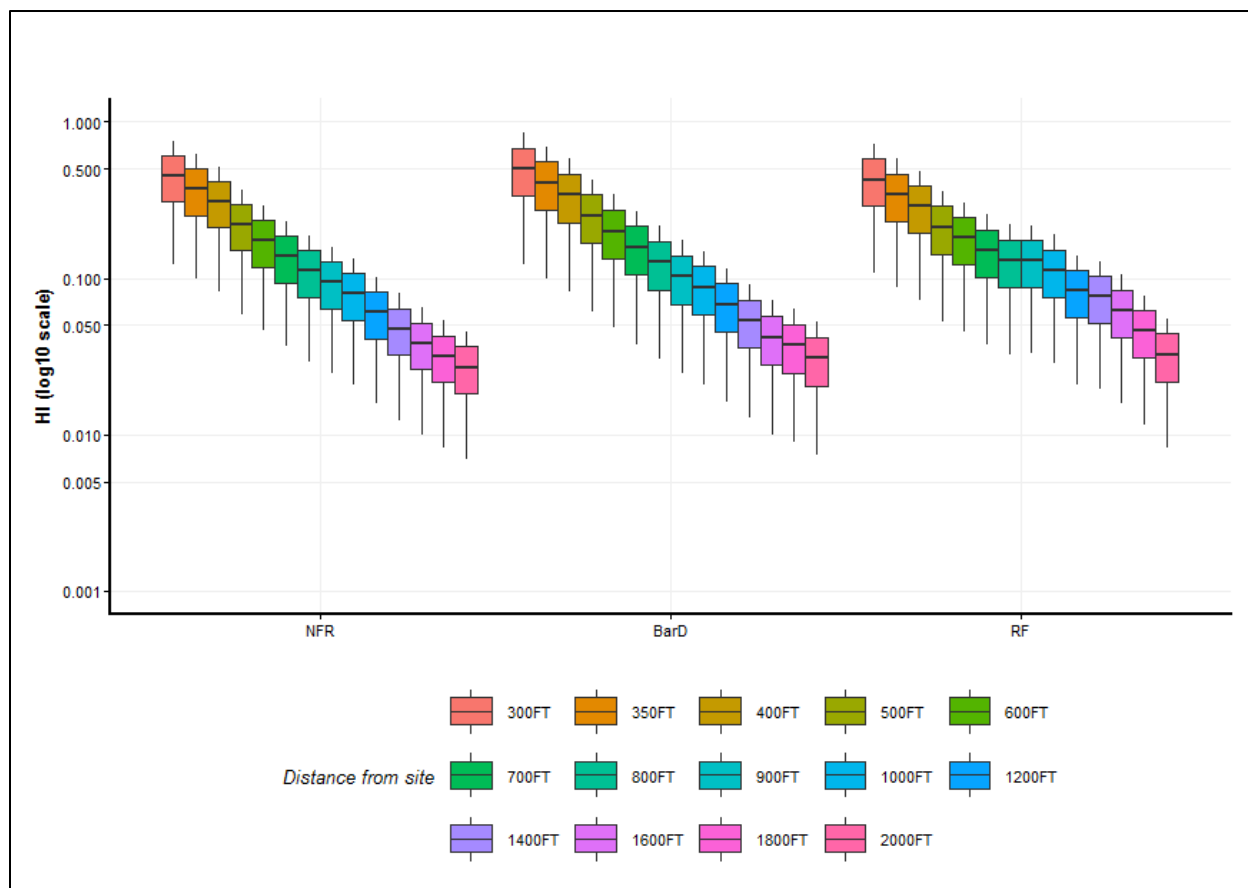


Notes: X-axis is not to scale. The data in this graph refer to the percentage of hazard indices (across all modeled individuals) greater than 1. Thick line emphasizes the 500-foot distance. Corresponds to ages 17 and younger (results for other age groups are nearly identical).

Figure 5-51. Percentage of Chronic Non-cancer Hazard Indices for the Neurotoxicity Critical-effect Group (Across the Hypothetical Population) that are Greater than 1 at Various Distances from the 5-acre Well Pad during Development Activities in Sequence

Figure 5-52 is analogous to Figure 5-49 in the previous subsection, showing distributions of hematological HIs during all activities in sequence, across all modeled individuals. The 25th-to-75th-percentile ranges of chronic HIs for hematological at the 500-ft distance were 0.16–0.34, 0.14–0.29, and 0.15–0.3 at the Garfield County ridge-top, Garfield County valley, and NFR sites, respectively (compared with 0.15–0.32, 0.13–0.27, and 0.13–0.26 with all activities in sequence where development occurs on a 3-acre well pad). These were lower than the absolute maximum values at the same distance: 0.43, 0.36, and 0.37, respectively. The median hematological HIs during all activities in sequence were 0.25, 0.21, and 0.22 at 500 ft from the three sites respectively, which were a factor of 1.7 lower than the absolute maximum values at the same distance. For the scenario which had the highest HIs at the 500-ft distance (hematological HIs at the Garfield County ridge-top site), Figure 5-52 shows that approximately

9 percent of all chronic HIs at the 500-ft distance were below 0.1 (13 percent for the valley site, 11 percent for the NFR site).



Notes: The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Each box-whisker plot indicates the maximum and 1st percentile (top and bottom whiskers), 75th and 25th percentiles (top and bottom of box), and 50th percentile (bar inside box). Corresponds to ages 17 and younger (results for other age groups are nearly identical).

log10 = logarithm base 10; HI = hazard index; FT = feet; NFR = Northern Front Range; BarD = Garfield County ridge-top site; RF = Garfield County valley site (Rifle).

Figure 5-52. Distributions of Chronic Non-cancer Hazard Indices for the Hematological Critical-effect Group (Across the Hypothetical Population) at Various Distances from the 5-acre Development Well Pad/1-acre Production Pad during All Activities in Sequence

5.5.3. Chronic Cancer Risks

We assessed incremental lifetime cancer risks for exposure to the VOC for which strong evidence of carcinogenicity was available (benzene; Section 4.3).¹³ As discussed in Section 4.3, we focused our cancer assessment on O&G activities or sequences of activities lasting more than several years—the 30-year production activity (discussed earlier in Section 5.4.3), and the 30–32-year sequences of development and production activities (discussed here).

As discussed below, **simulated cancer risks to the average simulated individuals were below 1-in-one million by 1,800 ft from the well pads** at all sites and with all sizes of

development pads (by 2,000 ft for the maximum-exposed individuals). Risks to average individuals were below 10-in-one million at all modeled distances 300–2,000 ft from the pads (at 500+ ft for the maximum-exposed individuals). **At the 500-ft distance, risks to average individuals were 5-in-one million or less (8-in-one million or less for the maximum-exposed individuals).** These risk metrics for all activities in sequence are generally slightly larger than those presented in Section 5.4.3 for the production activity alone.

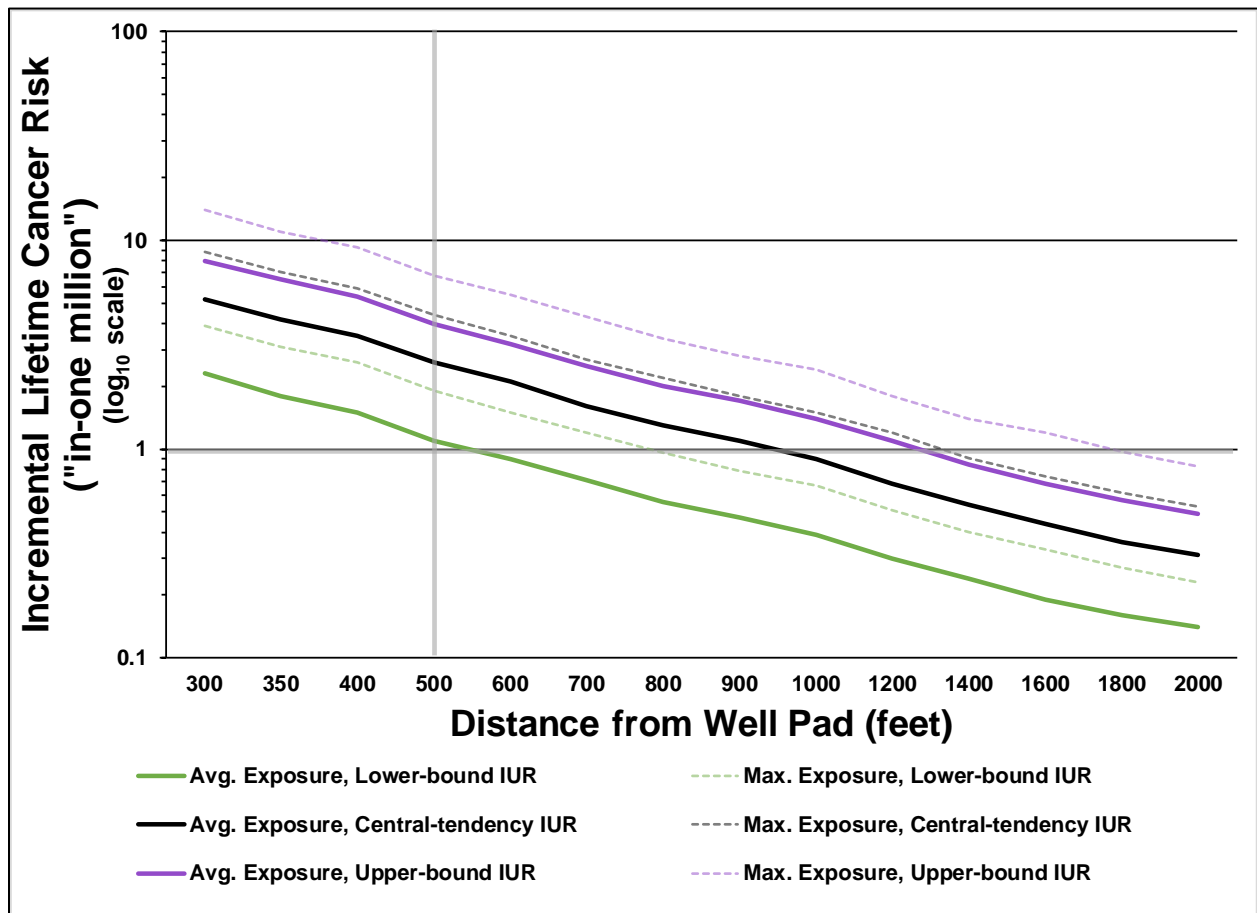
On average, cancer risks from these activities were largest at the Garfield County ridge-top site—between about 10- and 15-percent larger than the risks at the valley site. In the scenarios with 1- and 3-acre development pads, risks at the valley site tended to be between about 5- and 10-percent larger than risks at the NFR site, though at sites with 5-acre development pads the difference in risks between those two sites narrowed (with values slightly larger at the NFR site). On average, cancer risks tended to be largest at the sites with 5-acre development pads (by an average of 14 percent relative to sites with 3-acre development pads) and smallest at the sites with 1-acre development pads (by an average of about 9 percent relative to sites with 3-acre development pads). This pattern of increasing risk with increasing size of development pad is likely due primarily to longer periods of positive chemical exposure at the larger sites and longer durations of development activities.

In Figure 5-53, Figure 5-54, and Figure 5-55, we plot the incremental lifetime cancer risks associated with benzene exposures at the selected receptors at the Garfield County ridge-top, Garfield County valley, and Northern Front Range sites which have 1-acre development pads. As with the figures in Section 5.4.3, the plots mainly focus on risks to average simulated individuals (the solid lines), but they also include risks to the maximum-exposed simulated individuals (the dashed lines), utilizing the two EPA IURs and the central-tendency between them. In all of these scenarios, simulated risks to all individuals were well below 10-in-one million at the selected downwind 500-ft receptor—between 0.93- and 4-in-one million for the average individual (depending on the IUR) and between 1.6- and 6.8-in-one million for the maximum-exposed individual. All risks for the average individual fell to 1-in-one million or below by 1,400 ft from the well pad utilizing the upper-bound IUR (by 600 ft utilizing the lower-bound IUR). For the maximum-exposed individual, those distances respectively were 2,000 and 800 ft. Risks closer to the well pad were sometimes above 10-in-one million but only for maximum-exposed individuals utilizing the upper-bound IUR (risk up to 14-in-one million at the 300-ft distance; 8-in-one million for the average individual with the same IUR); risks were below 4-in-one million utilizing the lower-bound IUR. All simulated risks were below 10-in-one million by the 400-ft distance.

Figure 5-56, Figure 5-57, and Figure 5-58 are analogous to Figure 5-53, Figure 5-54, and Figure 5-55, but for sites that have 3-acre development well pads. In all of these scenarios, simulated risks to all individuals were well below 10-in-one million at the selected downwind 500-ft receptor—between 1 and 4.4-in-one million the average individual (depending on the IUR; rather than 0.93- and 4-in-one million for locations with 1-acre development pads) and between 1.7- and 7.4-in-one million for the maximum-exposed individual (rather than 1.6- and 6.8-in-one million for locations with 1-acre development pads). All risks for the average individual fell to 1-in-one million or below by 1,600 ft from the well pad utilizing the upper-bound IUR (rather than 1,400 ft for locations with 1-acre development pads; by 600 ft utilizing the lower-bound IUR, same as with locations with 1-acre development pads). For the maximum-exposed individual, those distances respectively were 2,000 and 800 ft (rather than 2,000 ft and 900 ft at locations with 1-acre development pads). Similar to locations with 1-acre development pads, risks closer

to the well pad were sometimes above 10-in-one million but only for maximum-exposed individuals utilizing the upper-bound IUR (risk up to 15-in-one million at the 300-ft distance; 8.7-in-one million for the average individual with the same IUR); risks were below 5-in-one million utilizing the lower-bound IUR. All simulated risks were at or below 10-in-one million by the 400-ft distance.

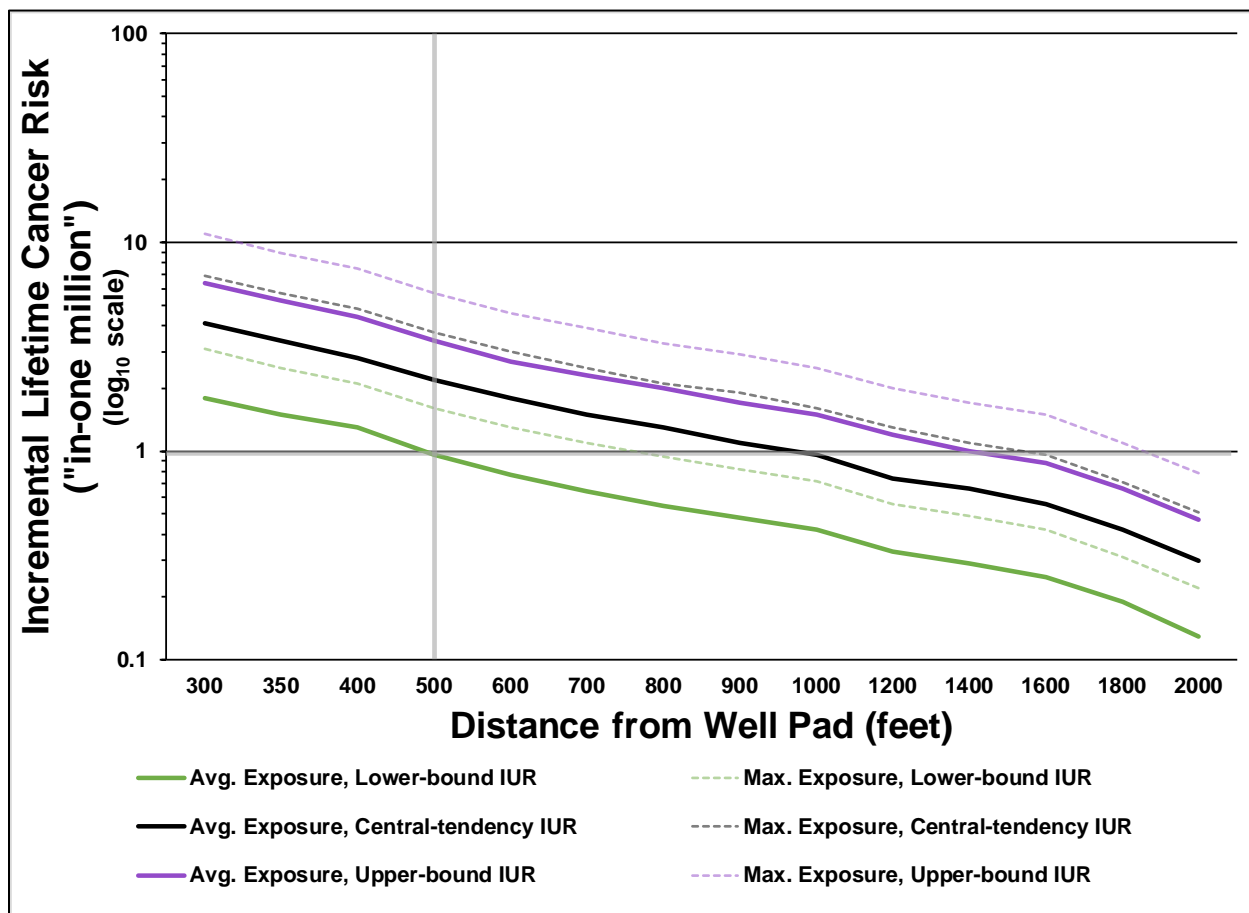
Figure 5-59, Figure 5-60, and Figure 5-61 are analogous to Figure 5-56, Figure 5-57, and Figure 5-58, but for sites that have 5-acre development well pads. In all of these scenarios, simulated risks to all individuals were below 10-in-one million at the selected downwind 500-ft receptor—between 1.1- and 4.8-in-one million the average individual (depending on the IUR; rather than 1 and 4.4-in-one million for locations with 3-acre development pads) and between 1.9- and 8.2-in-one million for the maximum-exposed individual (rather than 1.7- and 7.4-in-one million for locations with 3-acre development pads). All risks for the average individual fell to 1-in-one million or below by 1,800 ft from the well pad utilizing the upper-bound IUR (rather than 1,600 ft for locations with 3-acre development pads; by 700 ft utilizing the lower-bound IUR, rather than 600 ft at locations with 3-acre development pads). For the maximum-exposed individual, those distances respectively were 2,000 and 1,000 ft (rather than 2,000 ft and 800 ft at locations with 3-acre development pads). Similar to locations with 3-acre development pads, risks closer to the well pad were sometimes above 10-in-one million but only for maximum-exposed individuals utilizing the upper-bound IUR (risk up to 16-in-one million at the 300-ft distance; 9.6-in-one million for the average individual with the same IUR); risks were below 5-in-one million utilizing the lower-bound IUR. All simulated risks were at or below 10-in-one million by the 500-ft distance.



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log10 = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

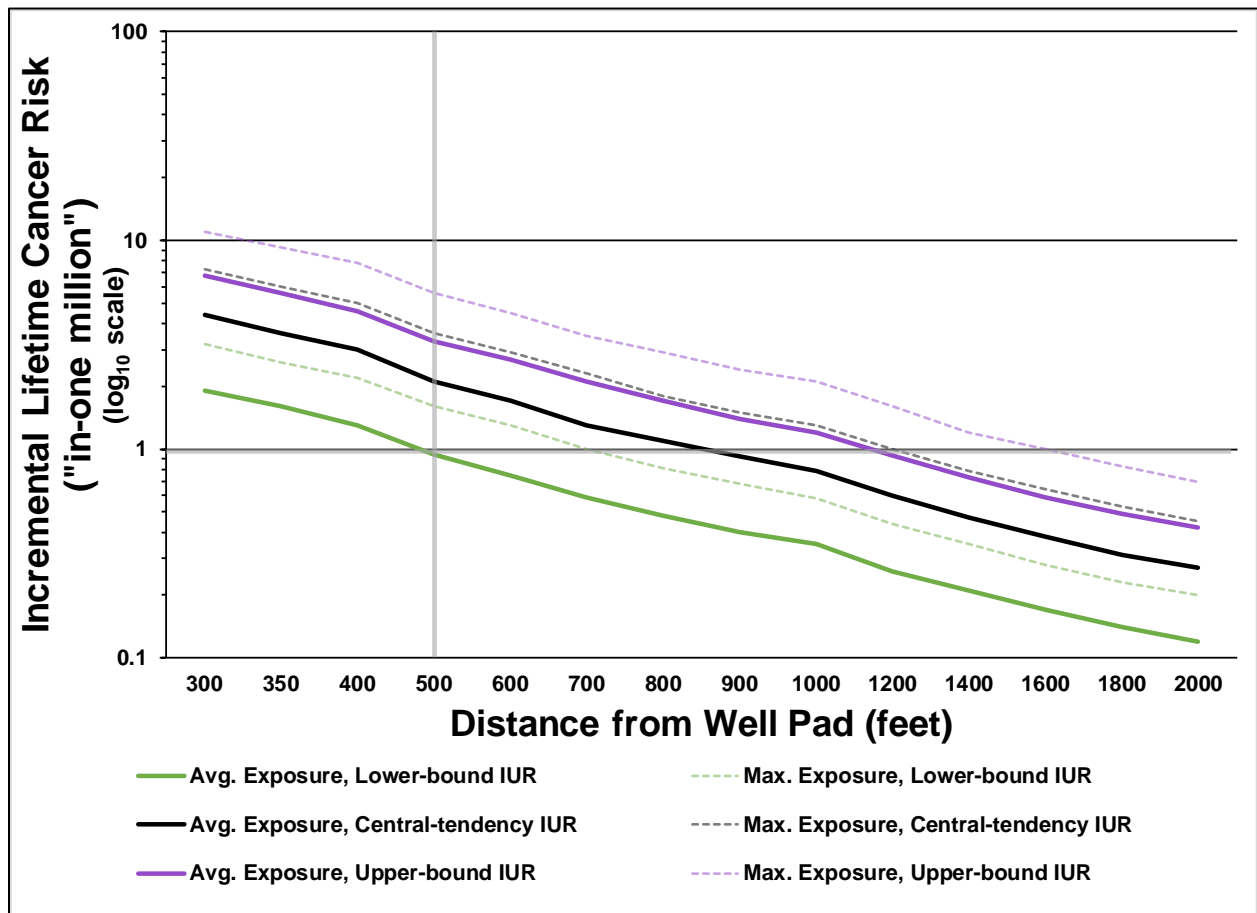
Figure 5-53. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Garfield County Ridge-top Site (1-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log10 = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

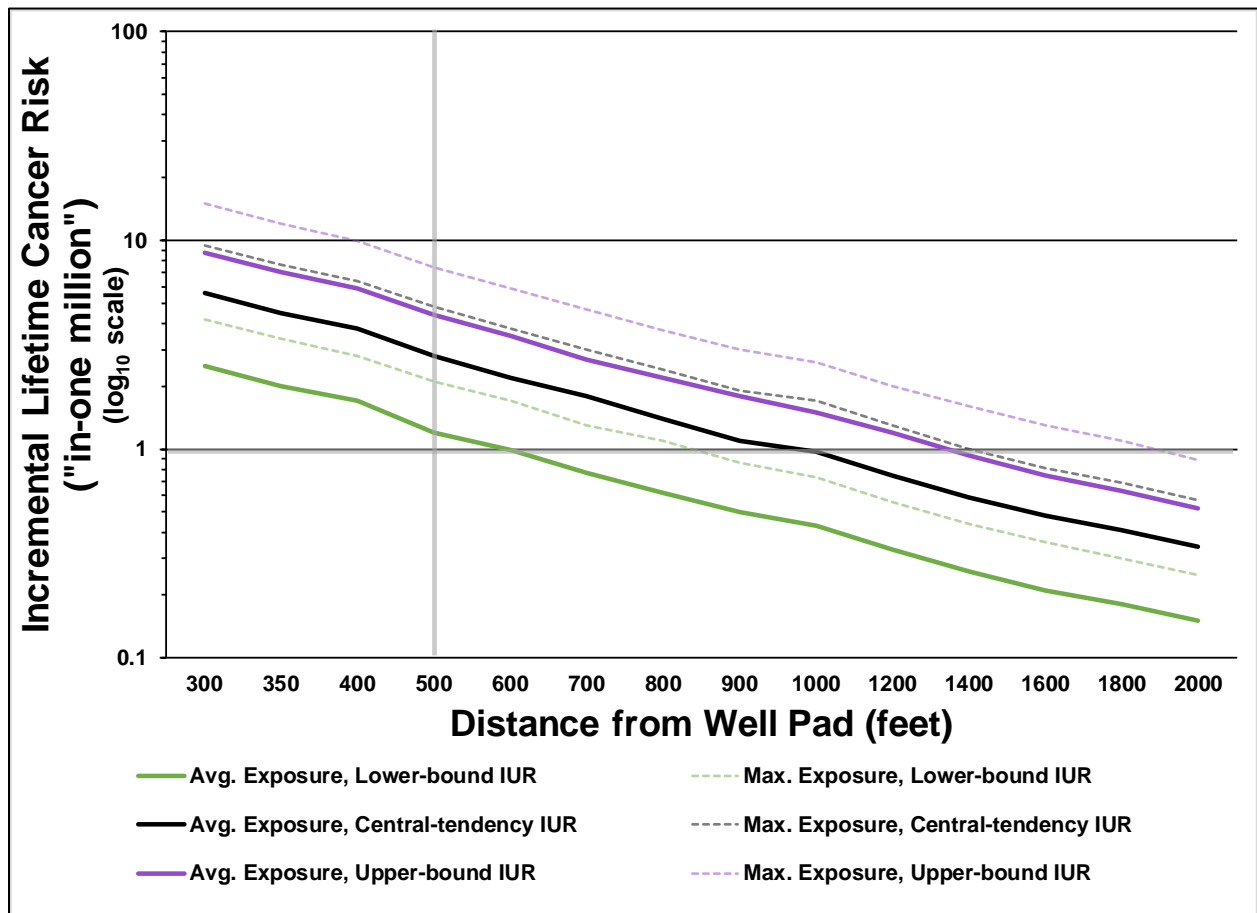
Figure 5-54. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Garfield County Valley Site (1-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log10 = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

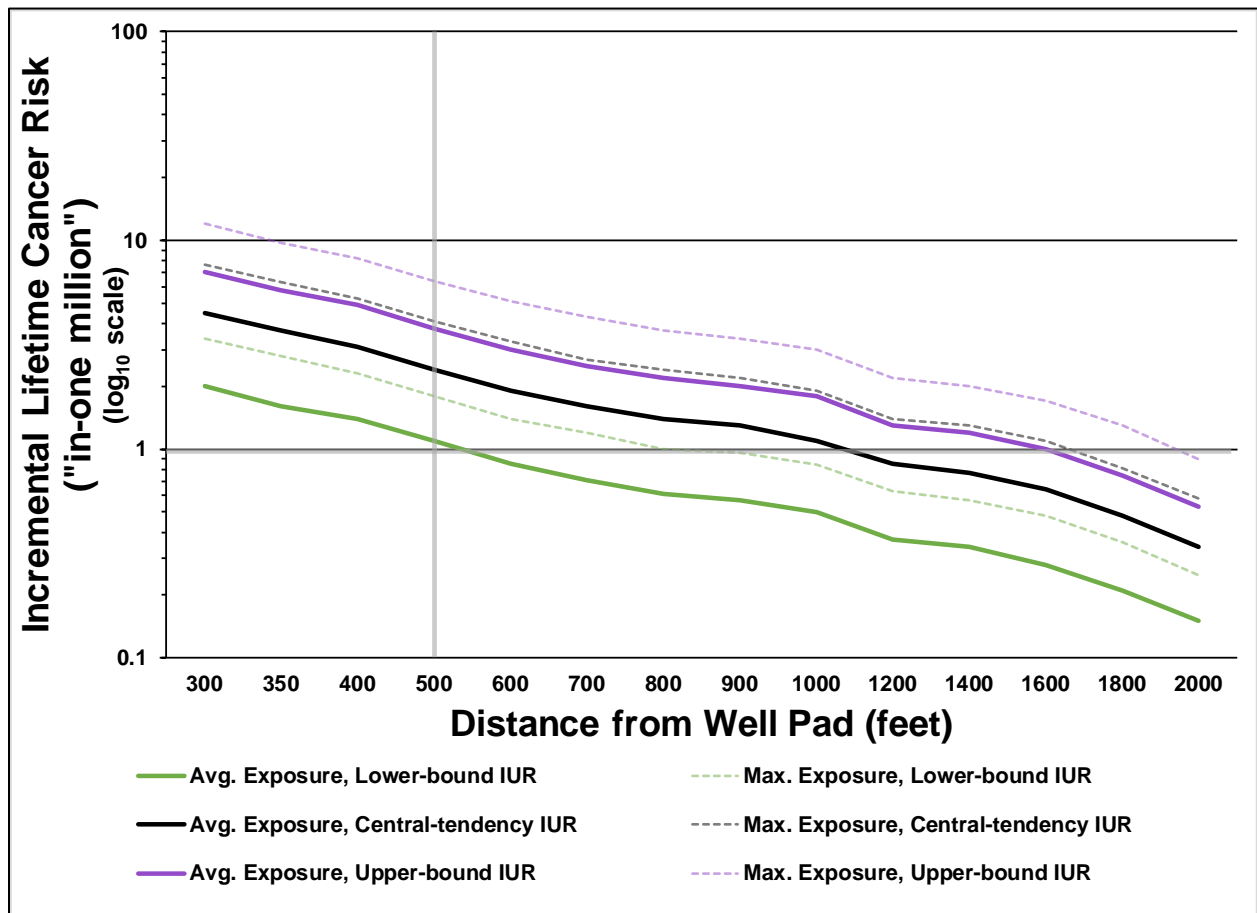
Figure 5-55. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Northern Front Range Site (1-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log10 = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

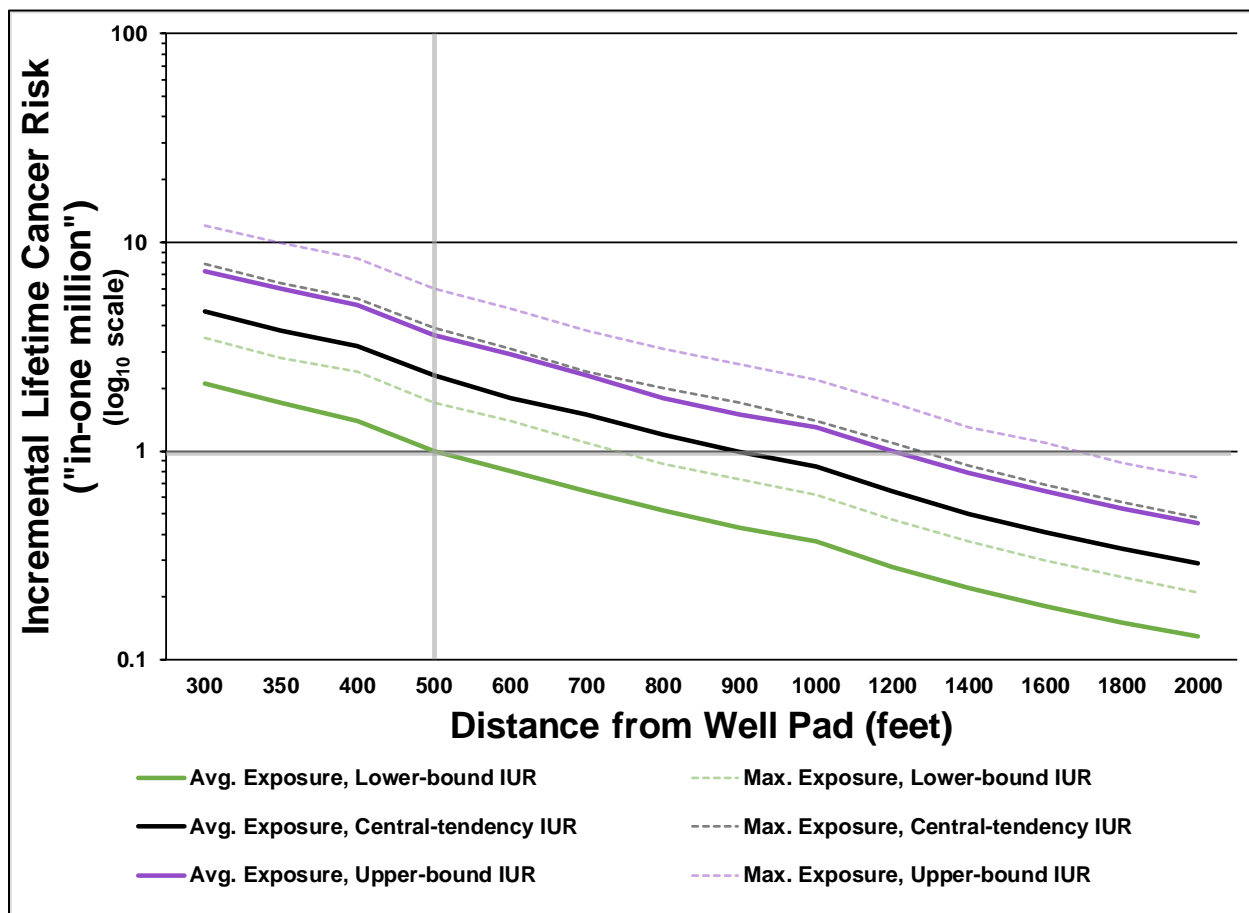
Figure 5-56. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Garfield County Ridge-top Site (3-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log₁₀ = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

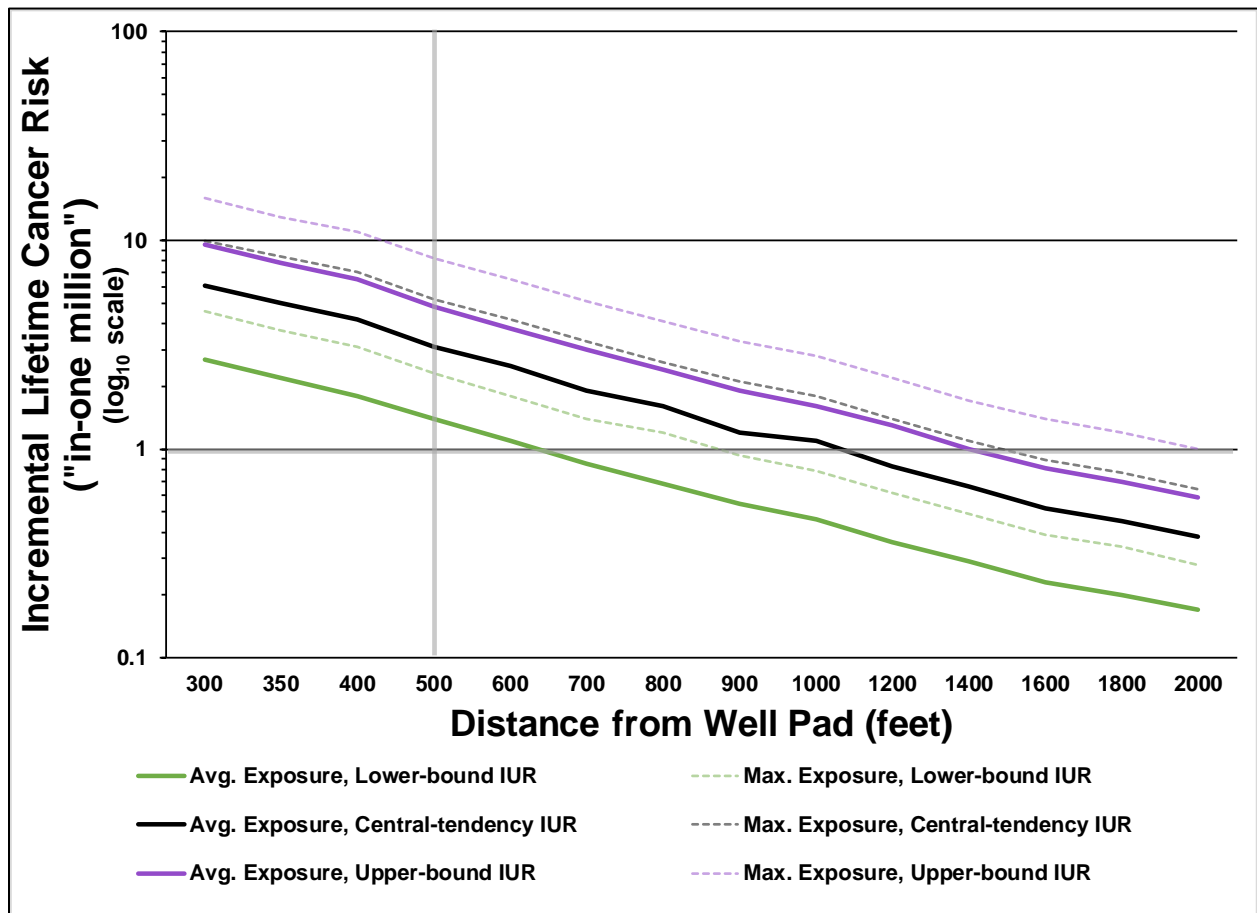
Figure 5-57. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Garfield County Valley Site (3-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log10 = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

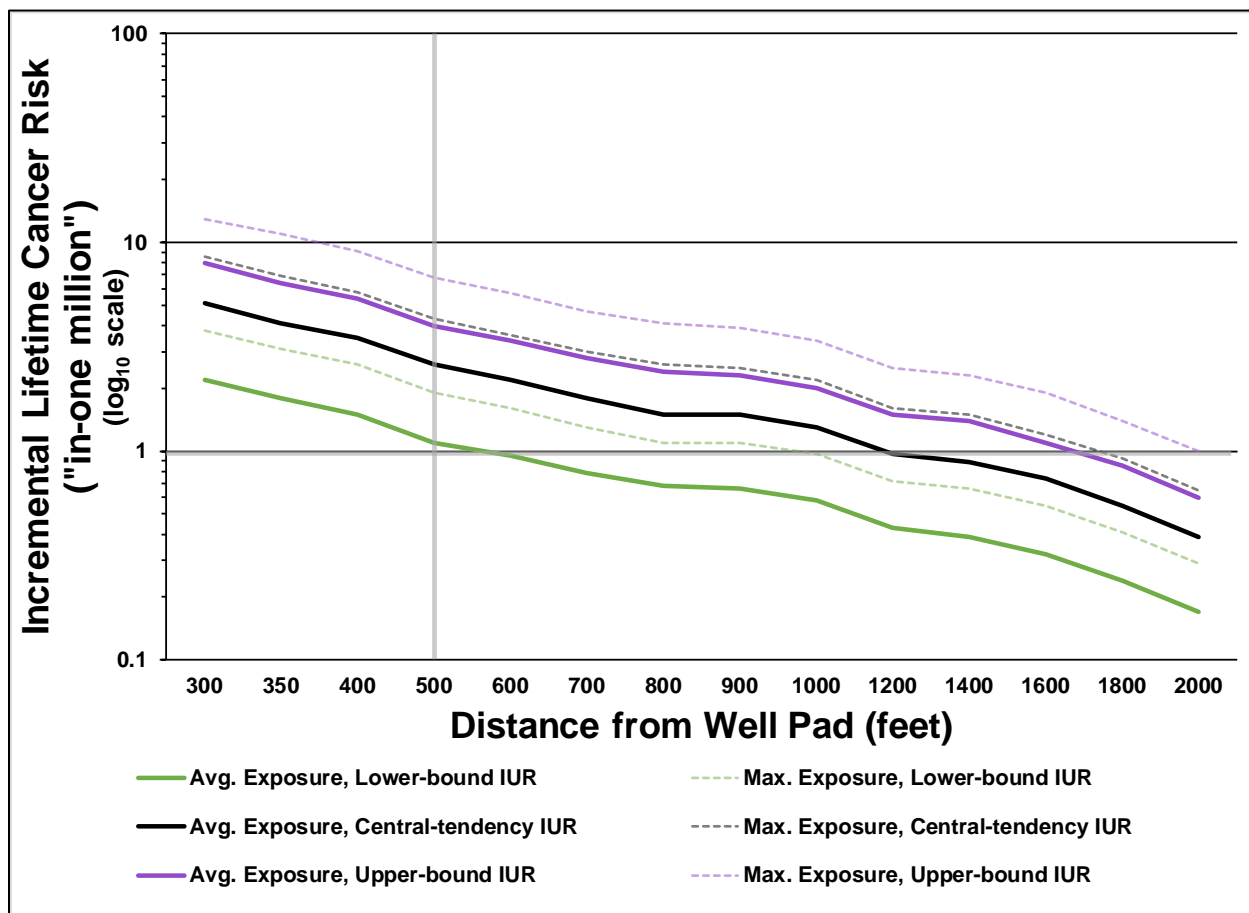
Figure 5-58. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Northern Front Range Site (3-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log10 = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

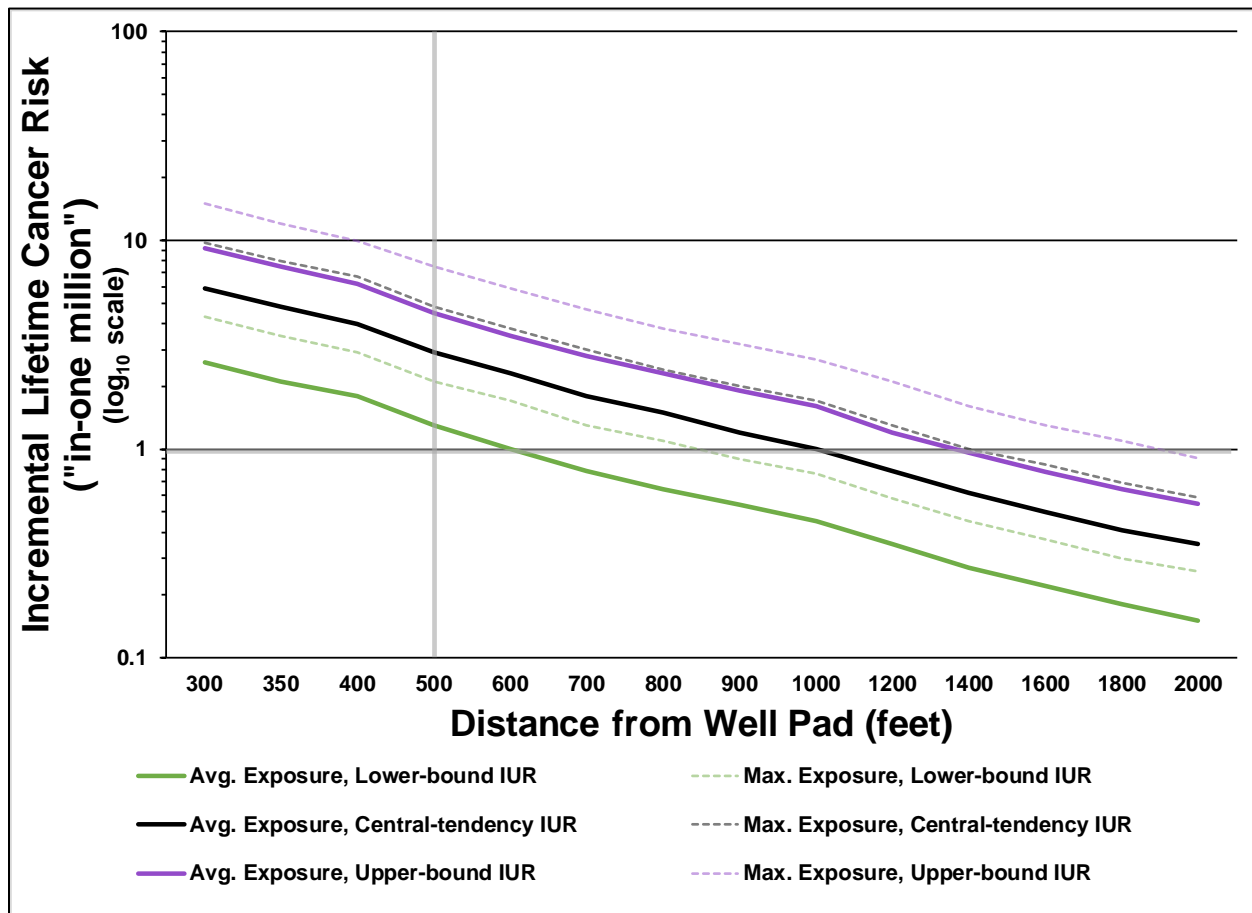
Figure 5-59. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Garfield County Ridge-top Site (5-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log10 = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

Figure 5-60. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Garfield County Valley Site (5-acre Development Pad/1-acre Production Pad)



Notes: X-axis is not to scale. The y-axis is in logarithm base 10 scale while the values plotted are not transformed. Risks are shown normalized to 1×10^{-6} ("1-in-one million"), so that a plotted value of 10 equals 10×10^{-6} (10-in-one million). Values refer to the average- and maximum-exposed adult individuals at each distance (exposure to emissions during ages 18–59 years; results for exposure during younger or older ages are nearly identical). Thick lines emphasize the 500-foot distance and the 1-in-one million risk level.

log₁₀ = logarithm base 10; Avg. = average; Max. = maximum; IUR = inhalation unit risk.

Figure 5-61. Incremental Lifetime Cancer Risks from Benzene Exposure for Average- and Maximum-exposed Hypothetical Individuals at Various Distances from the Well Pad during All Activities in Sequence at the Northern Front Range Site (5-acre Development Pad/1-acre Production Pad)

5.6. Impact on Estimates of Hazards and Risks from the Derivation and Selection of Health Criteria: Data Gaps, Uncertainties, Variabilities, and Sensitivities

For the reasons discussed below, **HQ and HI values of 1.0 should not be interpreted as "bright lines" above which adverse effects will occur and below which they will not.** Nor do HQ and HI values provide numerical estimates of the probability or severity of potential risks.

The justification for use of HQs as indicators of non-cancer risk includes a large body of observational data and good mechanistic reasons to believe that such adverse effects are

almost always “threshold” in nature. That is, below a given dose, no measureable health effects will occur. However, it is recognized that **sensitivity to certain chemicals or adverse effects can vary substantially in the general population. This variability is taken into account in the procedures used to derive health criteria.** UFs and other procedures are used to assure that EPA RfCs, ATSDR MRLs, and similar state health guidelines are health-protective even for sensitive groups (children, pregnant women, the elderly, and individuals with pre-existing health conditions). For example, EPA indicates that the level of uncertainty associated with their well-documented non-cancer RfC values is “perhaps an order of magnitude” (EPA, 2018). In the absence of data, individual UF values are customarily set at 10 or the square root of 10 for each source of uncertainty, so they only approximately account for potential overall uncertainty in the expected responses to exposure. For a number of VOCs addressed in these HHRAs, particularly in the case of subchronic and acute exposures, the data supporting health criteria values are quite limited, and the associated degree of uncertainty for subchronic and acute criteria values is almost certainly higher than that for chronic criteria values. Indeed, agencies’ usage of UFs (discussed in Section 4.4) reflect these high degrees of uncertainty, in particular for differences in effects between different subpopulations. In practice, inhalation health guidelines are usually set at concentrations 100–1,000 times lower than the lowest concentrations at which adverse effects are observed in the most sensitive animal species, or 10–300 times lower than the exposures where adverse effects are seen in humans (so, erring on the side of health protection). The intent is to build in an adequate “margin of safety,” and more UFs are included when the data sets are more limited. For these reasons, HQ values near 1.0 should be interpreted cautiously. HQ values less than 1.0 generally provide a high degree of health protection. We have assumed that these degrees of health protection apply adequately to all identifiable sensitive populations (characterized by age, gender, or common pre-existing conditions).

As discussed in Sections 4.1.1 and 4.3, different agencies have sometimes derived different health-protective criteria values for the same chemical. Differences arise from professional judgements related to the identity of the “critical” effect (the adverse effect seen at lowest exposures), the most reliable study, the exact exposure levels at which effects first occur, how to extrapolate animal exposures to humans, and how to estimate effects at different exposure durations. Criteria promulgated by different agencies also may vary because they are intended for different purposes, to protect different populations in different situations. We utilized a system that generally preferred values that were the best-documented, based on the most recent studies, and derived in such a way as to be health-protective of sensitive subpopulations. For most VOCs, there is general agreement regarding the general magnitude of chronic hazards, and the differences in criteria values are moderate (an order of magnitude or less). There tends to be somewhat less agreement with regard to acute and subchronic hazards. In the case of acute effects, data are often limited to occupational studies, and questions arise with regard to which effects are “critical” and how best to protect sensitive populations. A major source of uncertainty in the derivation of subchronic criteria is how best to account for variations in effect as a function of exposure duration; “subchronic” covers a broad range of exposure durations (in these HHRAs, 24 hours to 365 days) and assumptions related to corrections for duration may lead to large uncertainty.

Depending on the exposure duration, different agencies accounted for different proportions of the selected criteria values. We selected chronic RfCs or MRLs from federal agencies (EPA and ATSDR, respectively) for only 12 of the VOCs assessed in these HHRAs, plus EPA PPRTVs for five VOCs. On the other hand, we selected TCEQ-issued chronic ReVs for 20 of the assessed

VOCs, plus TCEQ ESLs for seven VOCs. In contrast, all of the selected subchronic criteria values were promulgated by EPA (3 RfCs and 29 PPRTVs). The bulk of the selected acute criteria were issued by TCEQ (32 ReVs [one proposed] and 10 interim ESLs).

As shown in Table 4-1, we were not able to identify adequately-documented criteria values for a number of chemicals and exposure durations (2 chronic, 16 subchronic, and 3 acute values).

We were unable to calculate HQs for these chemicals and exposure durations, and they could not be included in HI calculations, leading to an underestimation of health hazards that cannot be reasonably quantified.

Varying levels of evidence exist regarding the potential cancer-causing potential of several chemicals included in these HHRAs. For example, the International Agency for Research on Cancer (IARC, 1982) has concluded that there is "sufficient evidence" for the human carcinogenicity of benzene, and EPA has promulgated an IUR value for estimating human cancer risks from benzene exposure (EPA, 1998). The IUR value is based on data from epidemiological studies. IARC (2000) also classified ethylbenzene as "possibly carcinogenic to humans", and the National Toxicity Program (NTP 2016) has indicated that both styrene and isoprene are "reasonably anticipated to be a human carcinogen." In all three of these cases, however, the quantitative data regarding carcinogenicity come exclusively from animal studies, and information from epidemiological studies is limited or ambiguous. No federal agency has issued quantitative health criteria (IURs) for carcinogenic risks for any of the three chemicals, and, given the large uncertainties associated with the use of unit risk values derived solely from the currently available data, no quantitative cancer risks estimates have been derived for these chemicals.

In evaluating the "sensitivity" of the non-cancer risk estimates to the selection of specific health criteria derived by the agencies, probably the most important consideration is the relatively high levels of conservatism (health protection) that are built into the derivation process. Experience suggests that criteria are highly likely to be protective with a reasonable margin of safety. Thus, **small disagreements between agencies, or small changes in health criteria values, are not likely to have major impacts on conclusions regarding estimates of public health impacts.** In practice (see Appendix B), we found that for chemicals where more than one agency had issued health criteria, **the differences between a chemical's criteria values tended to be relatively small (almost always less than the order-of-magnitude uncertainty already considered in deriving the criteria).** Also, even large differences in health criteria for a given chemical are not so important if the estimated exposure levels in the HHRAs are always far below the lowest criteria values. Thus, a key issue is whether use of alternative health criteria values could change HQ values to increase or decrease the level of concern for non-cancer effects. **Credible uncertainty in numerical criteria values will almost certainly not change the basic risk conclusions for chemicals with HQs far above 1.0 (e.g., greater than 10) or far below 1.0 (e.g., less than 0.1).**

For example, as discussed earlier in Section 5, for maximum acute exposures in these HHRAs, we estimated HQs far above 1.0 (above 10) for two chemicals at the 500-ft distance from well pads: benzene (20) and 2-ethyltoluene (13) during O&G development activities. As discussed in Appendix C, OEHHA and TCEQ have issued acute health criteria for benzene that differ by more than a factor of 20 (8 versus 180 ppb, respectively). After a review of the available data, we chose to employ an acute criterion of 30 ppb. Even using the higher (less-stringent) TCEQ value, however, the maximum acute HQ value for benzene would still be greater than 1.0.

Similarly, the HQ for 2-ethyltoluene was based on an interim TCEQ ESL; even if they promulgated a more refined ReV based on the same data, it would only be approximately three-fold higher (less stringent), and the resulting HQ for 2-ethyltoluene would likewise still be greater than 1.0. If we used less stringent criterion values to calculate HQs for these chemicals, however, the frequency of HQs above 1.0 might be lower, and the maximum distance from the well pad emissions at which HQ values were above 1.0 might be reduced for some activities and locations. Otherwise, maximum acute HQs for other chemicals were above 1.0, but closer to 1.0 than to 10.

In contrast, for maximum subchronic exposures, we estimated that HQs were close to 1.0 or far less. The highest subchronic HQ at the 500-ft distance was for m+p-xylenes (1.0), n-nonane (0.59), and benzene (0.53). For all three chemicals, small changes in how criteria were derived would not have resulted in HQs far above or below 1. For example, we calculated the HQ for xylenes based on the EPA subchronic PPRTV of 91 ppb; had we used the ATSDR intermediate MRL (600 ppb), the HQ would have been about six-fold lower (but still above 0.1). As another example, the benzene HQ would have been above 1.0 (but well below 10) if we had utilized the four-fold more stringent ATSDR MRL (6 ppb) rather than the EPA PPRTV (25 ppb).

Finally, for chronic exposures during O&G production, we estimated that HQs were close to 1.0 or far less. The chronic benzene HQ, for example, was 0.25 for the most exposed hypothetical individual at the 500-ft distance during production activities, based on the ATSDR MRL of 3 ppb. That value would have been three-fold higher (but still between 0.1 and 1) if we had selected the more stringent OEHHA chronic criterion (1 ppb), with HQs somewhat above 1.0 for additional hypothetical individuals at closer distances to the well pad. The chronic benzene HQ would have been approximately 28-fold lower (below 0.1) if we had selected the less stringent non-cancer TCEQ ReV (86 ppb). This is the largest difference in HQ value associated with criteria choice for chronic exposure to any VOC. On the other hand, at the 500-ft distance, the maximum estimated chronic HQ for toluene during production activities was about 0.003 based on our selection of the EPA RfC (1,328 ppb); the HQ would have remained below 0.1 had we used the 17-fold more stringent OEHHA REL (80 ppb).

As shown in the highlighted cells of Table 5-31, for all three exposure durations (acute, subchronic, and chronic) there are a number of chemicals whose highest HQs fall into the “grey area” range between 0.1 and 10 (shown for individual O&G activities on a 1-acre well pad). It is difficult to generalize about the potential effect of criteria selection on the HQs and HIs associated with this group of chemicals. However, all of the HQs between 1.0 and 10 are closer to 1.0 than to 10.0, and HQs between 0.1 and 1.0 tend to be closer to 0.1 than to 1.0. Thus, **shifts in criteria values are more likely to result in calculated HQs dropping below 1.0 rather than increasing above 10.0, or dropping below 0.1 rather than increasing above 1.0.**

Table 5-31. Evaluated Chemicals with Maximum Hazard Quotients near 1.0 during Simulations of Individual Oil and Gas Activities on 1-acre Well Pads

Chemical	Highest Hazard Quotient at 500 Feet			Criteria Derived for Neurotoxicity Effects?
	Acute	Subchronic	Chronic	
benzene	>10	0.53	0.25	no
toluene	2.4	0.11	<0.1	yes
3-ethyltoluene	1.4	<0.1	<0.1	no
m+p-xylene	1	1	<0.1	yes
4-ethyltoluene	0.91	<0.1	<0.1	no
n-decane	0.86	N/A	<0.1	no
n-propylbenzene	0.82	<0.1	<0.1	no
1,3-diethylbenzene	0.7	<0.1	<0.1	no
cyclohexane	0.58	<0.1	<0.1	yes
isopropylbenzene	0.54	<0.1	<0.1	no
1,2,3-trimethylbenzene	0.27	0.13	<0.1	yes
methylcyclohexane	0.27	<0.1	<0.1	yes
1,2,4-trimethylbenzene	0.26	0.23	<0.1	yes
n-hexane	0.26	<0.1	<0.1	yes
1,3,5-trimethylbenzene	0.26	0.19	<0.1	yes
trans-2-butene	0.2	N/A	<0.1	no
o-xylene	0.19	<0.1	<0.1	yes
n-octane	0.19	<0.1	<0.1	yes
n-nonane	0.16	0.59	<0.1	yes
styrene	0.15	N/A	<0.1	yes
2-methylheptane	0.11	<0.1	<0.1	yes

Notes: Highlighted cells indicate maximum hazard quotients between 0.1 and 10.

N/A = hazard quotient not calculated because we could not identify an appropriate health-criteria value.

In reviewing the available toxicity criteria for the 28 chemicals in Table 5-31, we have not identified any specific chemicals or groups of chemicals for which the criteria are particularly problematic, or for which numerical values are likely to be particularly uncertain. In these HHRAs, HIs for neurotoxicity effects may be the most susceptible (among all critical-effect groups) to differences in VOC criteria values. This is based on the fact that the selected criteria values for 27 (more than half) of the assessed VOCs were derived for neurotoxic effects at one or more exposure durations; 13 of these are in Table 5-31 (see last column). However, based on the patterns of estimated exposure and the span of credible criteria values, we expect that the use of alternative criteria would be unlikely to affect the HIs for neurotoxicity (or other effects) by a factor of as much as two-fold.

As for HIs, **the aggregation of individual VOC HQs into HIs for critical-effects groups is associated with a number of uncertainties**, as discussed in Section 4.2. Different agencies may identify different critical studies and effects, and data related to other effects near the critical exposures may be limited. Also, there is substantial uncertainty in assuming that all chemicals in a critical-effect group act cumulatively through the same or similar mechanisms, and in assuming no interactions (either positive [greater-than-additive] or negative [less-than-additive]) between the health effects of the different chemicals. In addition, we assume exposures to the multiple chemicals are simultaneous and continuous across the exposure period; however, the exposure-simulation approach used in these HHRAs does not specifically incorporate correlations in exposure to different VOCs over time.

As we discussed earlier in Section 5 regarding the incremental lifetime cancer risk for benzene, available IUR estimates (from EPA, TCEQ, and OEHHHA) range over a factor of approximately

four. We selected EPA's range of IURs from 2.2×10^{-6} to 7.8×10^{-6} $\mu\text{g}/\text{m}^3$, plus the central-tendency midpoint between those two values. **There does not appear to be any firm basis for selecting one IUR value over the other, and the span of the EPA range is considerably smaller than the uncertainty associated with release and exposure estimates.** Using one of these EPA IURs versus another does not make a substantive difference in the conclusion regarding estimated benzene cancer risks, which all fell between just below 1-in-one million to just below 10-in-one million at the 500-ft distance, depending on the site, activity, and whether the individual experienced average exposure or maximum exposure according to the modeling.

There is uncertainty in our assumption that exposure to carcinogens is equally weighted across an individual's stages of life in calculating the risk for cancer. However, the impact of unequal weighting is likely to be much smaller than the other uncertainties already part of these HHRAs, and the agencies have not found sufficient evidence of carcinogenic modes of action for the two assessed carcinogens in these HHRAs. Another source of uncertainty is the assumption of low-dose linearity that we applied for both chemicals. Low-dose linearity is a "default" assumption applied in the absence of information related to low-dose mechanism, and it is generally considered to be conservative. That is, risks are unlikely to be greater than the estimated value and could be far less.

Besides the aliphatic and aromatic hydrocarbons specifically measured by CSU (2016a, 2016b) and utilized in these HHRAs, **a previous CDPHE study of O&G operations (CDPHE, 2017) identified additional compounds which have been detected in the vicinity of O&G operations in Colorado**, particularly aldehydes and alcohols but also ketones, sulfur-containing compounds, and heterocyclic compounds. In these HHRAs, we do not quantitatively assess emissions, air concentrations, exposures, and hazards/risks for these additional compounds not measured in the CSU studies. Among the compounds assessed in the CDPHE (2017) interim assessment, estimated hazards were quite low for some of the compounds that are not included in these HHRAs (e.g., methanol, acetone), while formaldehyde and acetaldehyde (also not included in these HHRAs) accounted for the highest non-cancer HQs (which were well below 1.0) and had estimated lifetime cancer risks between 1- and 100-in-one million. The cancer risk estimated by CDPHE for formaldehyde was similar to that of benzene (which we included in these HHRAs).

6. Summary of Data Gaps, Uncertainties, Variabilities, and Sensitivities across the HHRAs

With respect to the input parameters we used and the modeling methodology we employed throughout the HHRAs, we made a number of choices or assumptions that must be accounted for in order to correctly interpret the numerical risk estimates. Two aspects of the modeling need to be understood, and they are

1. the overall "uncertainty" of the results, which may include contributions from both known data gaps/uncertainty/variability in the modeling and unknown factors which affect the accuracy of risk results, and
2. the potential for under- or over-estimation of health risks.

In some parts of the analysis, we used methods that are known, based on past experience, to be “conservative”—that is, they tend to produce exposure or risk estimates that are higher than “central-tendency” values might be. A good example is in the toxicological evaluation of VOCs, where UFs are applied where data are equivocal, to provide a high degree of assurance that HQ and HI values are health-protective. Some parts of the modeling, in contrast, do not have much built-in conservatism but are associated with a high degree of uncertainty. An example is the estimation of VOC emissions: owing to the relatively small number of data points for each chemical, the ranges of estimated emissions in any given hour can be very large.

In the previous sections of this document (Sections 2.10, 3.6, and 5.6), we have discussed these data gaps, uncertainties, variabilities, and sensitivities in detail. The two tables we present below serve as summaries of these sections, focusing on the key parameters and methods, along with the qualitative estimates of their potential influence on the simulated risks. We use the definitions below for these qualitative estimates of potential influence.

- High: at least a half an order of magnitude (about three-fold or more) of potential influence
- Medium: about a two-fold to half an order of magnitude of potential influence
- Low: no more than about a two-fold potential influence

These estimates should be interpreted with caution since the numerical ranges of the low, medium, and high categories are somewhat arbitrary. In some cases, the “High” category of uncertainty can be much greater than three-fold, and uncertainty tends to be higher in the case of acute exposures because of both the large variability in hourly emissions and the limited nature of the data sets supporting the health criteria. Factors affecting the magnitude and uncertainty of risk estimates include both “known unknowns” and “unknown unknowns”— these correspond roughly to “sensitivity” and “uncertainty,” respectively, as discussed below.

In Table 6-1, we give a qualitative estimate of the influence on the simulated health risk estimates in these HHRAs from various data gaps, uncertainties, and variabilities in the input data and methodologies. We have used color-coding for ease of readability, purples and reds corresponding to higher potential influence and oranges and yellows corresponding to lower potential influence on health risks. It is important to understand that the influence of the identified factors is generally not the same for estimated acute, subchronic, and chronic health risks. As noted above, we expect the numerical uncertainty in acute HIs and HQs to be considerably greater than for the subchronic and chronic time periods, because of both the conservative modeling methods (e.g., using maximum hourly exposures) and the greater uncertainty associated with the choice of acute health-criteria values.

In Table 6-2, we give a summary of the qualitative estimates of the sensitivity of simulated health risks to various input parameters used in the HHRAs, as well as whether these parameter choices are more likely to lead to over- or under-estimates of risks and hazards.

Table 6-1. Qualitative Summary of the Potential Influence on Simulated Risks from Data Gaps, Uncertainties, and Variabilities in Input Data and Methodologies

Input Data, Method, or Model Used	Description of Data Gap, Uncertainty, or Variability	Qualitative Estimate of the Potential Influence on Simulated Risks	Comment
Emission Rates of the Selected VOCs	<ul style="list-style-type: none"> representativeness of the sampled emission rates (limited in number) to real emission rates across O&G operations in Garfield County and the NFR non-continuous nature of the air sampling 	High	
Meteorological Data	<ul style="list-style-type: none"> missing key data or calm winds selected meteorological data sets' representativeness of Garfield County and the NFR inherent variability in weather conditions across Garfield County and across the NFR 	Medium	
Hazard/Risk Estimation Methods	<ul style="list-style-type: none"> commonly occurring chemicals excluded from risk characterization (non-hydrocarbons [aldehydes, ketones, alcohols, sulfur- and nitrogen-containing compounds] not sampled) hourly exposures to multiple VOCs assumed to be uncorrelated (most important for acute HI estimation) uncertainty associated with health-criteria values (derived from different databases, different "margins of safety") criteria levels not available for some VOCs and exposure durations (especially subchronic) assume affect additivity to derive HIs for adverse endpoint groups 	Medium to High	Uncertainty is probably higher for acute toxicity criteria, may far exceed three-fold)
AERMOD Model	<ul style="list-style-type: none"> handling of low-wind-speed conditions inability to model the precise location of the emission source(s) on a well pad 	Low to Medium	Handling of low winds may overall lean towards over-estimates of risk during low-wind times
PENs	<ul style="list-style-type: none"> data gaps and variabilities in the PEN literature, and uncertainty with respect to their derivations and application across groups of VOCs 	Low to Medium	
Activity Diaries	<ul style="list-style-type: none"> use of hybrid set of activity diaries (for different age groups) 	Low	
Commuting	<ul style="list-style-type: none"> assuming that school/workplace is located at exactly the same location as the individual's residence 	Low	
APEX Model	<ul style="list-style-type: none"> calculation of exposures from APEX model inputs 	Low	

Notes: NFR = Northern Front Range; VOCs = volatile organic compounds; O&G = oil and gas; PEN = penetration factor; APEX = U.S. EPA Air Pollutants Exposure Model; HI = hazard index; High = at least a half an order of magnitude (about three-fold or more) of potential influence on risk estimates; Medium = about a two-fold to half an order of magnitude of potential influence; Low = no more than about a two-fold potential influence.

Color-coding utilized for ease of readability, with purples and reds corresponding to higher potential influence and oranges and yellows corresponding to lower potential influence.

Table 6-2. Qualitative Summary of the Estimated Sensitivity of Simulated Health Risks to Input Parameters

Area of the HHRA	Input Parameter	Qualitative Estimate of the Sensitivity of the Simulated Risks	Likely Influence of Current Assumption on estimated Health Risks	Comment
Air Modeling	VOC Emission Rates	High	Under-estimate or over-estimate	Being a multiplicative factor in the risk assessment, these might increase or decrease the estimated risks
Hazard/Risk Estimation	Degree of Protectiveness of Chosen Health-criteria Values	Medium	Over-estimate	The currently available health-criteria values are based on health-protective assumptions and generally provide conservative estimates of risk
Air Modeling	Surface Roughness	Low to Medium	Over-estimate	Currently use a lower surface-roughness value in modeling; an increase in surface roughness will decrease the health risk
Air Modeling	Urbanization	Low to Medium	Over-estimate	Modeled with rural dispersion-modeling setting; with the urban setting, in general, we would find a decrease in air concentrations and health risks
Exposure Modeling	PEN Factors	Low to Medium	Under-estimate or over-estimate	Modeled with broad PEN ranges for groups of VOCs. For any specific VOC, a more specific PEN might increase/decrease PEN, in turn increasing or decreasing health risks
Exposure Modeling	Commuting	Low to Medium	Over-estimate	Modeling did not include commuting. Commuting away from the well pads will reduce risks from well-pad emissions.

Notes: HHRA = human health risk assessment; VOC = volatile organic compound; PEN = penetration factor; High = at least a half an order of magnitude (about three-fold or more) of potential influence on risk estimates; Medium = about a two-fold to half an order of magnitude of potential influence; Low = no more than about a two-fold potential influence.

Color-coding utilized for ease of readability, with purples and reds corresponding to higher potential influence and orange corresponding to lower potential influence.

7. Possible Future Work to Further Refine Estimates of Human Health Risk

Additional, deeper analyses of the data generated in these HHRA, or newly generated data utilizing a slightly different approach, may further refine the characterizations of potential exposures to O&G emissions. For example, examining the full set of hourly chemical exposures to a higher-impact chemical during a higher-impact scenario (e.g., benzene during flowback)

may help better characterize the full distribution of acute HQs, relative to the computationally lighter method utilized in these HHRAs where we focused on the daily-maximum acute HQs. That kind of reexamination of acute HQs may also benefit from incorporating modeled hourly concentrations beyond those utilized in these HHRAs for acute assessment, which were the maximum values per AERMOD Monte Carlo run. Broadening that reexamination to lower-impact receptors would also better characterize the HQs throughout the modeling domain rather than just at those receptors most often downwind from the well pads.

Additionally, as described below, additional air monitoring near O&G sites may further elucidate potential air-quality and exposure impacts from emissions from O&G operations. Depending on the monitoring approach and the goals of a future risk assessment, the additional monitoring could lead to more robust distributions of O&G-attributable emissions, which could be used in probabilistic-type risk assessments like the ones we used in these HHRAs, and/or they could lead to a more site-specific assessment approach that may allow monitor-to-model comparisons/calibrations for validation/refinement of the risk results. The additional monitoring could also collect chemicals other than the VOCs utilized in these HHRAs, such as aldehydes and polycyclic aromatic hydrocarbons that may also originate from some O&G processes. Detailed, real-time monitoring may also lead to better estimates of concurrent exposures to multiple chemicals, especially for acute exposures. Data from the monitoring could be correlated with specific activities at the O&G sites in order to better understand what on-site activities may be producing higher emissions of certain chemicals.

New monitoring could be similar to those conducted by CSU (whose data we utilized in these HHRAs), where new air samples could be taken at carefully selected times and locations near O&G sites, with tracer and background methods allowing the derivation of emission rates. This additional monitoring would increase the number of data points collected for near-site air concentrations and emissions, which, together with the data already collected by CSU, would increase the measurements' representativeness of general O&G operations in the NFR and Garfield County. If the new superset of emissions rates derived from the new and existing measurements had a notably different distribution than the existing rates used in these HHRAs, additional risk modeling could be conducted to reflect the new distributions. Background air measurements could also be useful in a separate assessment of cumulative exposure to O&G sources and other sources at the same time.

A new HHRA could also be conducted on available or newly-conducted continuous air-monitoring experiments, whereby monitors collect a continuous time series of air samples across days, weeks, or longer near one or more O&G sites. If such monitoring were conducted in a way that allows derivation of O&G emission rates, then they could be use in air models such as AERMOD to simulate air concentrations. If meteorology data were collected concurrently, then the air simulations could utilize those data along with the emission rates to model air concentrations and compare them to the measured concentrations (a monitor-to-model comparison). Those on-site meteorological data could also be used to understand the conditions that may lead to higher downwind air concentrations from O&G emissions, and to better attribute the source(s) of the measured chemicals if tracer and background methods are not used to do so. The continuous time series of measured air concentrations could be used directly in an exposure model like APEX to simulate continuous time series of potential population exposures to those chemicals as the hypothetical individuals go about their daily lives. Such APEX runs could utilize hypothetical populations as we did for the HHRAs in this report, or they could utilize data on the populations living near the measurement sites, such as

their demographics, residential locations, and distributions of employment locations. Continuous data could allow for a better understanding of “real-world” time patterns of exposure near O&G sites, as opposed to the probabilistic methods utilized in our HHRAs here that focused more on the potential for higher exposures, especially for acute exposures.

As a separate exercise, if monitoring of air concentrations at a range of distances (similar to those modeled in our HHRAs) from the modeled sites is possible, those measured air concentrations can then potentially be used to calibrate the AERMOD-estimated air concentrations. These calibrated air concentrations would be more realistic than purely modeled air concentrations (which are currently based on modeling using the emission rates back-calculated from limited measured air concentrations). These calibrated air concentrations can then be utilized in the APEX exposure modeling to arrive at more realistic exposures and risk estimates. Monitoring near the barriers often erected around development sites might also inform us about the effect they may have on local exposures and inform model calibration.

Personal exposure monitoring is a burgeoning field of study and could be utilized near O&G sites to better estimate individual exposures to O&G-attributable chemicals as people go about their daily lives. Great care must be taken with personal-exposure monitoring to collect the data in such a way that allows source attribution—distinctions between emissions from O&G sources, other non-O&G outdoor sources, indoor sources, etc. With a well-planned personal-monitoring study design (defining specific population demographics, activity patterns, source attribution, etc.), we could get more accurate personal-level data on exposure. Again, this could potentially be used to calibrate our APEX-model-based exposure estimations to arrive at more realistic estimates of exposure and, in turn, risk. Stationary monitors near sensitive receptors (e.g., schools, elder care facilities) could provide continuous air sampling in these important locations and provide better understanding of exposures there.

Monitoring both outside a building or residence and inside would help in deriving chemical PENs specific to the areas near these Colorado O&G sites—specific to the kinds of buildings in the area and the habits of the local population in terms of indoor air circulation systems, patterns of having windows open or closed, etc. These more site-specific PENs may follow different distributions (potentially more narrow and accurate) than those used in our HHRAs (gleaned from literature sources).

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Appendix B. Health-protective Non-cancer Criteria Values Selected for these HHRAs

Table B-1. Non-cancer Criteria Values

Chemical	Chronic Reference Value		Subchronic Reference Value		Acute Reference Value	
	Value (ppb)	Source ^a	Value (ppb)	Source ^a	Value (ppb)	Source ^a
1,2,3-trimethylbenzene	12	EPA RfC	41	EPA RfC	3000	TCEQ ReV
1,2,4-trimethylbenzene	12	EPA RfC	41	EPA RfC	3000	TCEQ ReV
1,3,5-trimethylbenzene	12	EPA RfC	41	EPA RfC	3000	TCEQ ReV
1,3-diethylbenzene	45	TCEQ ESL	182	EPA PPRTV	450	TCEQ interim ESL
1,4-diethylbenzene	45	TCEQ ESL	182	EPA PPRTV	450	TCEQ interim ESL, surr.
1-butene	2300	TCEQ ReV	NA	NA	27000	TCEQ ReV
1-pentene	560	TCEQ ReV	NA	NA	12000	TCEQ ReV
2,2,4-trimethylpentane	124	EPA PPRTV	5740	EPA PPRTV	4100	TCEQ ReV
2,3,4-trimethylpentane	124	EPA PPRTV	5740	EPA PPRTV	4100	TCEQ ReV
2,3-dimethylpentane	2200	TCEQ ReV	6543	EPA PPRTV	8200	TCEQ ReV
2,4-dimethylpentane	2200	TCEQ ReV	6543	EPA PPRTV	8200	TCEQ ReV
2-ethyltoluene	25	TCEQ ESL	204	EPA PPRTV	250	TCEQ interim ESL, surr.
2-methylheptane	390	TCEQ ReV	5740	EPA PPRTV	4100	TCEQ ReV
2-methylhexane	2200	TCEQ ReV	6543	EPA PPRTV	8200	TCEQ ReV
3-ethyltoluene	25	TCEQ ESL	204	EPA PPRTV	250	TCEQ interim ESL, surr.
3-methylheptane	390	TCEQ ReV	5740	EPA PPRTV	4100	TCEQ ReV
3-methylhexane	2200	TCEQ ReV	6543	EPA PPRTV	8200	TCEQ ReV
4-ethyltoluene	25	TCEQ ESL	204	EPA PPRTV	250	TCEQ interim ESL, surr.
benzene	3	ATSDR MRL	25	EPA PPRTV	30	Literature review
cis-2-butene	690	TCEQ ReV	NA	NA	15000	TCEQ ReV
cis-2-pentene	560	TCEQ ReV	NA	NA	12000	TCEQ ReV
cyclohexane	1744	EPA RfC	5232	EPA PPRTV	1000	TCEQ interim ESL
cyclopentane	202	EPA PPRTV	9348	EPA PPRTV	5900	TCEQ interim ESL
ethane	NA	NA	NA	NA	NA	NA
ethene	5300	TCEQ ReV	NA	NA	500000	TCEQ ReV
ethylbenzene	230	EPA RfC	2074	EPA PPRTV	20000	TCEQ ReV
isobutane	10000	TCEQ ReV	NA	NA	33000	TCEQ ReV
isopentane	8000	TCEQ ReV	9087	EPA PPRTV	68000	TCEQ ReV

Chemical	Chronic Reference Value		Subchronic Reference Value		Acute Reference Value	
	Value (ppb)	Source ^a	Value (ppb)	Source ^a	Value (ppb)	Source ^a
isoprene	140	TCEQ ReV	NA	NA	1400	TCEQ ReV, proposed
isopropyl benzene	81	EPA RfC	204	EPA PPRTV	510	TCEQ interim ESL
m+p-xylene	23	EPA RfC	91	EPA PPRTV	1700	TCEQ ReV
methylcyclohexane	400	TCEQ ESL	6677	EPA PPRTV	4000	TCEQ interim ESL
n-butane	10000	TCEQ ReV	NA	NA	92000	TCEQ ReV
n-decane	190	TCEQ ReV	NA	NA	1000	TCEQ ReV
n-heptane	2200	TCEQ ReV	977	EPA PPRTV	8200	TCEQ ReV
n-hexane	199	EPA RfC	625	EPA PPRTV	5500	TCEQ ReV
n-nonane	3.8	EPA PPRTV	38	EPA PPRTV	3000	TCEQ ReV
n-octane	124	EPA PPRTV	5740	EPA PPRTV	4100	TCEQ ReV
n-pentane	8000	TCEQ ReV	3391	EPA PPRTV	68000	TCEQ ReV
n-propylbenzene	51	TCEQ ESL	204	EPA PPRTV	510	TCEQ interim ESL
o-xylene	23	EPA RfC	92	EPA PPRTV	1700	TCEQ ReV
propane	NA	NA	NA	NA	NA	NA
propene	1744	OEHHA REL	NA	NA	NA	NA
styrene	235	EPA RfC	NA	NA	5100	TCEQ ReV
toluene	1328	EPA RfC	1328	EPA PPRTV	2000	ATSDR MRL
trans-2-butene	690	TCEQ ReV	NA	NA	15000	TCEQ ReV
trans-2-pentene	560	TCEQ ReV	NA	NA	12000	TCEQ ReV

Notes: ppb = parts per billion; RfC = Reference Concentration; MRL = Minimum Risk Level; PPRTV = Provisional Peer-reviewed Toxicity Value; ReV = Reference Value; ESL = Effects Screening Level; REL = Reference Exposure Level; EPA = U.S. Environmental Protection Agency; ATSDR = Agency for Toxic Substances and Disease Registry; TCEQ = Texas Commission on Environmental Quality; OEHHA = California Office of Environmental Health Hazard Assessment; NA = not available; surr. = data for a surrogate compound was used to derive the reference value.

Appendix C. Recommended Acute Screening-level Criterion for Benzene Exposure

C.1 Introduction

Benzene is a ubiquitously occurring VOC and is one of many contaminants emitted by O&G development and production operations. Over the years, a number of regulatory agencies have proposed health-protective criteria for inhalation exposure to benzene. Unfortunately, the bulk of the human data associated with short-term exposures is not well-suited to establishing acute exposure criteria for the general population. Reasons include

- uncertainty in the measurement of exposure concentrations,
- uncertainty in exposure duration and frequency,
- incomplete evaluation of potential adverse outcomes, and
- limited statistical power associated with small numbers of subjects.

Also, most studies have been conducted in adult populations and provide little information regarding potential effects in more sensitive life stages.

For these reasons, recent efforts to establish protective acute criteria have used animal study results as the basis for their derivation (CalEPA, 2014, TCEQ, 2015). As more evidence became available that the blood-forming (hematopoietic) organs are the “critical” (most sensitive) targets of benzene toxicity, a number studies were conducted to investigate the nature and dose-response relationships for these effects in adult animals, pregnant females, and their offspring. We summarize in Table C-1 the studies that have been evaluated for use in the derivation of health criteria.

These studies focus on identifying low-dose effects on the hematopoietic system, and two studies include experiments on pregnant animals and fetuses exposed *in utero*. Thus, they are more likely to identify “critical” effects occurring during sensitive early life stages. However, none provide definitive information related to acute (1-hour) impacts; all reported effects in animals after exposures of six hours per day for multiple days.

This situation is not unprecedented; health-protective criteria often must be derived from non-ideal data. Standard procedures in such cases include

1. methods for “adjusting” the data from the exposure duration used in the critical study to the relevant exposure duration,
2. conversions to adjust for differences between animal and human doses for a given exposure, and

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3. use of UFs based on professional judgement to account for differences between animal and human sensitivity, and variability in sensitivity among humans.

Different agencies have different policies regarding how these adjustments are made, and the approaches depend on factors including the severity of the effect being protected against and the degree of conservatism (risk aversion) that is to be built into the criteria in their intended uses. It is not surprising, therefore, that TCEQ and OEHHA have promulgated criteria which differ considerably, even though they are based on the same group of studies.

TCEQ has promulgated two criteria values for acute (1-hour) exposures to benzene. The TCEQ acute inhalation ReV has been set at **180 ppb** (0.18 ppm) while the acute ESL is set at 54 ppb. The ReV is defined as, “an estimate of an inhalation exposure concentration or oral exposure dose, respectively, for a given duration to the human population (including susceptible subgroups) that is likely to be without an appreciable risk of adverse effects”, and TCEQ policy calls for its use in formal risk assessment. An ESL is calculated as 30 percent of the ReV and is used in screening assessments to trigger more in-depth analyses.

In contrast, OEHHA has established an acute REL of **8 ppb** (0.008 ppm) for 1-hour exposures to benzene. The REL is defined, similar to the TCEQ ReV, as, “an exposure that is not likely to cause adverse health effects in a human population, including sensitive subgroups, exposed to that concentration [...] for the specified exposure duration on an intermittent basis.”

In these HHRAs of O&G operations, we are faced with a decision regarding how to define a 1-hour, acute benzene benchmark with regard to adverse health effects to nearby residents. Given the difference between the TCEQ and OEHHA criteria, CDPHE has elected to review the underlying analyses supporting both values.¹⁴

In Section C.2, we analyze the TCEQ and OEHHA criteria derivations, specifically the key studies used, adjustments made for exposure duration and dosimetry, adversity of critical effects, and UFs. In Section C.3 we present our judgments on the TCEQ and OEHHA criteria derivations. Section C.4 contains a discussion on a sensitivity analysis we conducted, and Section C.5 contains a summary of this review.

¹⁴ The EPA has also promulgated a 1-hour AEGL for benzene of **5,200 ppb**. We have chosen not to employ that value in these HHRAs because it is intended to protect against “discomfort, irritation, or certain asymptomatic, non-sensory effects...”; that is, it does not consider potential long-term consequences of acute exposures.

Table C-1. Effects of Short-term Benzene Exposure On Blood-forming Tissues in Rodents

Study	Species, Strain, Sex	Exposure Levels (ppm)	Exposure Duration and Frequency	Animals per Treatment Group (N)	Critical Effect	Selected POD for Derivation of Health Criteria	Selected as Basis for Health Criteria
(Rozen et al., 1984)	Adult male C57Bl mice	0, 10.2, 21, 100, 301	6 h/d, 6 d	10	Significantly reduced peripheral lymphocytes, femoral B-CFUs, B-lymphocytes	LOAEL (10.2 ppm)	TCEQ (primary study)
(Keller and Snyder, 1988)	Pregnant Swiss Webster mice	0, 5.1, 9.9, 20.4	6 h/d, gestational days 6-15	10	Peripheral early nucleated RBCs (%) in two-day old male and female neonates	LOAEL (5.1 ppm), significant trend	OEHHA
(Dempster and Snyder, 1991)	Adult male DBA/2J mice	0, 10.3	6 h/d, 5 d	10	Significantly reduced femoral CFU-E colonies, impaired CFU-E expansion	LOAEL (10.2 ppm)	TCEQ (supporting study)
(Corti and Snyder, 1996)	Adult male and female (virgin and pregnant) Swiss Webster mice	0, 10.2	6 h/d, 10 d	10	Significantly altered femoral CFU-E colonies in adult males (decreased), adult females (increased), and fetal or adult males exposed in utero (decreased)	LOAEL (10.2 ppm)	TCEQ (supporting study)

Notes: h = hour, d = day; ppm = parts per million; POD = point of departure; RBC = red blood cell; LOAEL = lowest observed adverse effect level; TCEQ = Texas Commission on Environmental Quality; OEHHA = California Office of Environmental Health Hazard Assessment.

C.2 Technical Analyses of TCEQ and OEHHA Criteria Derivations

After reviewing the supporting documents for the TCEQ and OEHHA criteria (CalEPA, 2014, TCEQ, 2015), we identified the issues discussed in the below subsections.

C.2.1 Selection of Critical and Supporting Studies

TCEQ chose to use data from the Rozen et al. (1984) study (a **10.2-ppm LOAEL** [lowest observed adverse effect level] in adult mice) as the basis for ReV calculation.

OEHHA, in contrast, used data from the Keller and Snyder (1988) study (a **5.1-ppm LOAEL** in two-day neonates) as the critical endpoint for REL calculation. Despite the fact that significant effects were only seen in the two-day neonates, and not in older offspring of exposed dams, it does not appear that the effect seen in the neonates is an artifact. The observed temporary decrease in peripheral early nucleated red blood cells (RBCs) can be explained as an effect of benzene on fetal blood formation (which occurs in the liver), which then is compensated for at later ages by hematopoiesis in bone marrow.

C.2.2 Adjustment for Exposure Duration

As noted previously, none of the studies in adults or pregnant female mice allow for direct assessment of the impacts of 1-hour benzene exposure.

In their derivation of the acute ReV, TCEQ chose to adjust the reported 6-hour daily exposure (from the Rozen et al. (1984) study) to an equivalent 1-hour exposure. This is appropriate for non-developmental effects, where time-integrated exposure may be an appropriate index of effect. In addition, the variation of Haber's law (employing the cube of exposure duration) applied by TCEQ results in a substantially lower human-equivalent exposure concentration than if a more conventional Haber's law correction (based on the product of concentration and time) had been used.

In contrast, OEHHA identified the critical effect in the Keller and Snyder (1988) study as "developmental," that is, involving some process during an unspecified crucial period of fetal growth and differentiation. For developmental effects, the argument for time-adjustment of exposures is much less clear-cut, since the observed impairment may have occurred at any time during the exposure period. It seems reasonable to accept that the critical effect is indeed developmental, not only based on Keller and Snyder (1988) but also on supporting data from Corti and Snyder (1996) who reported persistent effects in offspring of exposed pregnant dams.

C.2.3 Dosimetric Adjustment

Both TCEQ and OEHHA employed the same approach to adjusting animal exposures to equivalent human exposures. The regional gas dose ratio (RGDR) approach involves correcting for differences in absorption rates (reflected by air-blood partitioning coefficients) across the two species. If the animal partition coefficient is similar to or larger than that for humans, the default

approach is to assume a ratio of 1.0 (EPA, 1994). Both state agencies employed this approach. However, in the absence of validated models, neither agency attempted to adjust for differences in specific ventilation rates (ventilation/minute per kilogram body weight) across the two species. This is understandable, but available data indicate that specific ventilation rates may be as much as five-fold greater in mice than in “typical” humans. Thus, similar exposure concentrations might be expected to result in larger doses per body weight for mice than for humans, and not correcting for this difference may have resulted in an added degree of conservatism for the 1-hour TCEQ and OEHHA benzene benchmarks.

C.2.4 Adversity of the Critical Effects

None of the studies in Table C-1 report overt “adverse” effects of benzene in experimental animals; that is, no clear effects on mortality or morbidity were seen. Rather, the critical effects identified in these studies are precursor effects, such as decreased levels of circulating blood cells, which are considered “early biomarkers of benzene-induced hematotoxicity” (TCEQ, 2015). Abnormal hematological values alone do not constitute an adverse effect, but in human populations they can be indicators or precursor effects for more serious, clinical adverse effects, including leukemia (ATSDR, 2007, CalEPA, 2014).

Both TCEQ and OEHHA derived acute benzene benchmarks based on these precursor effects. The underlying rationale for their selection as critical is reasonable because precursor effects may develop into adverse effects. However, using LOAELs for precursor effects as points of departure (PODs) for health-criteria derivation is somewhat at odds with current practice and may have resulted in an additional level of conservatism in the derived criteria (see Section C.2.5).

C.2.5 Values of Uncertainty Factors

As noted above, UFs are commonly employed in health-criteria development to assure that an adequate level of health-protectiveness is achieved by taking into account the nature of the POD, animal-human differences, and human variability. A substantial amount of effort has been expended in developing supporting rationales for specific UF values; modern practice is to employ UFs only where specific sources of uncertainty cannot be adequately quantified.

Unfortunately, the database supporting specific UF values for acute effects is much less well-developed than that for chronic exposures. In deriving their ReV, TCEQ employs an aggregate UF value of 100, composed of the three individual UF values itemized below.

1. An approximate UF of 3 (the square root of 10) for using a LOAEL.
 - a. While a UF value of 10 for using a LOAEL is often selected, TCEQ argued that the data from supporting studies (including Keller and Snyder (1988)) support the use of a lower value (3) in this case.
2. UF=3 for interspecies (animal-human) differences.
 - a. The value of 3 for animal-human differences is lower than commonly employed, but TCEQ argued that it is reasonable since the default dosimetric correction had been employed. As noted above, the actual dosimetric difference between animals and humans (based on specific ventilation differences) may also support this choice.

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3. UF=10 for intraspecies (human) variability.
 - a. TCEQ's selection of 10 for the human variability UF is a routine default and is consistent with the endpoint they selected being observed in adult animals.

OEHHA, in contrast, employed a composite UF value of 600, composed of the three individual UF values itemized below.

1. UF=3 for using a LOAEL.
2. UF=2 and 3, respectively, for the toxicokinetic and toxicodynamic differences between animals and humans.
3. UF=10 and 3, respectively, for toxicokinetic and toxicodynamic variability within the human population.
 - a. Using more than a total factor of 10 for human variability is uncommon; OEHHA suggests that this choice is justified by findings of large toxicokinetic variability, associated with genetically determined metabolic differences, in several human populations.

C.3 Evaluation of Criteria Derivation

Having reviewed the approaches taken by TCEQ and OEHHA in deriving acute hazard criteria for benzene, the judgements described below are supported by the data.

- It is reasonable to select the two-day neonate results from Keller and Snyder (1988) rather than use the results of Rozen et al. (1984). The data from Keller and Snyder (1988) have the additional advantage that they are suitable for benchmark-dose (concentration) analysis.
- Given the developmental nature of the selected endpoint, using a large correction for duration of exposure is probably not justified. (Since TCEQ identified their endpoint as non-developmental, however, some form of correction may be appropriate.)
- Because the reduction in early nucleated RBCs seen in Keller and Snyder (1988) is a precursor effect (not accompanied by demonstrated effects on the health or survival in experimental animals), current best practices suggest that a relatively large reduction in RBC counts should be used in benchmark-concentration modeling. Since the level of reduction that would be biologically significant is not known, a change of 1 standard deviation from controls (rather than 0.5 standard deviations) would be appropriate. Identifying a benchmark concentration as the POD for criteria derivation obviates the need for a UF for the use of a LOAEL.
- Given the likely conservative nature of the RGDR correction, an additional large UF to account for differences between animal and human toxicokinetics does not appear justified.
- Because the critical study was performed in pregnant animals, with fetuses representing a presumed sensitive population, default adjustments are appropriate for toxicodynamic differences between animals and humans (UF = square root of 10, or approximately 3) and among humans.

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- While a large UF of 10 for toxicodynamic variation in humans has been proposed by OEHHA, it is not clear that this value is adequately supported by the available data; while the variability in human benzene metabolism may indeed be large, it is by no means clear that this uncertainty points toward a more conservative UF value.

Based on these considerations, it appears that the acute health criteria derived by TCEQ (180 and 54 ppb) are not acceptably health protective, primarily owing to the duration adjustment used to calculate human-equivalent 1-hour concentrations. Similarly, the OEHHA UF of 10 for human toxicokinetic variability is very conservative, and it results in a criterion value (8 ppb) that is too far-removed from the human equivalent concentration (600-fold) to be very reliable.

Roughly speaking, the effect of the TCEQ duration adjustment was to increase the criteria by about three-fold compared to criteria derived using a more conventional adjustment method. Use of the cubic time-exposure adjustment model (Section C.2.2) resulted in an adjustment factor of approximately 1.8, compared to the six-fold adjustment that would have resulted from a simple (linear) Haber's law correction. Similarly, reduction to the square root of 10 of the OEHHA UF for human toxicokinetic variability would increase their acute criterion value by 3.2-fold.

Replicating the TCEQ criteria calculations, substituting the six-fold Haber's law adjustment yields a "modified" ReV of 53 ppb and a "modified" ESL of 16 ppb. Similarly, reducing the UF for human variability from 10 to 3.2 in the OEHHA criterion derivation gives a "modified" REL of approximately 26 ppb. That is, criteria values converge to the range of about 16–50 ppb.

C.4 Sensitivity Analyses

We have also conducted limited sensitivity analyses of acute-criteria derivation for benzene based on different PODs, duration adjustments, use of LOAELs versus a calculated benchmark concentration-low (BMCL), and different approaches to defining UF values. Because these calculations are all based on the same data sets used by TCEQ and OEHHA, it is not surprising that the range of results (calculated criteria values) are close to the "modified" values given above. Table C-2 shows an example analysis in which we derived an acute criterion based on the BMCL from Keller and Snyder (1988), with no duration adjustment (since the critical endpoint is developmental) and mostly standard default UF values. The resulting criterion value is approximately 26 ppb, close to the "modified" OEHHA value discussed above. Similar analyses, based on the LOAEL from Rozen et al. (1984), depending on the specific values for duration adjustments and UFs that are applied, also yield criteria values in the range of 30–60 ppb.

Table C-2. Example Acute Criteria Derivation Based on the BMCL from Keller and Snyder (1988)

Element	Value	Comment
POD (ppm)	1.61	1.0 standard deviation BMCL (Exp2 model) based on Keller and Snyder (1988)
Duration adjustment (1-hour)	NA	(developmental effect; default = no Haber's law correction)
Dosimetry adjustment:		
Ventilation/kg	1	(Even though mouse ventilation rate/kg is higher than in humans)
Absorption/partitioning	1	Default, defensible RGDR method (EPA, 1994)
UF (LOAEL)	NA	Because a BMCL is used as the POD
UF (interspecies):		
PK	2.0	Relatively low value because of likely animal-human differences in inhalation dosimetry
PD	3.2	< 10 because endpoint is measured at sensitive life stage
UF (intraspecies):		
PK	3.2	Default
PD	3.2	Default
Acute Criterion	0.026	ppm
	26	ppb

Notes: kg = kilogram; PK = pharmacokinetic adjustment; PD = pharmacodynamics adjustment; POD = point of departure; BMCL = benchmark concentration-low; UF = uncertainty factor; LOAEL = lowest observed adverse effect level; ppm = parts per million; ppb = parts per billion; RGDR = regional gas dose ratio; NA = not applicable.

C.5 Summary

Based on the analyses presented here, we conclude that the data support **a 1-hour health screening value of 30 ppb for benzene exposure**. In applying this value in these HHRAs, the intent is to provide a high but reasonable degree of protectiveness. This is assured by selection of a precursor effect (in a sensitive life stage) as the POD, using a BMCL instead of a LOAEL, and the inclusion of appropriate UF values to account for potential differences between experimental animal and humans and variability within the human population.

Because of the many sources of uncertainty and variability in its derivation, the numerical criterion value is associated with a high degree of uncertainty. One-hour exposures above this value should not be construed to automatically indicate that adverse health effects will occur; rather, frequent exposures above 30 ppb and isolated exposures far above this value need to be evaluated in more detail (with regard to meteorological conditions and exposure assumptions) to adequately evaluate the degree of hazard and health risk.

C.6 References

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Appendix D. Hazard-index Groups

Table D-1. Hazard-index Groups for Each Chemical

Chemical	Chronic Groups	Subchronic Groups	Acute Groups
1,2,3-trimethylbenzene	neurotoxicity, hematological, respiratory*	neurotoxicity, hematological, respiratory*	neurotoxicity
1,2,4-trimethylbenzene	neurotoxicity, hematological, respiratory*	neurotoxicity, hematological, respiratory*	neurotoxicity
1,3,5-trimethylbenzene	neurotoxicity, hematological, respiratory	neurotoxicity, hematological, respiratory*	neurotoxicity
1,3-diethylbenzene	systemic#	systemic#	unassigned
1,4-diethylbenzene	systemic	systemic	unassigned
1-butene	systemic	--	systemic
1-pentene	systemic	--	systemic
2,2,4-trimethylpentane	respiratory**	neurotoxicity, systemic	neurotoxicity
2,3,4-trimethylpentane	respiratory**	neurotoxicity, systemic	neurotoxicity
2,3-dimethylpentane	systemic, neurotoxicity	neurotoxicity, systemic	neurotoxicity
2,4-dimethylpentane	systemic, neurotoxicity	neurotoxicity, systemic	neurotoxicity
2-ethyltoluene	systemic	systemic	unassigned
2-methylheptane	systemic	neurotoxicity, systemic	neurotoxicity
2-methylhexane	systemic, neurotoxicity	neurotoxicity, systemic	neurotoxicity
3-ethyltoluene	systemic	systemic	unassigned
3-methylheptane	systemic	neurotoxicity, systemic	neurotoxicity
3-methylhexane	systemic, neurotoxicity	neurotoxicity, systemic	neurotoxicity
4-ethyltoluene	systemic	systemic	unassigned
benzene	hematological	hematological	hematological
cis-2-butene	systemic	--	systemic
cis-2-pentene	systemic	--	systemic
cyclohexane	developmental, hepatotoxicity, neurotoxicity	developmental, neurotoxicity	unassigned
cyclopentane	respiratory**	neurotoxicity, systemic	unassigned
ethane	--	--	--
ethene	hepatotoxicity	--	hepatotoxicity
ethylbenzene	developmental	sensory‡ , developmental	sensory
isobutane	neurotoxicity	--	respiratory, neurotoxicity
isopentane	neurotoxicity	neurotoxicity, systemic	neurotoxicity
isoprene	neurotoxicity, hematological	--	developmental, sensory
isopropyl benzene	nephrotoxicity, endocrine***	systemic	unassigned
m+p-xylene	neurotoxicity	neurotoxicity, hematological	respiratory, neurotoxicity
methylcyclohexane	unassigned	neurotoxicity, systemic	unassigned

Chemical	Chronic Groups	Subchronic Groups	Acute Groups
n-butane	neurotoxicity	--	systemic
n-decane	systemic, immune	--	sensory, hematological
n-heptane	neurotoxicity, systemic	sensory‡	neurotoxicity
n-hexane	neurotoxicity	neurotoxicity	neurotoxicity, endocrine
n-nonane	neurotoxicity	neurotoxicity	neurotoxicity
n-octane	respiratory**	neurotoxicity, systemic	neurotoxicity
n-pentane	neurotoxicity	systemic	neurotoxicity
n-propylbenzene	nephrotoxicity, endocrine	systemic	unassigned
o-xylene	neurotoxicity	neurotoxicity, hematological	respiratory, neurotoxicity
propane	--	--	--
propene	respiratory**	--	--
styrene	neurotoxicity	--	respiratory, neurotoxicity
toluene	neurotoxicity	neurotoxicity	neurotoxicity
trans-2-butene	systemic	--	systemic
trans-2-pentene	systemic	--	systemic

Notes: * = histological changes in the lung (alveoli); ** = histological changes in the nasal cavity; *** endocrine = increased adrenal weight; **** endocrine = HPA axis changes; # = effect seen in critical study was change in organism weight or weight gain; ‡ = ototoxicity; unassigned = promulgating authority does not identify the critical effects (usually TCEQ ESL).

Table D-2. Chemicals for Each Hazard Index Group

Exposure Duration	Group	Chemical(s)
Acute	Developmental	isoprene
	Endocrine	n-hexane
	Hematological	benzene; n-decane
	Hepatotoxicity	ethene
	Neurotoxicity	1,2,3-trimethylbenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 2,2,4-trimethylpentane; 2,3,4-trimethylpentane; 2,3-dimethylpentane; 2,4-dimethylpentane; 2-methylheptane; 2-methylhexane; 3-methylheptane; 3-methylhexane; isobutane; isopentane; m+p-xylene; n-heptane; n-hexane; n-nonane; n-octane; n-pentane; o-xylene; styrene; toluene
	Respiratory	isobutane; m+p-xylene; o-xylene; styrene
	Sensory	ethylbenzene; isoprene; n-decane
	Systemic	1-butene; 1-pentene; cis-2-butene; cis-2-pentene; n-butane; trans-2-butene; trans-2-pentene
	Unassigned	1,3-diethylbenzene; 1,4-diethylbenzene; 2-ethyltoluene; 3-ethyltoluene; 4-ethyltoluene; cyclohexane; cyclopentane; isopropyl benzene; methylcyclohexane; n-propylbenzene
Subchronic	Developmental	cyclohexane; ethylbenzene
	Hematological	1,2,3-trimethylbenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; benzene; m+p-xylene; o-xylene

Exposure Duration	Group	Chemical(s)
	Neurotoxicity	1,2,3-trimethylbenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 2,2,4-trimethylpentane; 2,3,4-trimethylpentane; 2,3-dimethylpentane; 2,4-dimethylpentane; 2-methylheptane; 2-methylhexane; 3-methylheptane; 3-methylhexane; cyclohexane; cyclopentane; isopentane; m+p-xylene; methylcyclohexane; n-hexane; n-nonane; n-octane; o-xylene; toluene
	Respiratory	1,2,3-trimethylbenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene
	Sensory	ethylbenzene; n-heptane
	Systemic	1,3-diethylbenzene; 1,4-diethylbenzene; 2,2,4-trimethylpentane; 2,3,4-trimethylpentane; 2,3-dimethylpentane; 2,4-dimethylpentane; 2-ethyltoluene; 2-methylheptane; 2-methylhexane; 3-ethyltoluene; 3-methylheptane; 3-methylhexane; 4-ethyltoluene; cyclopentane; isopentane; isopropyl benzene; methylcyclohexane; n-octane; n-pentane; n-propylbenzene
Chronic	Developmental	cyclohexane; ethylbenzene
	Endocrine	isopropyl benzene; n-propylbenzene
	Hematological	1,2,3-trimethylbenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; benzene; isoprene
	Hepatotoxicity	cyclohexane; ethene
	Immune	n-decane
	Nephrotoxicity	isopropyl benzene; n-propylbenzene
	Neurotoxicity	1,2,3-trimethylbenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 2,3-dimethylpentane; 2,4-dimethylpentane; 2-methylhexane; 3-methylhexane; cyclohexane; isobutane; isopentane; isoprene; m+p-xylene; n-butane; n-heptane; n-hexane; n-nonane; n-pentane; o-xylene; styrene; toluene
	Respiratory	1,2,3-trimethylbenzene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 2,2,4-trimethylpentane; 2,3,4-trimethylpentane; cyclopentane; n-octane; propene
	Systemic	1,3-diethylbenzene; 1,4-diethylbenzene; 1-butene; 1-pentene; 2,3-dimethylpentane; 2,4-dimethylpentane; 2-ethyltoluene; 2-methylheptane; 2-methylhexane; 3-ethyltoluene; 3-methylheptane; 3-methylhexane; 4-ethyltoluene; cis-2-butene; cis-2-pentene; n-decane; n-heptane; trans-2-butene; trans-2-pentene
	Unassigned	methylcyclohexane

Appendix E. Additional Quantifications of Estimated Hazard Quotients and Hazard Indices

This appendix contains **detailed tables of estimates of non-cancer HQs and HIs across the various scenarios modeled in these HHRAs**. They supplement the more abbreviated, summary-level tables and figures presented in Section 5. Each subsection of tables corresponds to a stratification by O&G activity type (development and production), exposure duration (acute [short term], subchronic [medium term], and chronic [long term]), and size of well pad (1, 3, and 5 acres for development activities; 1 acre for production). We also include tables at the end for subchronic and chronic exposures to sequences of O&G activities (drilling, fracking, and flowback activities in sequence, and those activities and production in sequence).

Each subsection generally has the four tables listed below. We stratify each table by the simulated age group, hypothetical O&G site, O&G activity, VOC or critical-effect group, and distance from the well pad.

1. The single maximum simulated HQ from among all hypothetical individuals simulated at the selected receptors at each distance from the well pad. **Since these are the single largest HQs from among the simulated population, they do not necessarily represent typical or average HQs for all simulated individuals and, for exposures below the chronic duration, these higher HQs may be relatively uncommon for any individual.**

We only show VOCs with at least one HQ above 0.1, so **in some tables we do not show many VOCs because their HQs are below 0.1 for all hypothetical individuals at all times in the modeling, at the selected receptors.**

For acute assessments, these are the largest 1-hour-average simulated exposures to any hypothetical individual during the course of the modeling, at the selected receptors.

For subchronic assessments, these are the largest multi-day-average simulated exposures to any hypothetical individual during the course of the modeling, at the selected receptors.

For chronic assessments, these are the largest annual-average or multi-year-average simulated exposures to any hypothetical individual, at the selected receptors.

2. The percentage of simulated HQs that are above 1 at the selected receptors at each distance from the well pad. We only show VOCs with at least one HQ above 1, so in some tables we do not show many VOCs because their HQs are below 1 for all hypothetical individuals at the selected receptors during the course of the modeling.

For acute assessments, the percentage is calculated from the collection across all modeled individuals of each individual's 365 daily-maximum 1-hour-average simulated HQs, totaling 365,000 values per age group and selected receptor. Recall, as discussed earlier in this report, that we designed the acute modeling to assess the potential for acute exposures above health-protective criteria. This means that **these 1-hour values that we produced**

reflect the highest exposures that may be possible during many types of local meteorological conditions combined with randomly sampled emission rates. They do not reflect every possible 1-hour combination of meteorology and emissions.

For subchronic assessments, the percentage is calculated from the collection across all modeled individuals of each individual's 365 multi-day-average simulated HQs, totaling 365,000 values per age group and selected receptor.

For chronic assessments, the percentage is calculated from the collection of each modeled individual's annual- or multi-year-average simulated HQs, totaling 1,000 values per age group and selected receptor.

3. Same as Bullet 1 above but for HIs for critical-effect groups. We do not show critical-effect groups whose HIs are below 0.1 for all simulated individuals at the selected receptors.
4. Same as Bullet 2 above but for HIs for critical-effect groups. We do not show critical-effect groups whose HIs are below 1 for all simulated individuals at the selected receptors.

The tables use color shading to call attention to different bins of HQ, HI, and percentage values. Tables of HQ and HI values utilize darker blue shading with white font for values above 10, medium blue shading for values between 1 and 10, light blue shading for values between 0.1 and 1, gray shading for values between 0.01 and 0.1, and light gray shading for values below 0.01. Tables of percentages utilize red shadings for higher values, orange and yellow shadings for medium values, greens for lower values, and gray for values of 0. Recall, as discussed earlier in this report, that HQs and HIs do not provide numerical estimates of the probability or severity of potential risks, meaning that an HQ of 20 does not mean 20 times the probability or severity of an adverse health impact of an HQ of 10. We intend the color-coding of different ranges of HQs and HIs to help the reader better synthesize the results and identify which VOCs and scenarios may be of greater concern and which are likely not of concern.

Each table is sorted within each combination of age group, O&G site, and O&G activity, so that VOCs and critical-effect groups with the highest values appear first while the lowest values appear last.

E.1 Oil and Gas Development

E.1.1 Acute Non-cancer Hazards

E.1.1.1 1-acre Well Pad

Table E-1. Largest Acute Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	12	11	11	9.8	8.9	8.2	7.6	8.5	7.9	5.7	5	4.5	4.1	5.3
			toluene	NA	NA	2.8	2.6	2.5	2.2	2	1.9	1.7	1.9	1.8	1.3	1.1	1	0.94	1.2
			2-ethyltoluene	NA	NA	0.2	0.18	0.17	0.14	0.12	0.1	0.089	0.14	0.13	0.066	0.058	0.052	0.067	0.043
		Fracking	benzene	NA	NA	10	9.4	8.7	7.6	6.5	5.6	5.1	4.8	4.2	4.2	3.5	3.2	3	2.8
			m+p-xylene	NA	NA	1.4	1.3	1.2	1	0.9	0.79	0.73	0.68	0.64	0.59	0.53	0.45	0.43	0.39
			2-ethyltoluene	NA	NA	0.77	0.72	0.68	0.61	0.56	0.51	0.48	0.42	0.39	0.37	0.33	0.29	0.27	0.24
			toluene	NA	NA	0.62	0.56	0.52	0.46	0.42	0.39	0.36	0.33	0.29	0.29	0.25	0.22	0.21	0.19
			3-ethyltoluene	NA	NA	0.47	0.43	0.4	0.34	0.3	0.28	0.26	0.24	0.23	0.21	0.18	0.16	0.15	0.14
			n-decane	NA	NA	0.33	0.3	0.28	0.25	0.23	0.21	0.19	0.18	0.17	0.16	0.13	0.12	0.11	0.1
			cyclohexane	NA	NA	0.27	0.25	0.23	0.21	0.19	0.18	0.16	0.15	0.14	0.13	0.11	0.1	0.097	0.088
			methylcyclohexane	NA	NA	0.27	0.25	0.23	0.2	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.095	0.09	0.082
			trans-2-butene	NA	NA	0.25	0.23	0.22	0.2	0.17	0.16	0.15	0.13	0.12	0.12	0.11	0.094	0.085	0.077
			n-nonane	NA	NA	0.19	0.17	0.16	0.14	0.12	0.11	0.099	0.092	0.086	0.08	0.072	0.061	0.058	0.053
			n-octane	NA	NA	0.19	0.18	0.16	0.14	0.12	0.11	0.1	0.096	0.089	0.083	0.071	0.063	0.06	0.055
			4-ethyltoluene	NA	NA	0.17	0.16	0.15	0.13	0.12	0.11	0.1	0.095	0.084	0.079	0.07	0.063	0.06	0.055
			o-xylene	NA	NA	0.12	0.11	0.099	0.085	0.074	0.065	0.061	0.056	0.053	0.049	0.044	0.037	0.036	0.032
		Flowback	2-ethyltoluene	NA	NA	17	16	15	13	11	13	12	15	13	8.9	7	6.3	6.2	7.3
			benzene	NA	NA	4.3	3.9	3.7	3.4	3	3.9	3.8	3.7	3.4	2.2	1.6	2.1	1.6	1.8
			3-ethyltoluene	NA	NA	1.8	1.6	1.5	1.3	1.2	1.4	1.6	1.5	1.4	0.92	0.72	0.85	0.65	0.76
			4-ethyltoluene	NA	NA	1.2	1.1	1	0.9	0.79	1.1	1.1	1	0.93	0.61	0.48	0.57	0.43	0.51
			n-decane	NA	NA	1.1	1	0.97	0.85	0.75	0.88	1	0.97	0.88	0.58	0.46	0.54	0.41	0.48
			n-propylbenzene	NA	NA	1.1	0.97	0.93	0.81	0.71	0.83	0.94	0.91	0.83	0.55	0.43	0.51	0.39	0.45
			1,3-diethylbenzene	NA	NA	0.9	0.83	0.79	0.69	0.6	0.71	0.81	0.78	0.71	0.47	0.37	0.44	0.33	0.39
			m+p-xylene	NA	NA	0.8	0.74	0.7	0.61	0.53	0.73	0.71	0.69	0.63	0.42	0.33	0.39	0.29	0.34
			isopropylbenzene	NA	NA	0.71	0.65	0.61	0.54	0.47	0.55	0.63	0.61	0.55	0.37	0.29	0.34	0.26	0.3
			toluene	NA	NA	0.67	0.62	0.58	0.51	0.45	0.61	0.6	0.58	0.53	0.35	0.27	0.32	0.25	0.29

Garfield County: Valley (Rifle)		1,2,3-trimethylbenzene	NA	NA	0.36	0.33	0.31	0.27	0.24	0.28	0.32	0.31	0.28	0.18	0.14	0.17	0.13	0.15
		1,2,4-trimethylbenzene	NA	NA	0.34	0.32	0.3	0.26	0.23	0.31	0.31	0.3	0.27	0.18	0.14	0.17	0.13	0.15
		1,3,5-trimethylbenzene	NA	NA	0.34	0.31	0.29	0.26	0.22	0.26	0.3	0.29	0.26	0.17	0.14	0.16	0.12	0.14
		o-xylene	NA	NA	0.25	0.23	0.22	0.19	0.17	0.23	0.22	0.21	0.19	0.13	0.1	0.12	0.091	0.11
		cyclohexane	NA	NA	0.23	0.21	0.2	0.18	0.16	0.21	0.2	0.19	0.18	0.12	0.085	0.11	0.082	0.097
		methylcyclohexane	NA	NA	0.23	0.21	0.2	0.18	0.15	0.21	0.21	0.2	0.18	0.12	0.094	0.11	0.085	0.099
		n-nonane	NA	NA	0.21	0.19	0.18	0.16	0.14	0.19	0.19	0.18	0.16	0.11	0.085	0.1	0.076	0.089
		styrene	NA	NA	0.19	0.18	0.17	0.15	0.13	0.15	0.17	0.17	0.15	0.1	0.078	0.093	0.07	0.082
	Drilling	benzene	NA	NA	10	9.8	8.9	7.3	6.6	6	5.5	5	4.6	3.8	3.4	2.8	2.5	2.3
		toluene	NA	NA	2.4	2.2	2	1.6	1.5	1.3	1.2	1.1	1	0.86	0.77	0.67	0.58	0.52
		2-ethyltoluene	NA	NA	0.17	0.19	0.17	0.12	0.11	0.096	0.088	0.081	0.072	0.061	0.055	0.047	0.042	0.038
	Fracking	benzene	NA	NA	8.4	7.6	7	6.2	5.6	5.1	4.7	4.4	4	3.2	2.9	2.9	2.4	2
		m+p-xylene	NA	NA	1.2	1	0.97	0.86	0.78	0.71	0.65	0.6	0.55	0.45	0.4	0.4	0.33	0.28
		2-ethyltoluene	NA	NA	0.61	0.55	0.5	0.44	0.4	0.36	0.33	0.3	0.28	0.23	0.21	0.21	0.17	0.12
		toluene	NA	NA	0.5	0.45	0.42	0.37	0.34	0.31	0.28	0.26	0.24	0.19	0.17	0.17	0.14	0.12
		3-ethyltoluene	NA	NA	0.38	0.34	0.32	0.28	0.26	0.23	0.21	0.2	0.18	0.15	0.13	0.13	0.11	0.093
		n-decane	NA	NA	0.27	0.24	0.22	0.2	0.18	0.16	0.15	0.14	0.13	0.1	0.091	0.093	0.076	0.065
		methylcyclohexane	NA	NA	0.22	0.2	0.18	0.16	0.15	0.13	0.12	0.11	0.1	0.085	0.075	0.077	0.063	0.054
		cyclohexane	NA	NA	0.21	0.19	0.18	0.16	0.14	0.13	0.12	0.11	0.1	0.086	0.076	0.075	0.062	0.051
		trans-2-butene	NA	NA	0.19	0.17	0.16	0.14	0.13	0.11	0.1	0.096	0.089	0.072	0.065	0.064	0.05	0.047
		n-octane	NA	NA	0.16	0.14	0.13	0.12	0.11	0.096	0.089	0.082	0.075	0.06	0.054	0.055	0.045	0.038
		n-nonane	NA	NA	0.15	0.14	0.13	0.11	0.1	0.092	0.085	0.078	0.072	0.058	0.052	0.052	0.043	0.037
		4-ethyltoluene	NA	NA	0.14	0.13	0.12	0.1	0.094	0.086	0.079	0.073	0.067	0.054	0.048	0.049	0.04	0.034
	Flowback	2-ethyltoluene	NA	NA	19	16	15	13	9	8.1	7.5	6.9	6.3	5.2	4.6	4	3.7	3.1
		benzene	NA	NA	4.7	3.8	3.5	3	2.4	2.2	1.9	1.7	1.8	1.6	1.2	1.1	0.92	0.79
		3-ethyltoluene	NA	NA	1.9	1.7	1.5	1.4	0.94	0.85	0.77	0.71	0.64	0.54	0.47	0.42	0.38	0.33
		4-ethyltoluene	NA	NA	1.3	1.1	1	0.91	0.63	0.57	0.52	0.48	0.44	0.36	0.32	0.28	0.26	0.22
		n-decane	NA	NA	1.2	1.1	0.97	0.86	0.59	0.54	0.49	0.45	0.4	0.34	0.3	0.26	0.24	0.21
		n-propylbenzene	NA	NA	1.2	1	0.92	0.82	0.56	0.51	0.46	0.43	0.39	0.32	0.28	0.25	0.23	0.19
		1,3-diethylbenzene	NA	NA	0.99	0.86	0.78	0.7	0.48	0.43	0.4	0.36	0.33	0.28	0.24	0.21	0.2	0.17
		m+p-xylene	NA	NA	0.88	0.76	0.7	0.62	0.42	0.39	0.35	0.32	0.29	0.24	0.22	0.19	0.17	0.15
		isopropylbenzene	NA	NA	0.78	0.67	0.61	0.54	0.37	0.34	0.31	0.28	0.26	0.21	0.19	0.17	0.15	0.13
		toluene	NA	NA	0.74	0.64	0.58	0.52	0.36	0.32	0.29	0.27	0.24	0.2	0.18	0.16	0.15	0.12
		1,2,3-trimethylbenzene	NA	NA	0.39	0.34	0.31	0.27	0.19	0.17	0.16	0.14	0.13	0.11	0.096	0.084	0.077	0.065
		1,2,4-trimethylbenzene	NA	NA	0.38	0.33	0.3	0.26	0.18	0.16	0.15	0.14	0.13	0.1	0.092	0.081	0.075	0.063
		1,3,5-trimethylbenzene	NA	NA	0.37	0.32	0.29	0.26	0.18	0.16	0.15	0.14	0.12	0.1	0.09	0.079	0.073	0.062
		o-xylene	NA	NA	0.27	0.24	0.22	0.19	0.13	0.12	0.11	0.1	0.09	0.076	0.067	0.058	0.054	0.046

	Northern Front Range		cyclohexane	NA	NA	0.25	0.2	0.18	0.16	0.13	0.12	0.099	0.09	0.094	0.082	0.065	0.06	0.049	0.041
			methylcyclohexane	NA	NA	0.25	0.22	0.2	0.18	0.12	0.11	0.1	0.093	0.083	0.07	0.062	0.054	0.05	0.043
			n-nonane	NA	NA	0.23	0.2	0.18	0.16	0.11	0.1	0.091	0.084	0.075	0.063	0.056	0.049	0.045	0.038
			styrene	NA	NA	0.21	0.18	0.17	0.15	0.1	0.092	0.084	0.078	0.071	0.059	0.052	0.045	0.042	0.035
		Drilling	benzene	NA	NA	14	13	12	11	9	7.9	7.1	6.3	5.7	4.8	4.1	3.6	3.1	2.8
			toluene	NA	NA	3.2	3	2.8	2.4	2	1.8	1.6	1.4	1.3	1.1	0.93	0.81	0.71	0.62
			2-ethyltoluene	NA	NA	0.23	0.21	0.2	0.17	0.15	0.13	0.11	0.1	0.092	0.078	0.066	0.058	0.05	0.044
			cyclohexane	NA	NA	0.11	0.1	0.097	0.084	0.072	0.063	0.056	0.05	0.046	0.038	0.033	0.028	0.025	0.022
		Fracking	benzene	NA	NA	0.85	0.79	0.74	0.66	0.73	0.73	0.73	0.66	0.61	0.51	0.49	0.43	0.41	0.38
			2-ethyltoluene	NA	NA	0.19	0.18	0.16	0.14	0.12	0.11	0.093	0.084	0.076	0.059	0.051	0.045	0.043	0.04
		Flowback	benzene	NA	NA	27	25	23	20	17	14	13	12	11	9.1	7.7	6.7	5.9	5.2
			toluene	NA	NA	0.89	0.83	0.77	0.67	0.58	0.49	0.44	0.4	0.36	0.3	0.26	0.23	0.2	0.17
			3-ethyltoluene	NA	NA	0.88	0.82	0.77	0.66	0.57	0.51	0.43	0.39	0.36	0.3	0.26	0.22	0.2	0.17
			cyclohexane	NA	NA	0.78	0.72	0.67	0.58	0.5	0.42	0.38	0.35	0.32	0.26	0.23	0.2	0.17	0.15
			m+p-xylene	NA	NA	0.56	0.52	0.49	0.42	0.36	0.32	0.28	0.25	0.23	0.19	0.16	0.14	0.12	0.11
			methylcyclohexane	NA	NA	0.36	0.34	0.31	0.27	0.23	0.2	0.18	0.16	0.15	0.12	0.1	0.091	0.08	0.07
			n-hexane	NA	NA	0.35	0.32	0.3	0.26	0.23	0.19	0.17	0.16	0.14	0.12	0.1	0.088	0.077	0.068
			n-decane	NA	NA	0.3	0.28	0.26	0.23	0.2	0.18	0.15	0.14	0.12	0.1	0.089	0.077	0.067	0.06
			n-octane	NA	NA	0.25	0.23	0.22	0.19	0.16	0.16	0.12	0.11	0.1	0.085	0.072	0.063	0.055	0.049
			n-nonane	NA	NA	0.21	0.2	0.18	0.16	0.14	0.12	0.1	0.094	0.086	0.072	0.061	0.053	0.047	0.041
			2-ethyltoluene	NA	NA	0.16	0.15	0.14	0.12	0.1	0.091	0.081	0.073	0.066	0.055	0.046	0.04	0.035	0.031
			o-xylene	NA	NA	0.15	0.14	0.13	0.11	0.098	0.094	0.074	0.068	0.062	0.052	0.044	0.038	0.033	0.03
			2-methylheptane	NA	NA	0.14	0.13	0.12	0.11	0.091	0.077	0.069	0.063	0.058	0.048	0.041	0.036	0.031	0.028
			n-heptane	NA	NA	0.13	0.12	0.11	0.095	0.082	0.069	0.062	0.056	0.052	0.043	0.037	0.032	0.028	0.025
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	12	11	11	9.8	8.9	8.2	7.6	8.5	7.9	5.7	5	4.5	4.1	5.3
			toluene	NA	NA	2.8	2.6	2.5	2.2	2	1.9	1.7	1.9	1.8	1.3	1.1	1	0.94	1.2
			2-ethyltoluene	NA	NA	0.2	0.18	0.17	0.14	0.12	0.1	0.089	0.14	0.13	0.066	0.058	0.052	0.067	0.043
		Fracking	benzene	NA	NA	10	9.4	8.7	7.6	6.5	5.6	5.1	4.8	4.2	4.2	3.5	3.2	3	2.8
			m+p-xylene	NA	NA	1.4	1.3	1.2	1	0.9	0.79	0.73	0.68	0.64	0.59	0.53	0.45	0.43	0.39
			2-ethyltoluene	NA	NA	0.77	0.72	0.68	0.61	0.56	0.51	0.48	0.42	0.39	0.37	0.33	0.29	0.27	0.24
			toluene	NA	NA	0.62	0.56	0.52	0.46	0.42	0.39	0.36	0.33	0.29	0.29	0.25	0.22	0.21	0.19
			3-ethyltoluene	NA	NA	0.47	0.43	0.4	0.34	0.3	0.28	0.26	0.24	0.23	0.21	0.18	0.16	0.15	0.14
			n-decane	NA	NA	0.33	0.3	0.28	0.25	0.23	0.21	0.19	0.18	0.17	0.16	0.13	0.12	0.11	0.1
			cyclohexane	NA	NA	0.27	0.25	0.23	0.21	0.19	0.18	0.16	0.15	0.14	0.13	0.11	0.1	0.097	0.088
			methylcyclohexane	NA	NA	0.27	0.25	0.23	0.2	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.095	0.09	0.082
			trans-2-butene	NA	NA	0.25	0.23	0.22	0.2	0.17	0.16	0.15	0.13	0.12	0.12	0.11	0.094	0.085	0.077
			n-nonane	NA	NA	0.19	0.17	0.16	0.14	0.12	0.11	0.099	0.092	0.086	0.08	0.072	0.061	0.058	0.053

Garfield County: Valley (Rifle)	Flowback	n-octane	NA	NA	0.19	0.18	0.16	0.14	0.12	0.11	0.1	0.096	0.089	0.083	0.071	0.063	0.06	0.055
		4-ethyltoluene	NA	NA	0.17	0.16	0.15	0.13	0.12	0.11	0.1	0.095	0.084	0.079	0.07	0.063	0.06	0.055
		o-xylene	NA	NA	0.12	0.11	0.099	0.085	0.074	0.065	0.061	0.056	0.053	0.049	0.044	0.037	0.036	0.032
		2-ethyltoluene	NA	NA	17	16	15	13	11	13	12	15	13	8.9	7	6.3	6.2	7.3
		benzene	NA	NA	4.3	3.9	3.7	3.4	3	3.9	3.8	3.7	3.4	2.2	1.6	2.1	1.6	1.8
		3-ethyltoluene	NA	NA	1.8	1.6	1.5	1.3	1.2	1.4	1.6	1.5	1.4	0.92	0.72	0.85	0.65	0.76
		4-ethyltoluene	NA	NA	1.2	1.1	1	0.9	0.79	1.1	1.1	1	0.93	0.61	0.48	0.57	0.43	0.51
		n-decane	NA	NA	1.1	1	0.97	0.85	0.75	0.88	1	0.97	0.88	0.58	0.46	0.54	0.41	0.48
		n-propylbenzene	NA	NA	1.1	0.97	0.93	0.81	0.71	0.83	0.94	0.91	0.83	0.55	0.43	0.51	0.39	0.45
		1,3-diethylbenzene	NA	NA	0.9	0.83	0.79	0.69	0.6	0.71	0.81	0.78	0.71	0.47	0.37	0.44	0.33	0.39
		m+p-xylene	NA	NA	0.8	0.74	0.7	0.61	0.53	0.73	0.71	0.69	0.63	0.42	0.33	0.39	0.29	0.34
		isopropylbenzene	NA	NA	0.71	0.65	0.61	0.54	0.47	0.55	0.63	0.61	0.55	0.37	0.29	0.34	0.26	0.3
		toluene	NA	NA	0.67	0.62	0.58	0.51	0.45	0.61	0.6	0.58	0.53	0.35	0.27	0.32	0.25	0.29
		1,2,3-trimethylbenzene	NA	NA	0.36	0.33	0.31	0.27	0.24	0.28	0.32	0.31	0.28	0.18	0.14	0.17	0.13	0.15
		1,2,4-trimethylbenzene	NA	NA	0.34	0.32	0.3	0.26	0.23	0.31	0.31	0.3	0.27	0.18	0.14	0.17	0.13	0.15
		1,3,5-trimethylbenzene	NA	NA	0.34	0.31	0.29	0.26	0.22	0.26	0.3	0.29	0.26	0.17	0.14	0.16	0.12	0.14
		o-xylene	NA	NA	0.25	0.23	0.22	0.19	0.17	0.23	0.22	0.21	0.19	0.13	0.1	0.12	0.091	0.11
		cyclohexane	NA	NA	0.23	0.21	0.2	0.18	0.16	0.21	0.2	0.19	0.18	0.12	0.085	0.11	0.082	0.097
		methylcyclohexane	NA	NA	0.23	0.21	0.2	0.18	0.15	0.21	0.21	0.2	0.18	0.12	0.094	0.11	0.085	0.099
		n-nonane	NA	NA	0.21	0.19	0.18	0.16	0.14	0.19	0.19	0.18	0.16	0.11	0.085	0.1	0.076	0.089
		styrene	NA	NA	0.19	0.18	0.17	0.15	0.13	0.15	0.17	0.17	0.15	0.1	0.078	0.093	0.07	0.082
	Drilling	benzene	NA	NA	10	9.8	8.9	7.3	6.6	6	5.5	5	4.6	3.8	3.4	2.8	2.5	2.3
		toluene	NA	NA	2.4	2.2	2	1.6	1.5	1.3	1.2	1.1	1	0.86	0.77	0.67	0.58	0.52
		2-ethyltoluene	NA	NA	0.17	0.19	0.17	0.12	0.11	0.096	0.088	0.081	0.072	0.061	0.055	0.047	0.042	0.038
	Fracking	benzene	NA	NA	8.4	7.6	7	6.2	5.6	5.1	4.7	4.4	4	3.2	2.9	2.9	2.4	2
		m+p-xylene	NA	NA	1.2	1	0.97	0.86	0.78	0.71	0.65	0.6	0.55	0.45	0.4	0.4	0.33	0.28
		2-ethyltoluene	NA	NA	0.61	0.55	0.5	0.44	0.4	0.36	0.33	0.3	0.28	0.23	0.21	0.21	0.17	0.12
		toluene	NA	NA	0.5	0.45	0.42	0.37	0.34	0.31	0.28	0.26	0.24	0.19	0.17	0.17	0.14	0.12
		3-ethyltoluene	NA	NA	0.38	0.34	0.32	0.28	0.26	0.23	0.21	0.2	0.18	0.15	0.13	0.13	0.11	0.093
		n-decane	NA	NA	0.27	0.24	0.22	0.2	0.18	0.16	0.15	0.14	0.13	0.1	0.091	0.093	0.076	0.065
		methylcyclohexane	NA	NA	0.22	0.2	0.18	0.16	0.15	0.13	0.12	0.11	0.1	0.085	0.075	0.077	0.063	0.054
		cyclohexane	NA	NA	0.21	0.19	0.18	0.16	0.14	0.13	0.12	0.11	0.1	0.086	0.076	0.075	0.062	0.051
		trans-2-butene	NA	NA	0.19	0.17	0.16	0.14	0.13	0.11	0.1	0.096	0.089	0.072	0.065	0.064	0.05	0.047
		n-octane	NA	NA	0.16	0.14	0.13	0.12	0.11	0.096	0.089	0.082	0.075	0.06	0.054	0.055	0.045	0.038
		n-nonane	NA	NA	0.15	0.14	0.13	0.11	0.1	0.092	0.085	0.078	0.072	0.058	0.052	0.052	0.043	0.037
		4-ethyltoluene	NA	NA	0.14	0.13	0.12	0.1	0.094	0.086	0.079	0.073	0.067	0.054	0.048	0.049	0.04	0.034
	Flowback	2-ethyltoluene	NA	NA	19	16	15	13	9	8.1	7.5	6.9	6.3	5.2	4.6	4	3.7	3.1

			benzene	NA	NA	4.7	3.8	3.5	3	2.4	2.2	1.9	1.7	1.8	1.6	1.2	1.1	0.92	0.79
			3-ethyltoluene	NA	NA	1.9	1.7	1.5	1.4	0.94	0.85	0.77	0.71	0.64	0.54	0.47	0.42	0.38	0.33
			4-ethyltoluene	NA	NA	1.3	1.1	1	0.91	0.63	0.57	0.52	0.48	0.44	0.36	0.32	0.28	0.26	0.22
			n-decane	NA	NA	1.2	1.1	0.97	0.86	0.59	0.54	0.49	0.45	0.4	0.34	0.3	0.26	0.24	0.21
			n-propylbenzene	NA	NA	1.2	1	0.92	0.82	0.56	0.51	0.46	0.43	0.39	0.32	0.28	0.25	0.23	0.19
			1,3-diethylbenzene	NA	NA	0.99	0.86	0.78	0.7	0.48	0.43	0.4	0.36	0.33	0.28	0.24	0.21	0.2	0.17
			m+p-xylene	NA	NA	0.88	0.76	0.7	0.62	0.42	0.39	0.35	0.32	0.29	0.24	0.22	0.19	0.17	0.15
			isopropylbenzene	NA	NA	0.78	0.67	0.61	0.54	0.37	0.34	0.31	0.28	0.26	0.21	0.19	0.17	0.15	0.13
			toluene	NA	NA	0.74	0.64	0.58	0.52	0.36	0.32	0.29	0.27	0.24	0.2	0.18	0.16	0.15	0.12
			1,2,3-trimethylbenzene	NA	NA	0.39	0.34	0.31	0.27	0.19	0.17	0.16	0.14	0.13	0.11	0.096	0.084	0.077	0.065
			1,2,4-trimethylbenzene	NA	NA	0.38	0.33	0.3	0.26	0.18	0.16	0.15	0.14	0.13	0.1	0.092	0.081	0.075	0.063
			1,3,5-trimethylbenzene	NA	NA	0.37	0.32	0.29	0.26	0.18	0.16	0.15	0.14	0.12	0.1	0.09	0.079	0.073	0.062
			o-xylene	NA	NA	0.27	0.24	0.22	0.19	0.13	0.12	0.11	0.1	0.09	0.076	0.067	0.058	0.054	0.046
			cyclohexane	NA	NA	0.25	0.2	0.18	0.16	0.13	0.12	0.099	0.09	0.094	0.082	0.065	0.06	0.049	0.041
			methylcyclohexane	NA	NA	0.25	0.22	0.2	0.18	0.12	0.11	0.1	0.093	0.083	0.07	0.062	0.054	0.05	0.043
			n-nonane	NA	NA	0.23	0.2	0.18	0.16	0.11	0.1	0.091	0.084	0.075	0.063	0.056	0.049	0.045	0.038
			styrene	NA	NA	0.21	0.18	0.17	0.15	0.1	0.092	0.084	0.078	0.071	0.059	0.052	0.045	0.042	0.035
	Northern Front Range	Drilling	benzene	NA	NA	14	13	12	11	9	7.9	7.1	6.3	5.7	4.8	4.1	3.6	3.1	2.8
			toluene	NA	NA	3.2	3	2.8	2.4	2	1.8	1.6	1.4	1.3	1.1	0.93	0.81	0.71	0.62
			2-ethyltoluene	NA	NA	0.23	0.21	0.2	0.17	0.15	0.13	0.11	0.1	0.092	0.078	0.066	0.058	0.05	0.044
			cyclohexane	NA	NA	0.11	0.1	0.097	0.084	0.072	0.063	0.056	0.05	0.046	0.038	0.033	0.028	0.025	0.022
		Fracking	benzene	NA	NA	0.85	0.79	0.74	0.66	0.73	0.73	0.73	0.66	0.61	0.51	0.49	0.43	0.41	0.38
			2-ethyltoluene	NA	NA	0.19	0.18	0.16	0.14	0.12	0.11	0.093	0.084	0.076	0.059	0.051	0.045	0.043	0.04
		Flowback	benzene	NA	NA	27	25	23	20	17	14	13	12	11	9.1	7.7	6.7	5.9	5.2
			toluene	NA	NA	0.89	0.83	0.77	0.67	0.58	0.49	0.44	0.4	0.36	0.3	0.26	0.23	0.2	0.17
			3-ethyltoluene	NA	NA	0.88	0.82	0.77	0.66	0.57	0.51	0.43	0.39	0.36	0.3	0.26	0.22	0.2	0.17
			cyclohexane	NA	NA	0.78	0.72	0.67	0.58	0.5	0.42	0.38	0.35	0.32	0.26	0.23	0.2	0.17	0.15
			m+p-xylene	NA	NA	0.56	0.52	0.49	0.42	0.36	0.32	0.28	0.25	0.23	0.19	0.16	0.14	0.12	0.11
			methylcyclohexane	NA	NA	0.36	0.34	0.31	0.27	0.23	0.2	0.18	0.16	0.15	0.12	0.1	0.091	0.08	0.07
			n-hexane	NA	NA	0.35	0.32	0.3	0.26	0.23	0.19	0.17	0.16	0.14	0.12	0.1	0.088	0.077	0.068
			n-decane	NA	NA	0.3	0.28	0.26	0.23	0.2	0.18	0.15	0.14	0.12	0.1	0.089	0.077	0.067	0.06
			n-octane	NA	NA	0.25	0.23	0.22	0.19	0.16	0.16	0.12	0.11	0.1	0.085	0.072	0.063	0.055	0.049
			n-nonane	NA	NA	0.21	0.2	0.18	0.16	0.14	0.12	0.1	0.094	0.086	0.072	0.061	0.053	0.047	0.041
			2-ethyltoluene	NA	NA	0.16	0.15	0.14	0.12	0.1	0.091	0.081	0.073	0.066	0.055	0.046	0.04	0.035	0.031
			o-xylene	NA	NA	0.15	0.14	0.13	0.11	0.098	0.094	0.074	0.068	0.062	0.052	0.044	0.038	0.033	0.03
			2-methylheptane	NA	NA	0.14	0.13	0.12	0.11	0.091	0.077	0.069	0.063	0.058	0.048	0.041	0.036	0.031	0.028
			n-heptane	NA	NA	0.13	0.12	0.11	0.095	0.082	0.069	0.062	0.056	0.052	0.043	0.037	0.032	0.028	0.025

60+ Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	12	11	11	9.8	8.9	8.2	7.6	8.5	7.9	5.7	5	4.5	4.1	5.3
			toluene	NA	NA	2.8	2.6	2.5	2.2	2	1.9	1.7	1.9	1.8	1.3	1.1	1	0.94	1.2
			2-ethyltoluene	NA	NA	0.2	0.18	0.17	0.14	0.12	0.1	0.089	0.14	0.13	0.066	0.058	0.052	0.067	0.043
		Fracking	benzene	NA	NA	10	9.4	8.7	7.6	6.5	5.6	5.1	4.8	4.2	4.2	3.5	3.2	3	2.8
			m+p-xylene	NA	NA	1.4	1.3	1.2	1	0.9	0.79	0.73	0.68	0.64	0.59	0.53	0.45	0.43	0.39
			2-ethyltoluene	NA	NA	0.77	0.72	0.68	0.61	0.56	0.51	0.48	0.42	0.39	0.37	0.33	0.29	0.27	0.24
			toluene	NA	NA	0.62	0.56	0.52	0.46	0.42	0.39	0.36	0.33	0.29	0.29	0.25	0.22	0.21	0.19
			3-ethyltoluene	NA	NA	0.47	0.43	0.4	0.34	0.3	0.28	0.26	0.24	0.23	0.21	0.18	0.16	0.15	0.14
			n-decane	NA	NA	0.33	0.3	0.28	0.25	0.23	0.21	0.19	0.18	0.17	0.16	0.13	0.12	0.11	0.1
			cyclohexane	NA	NA	0.27	0.25	0.23	0.21	0.19	0.18	0.16	0.15	0.14	0.13	0.11	0.1	0.097	0.088
			methylcyclohexane	NA	NA	0.27	0.25	0.23	0.2	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.095	0.09	0.082
			trans-2-butene	NA	NA	0.25	0.23	0.22	0.2	0.17	0.16	0.15	0.13	0.12	0.12	0.11	0.094	0.085	0.077
			n-nonane	NA	NA	0.19	0.17	0.16	0.14	0.12	0.11	0.099	0.092	0.086	0.08	0.072	0.061	0.058	0.053
			n-octane	NA	NA	0.19	0.18	0.16	0.14	0.12	0.11	0.1	0.096	0.089	0.083	0.071	0.063	0.06	0.055
			4-ethyltoluene	NA	NA	0.17	0.16	0.15	0.13	0.12	0.11	0.1	0.095	0.084	0.079	0.07	0.063	0.06	0.055
			o-xylene	NA	NA	0.12	0.11	0.099	0.085	0.074	0.065	0.061	0.056	0.053	0.049	0.044	0.037	0.036	0.032
		Flowback	2-ethyltoluene	NA	NA	17	16	15	13	11	13	12	15	13	8.9	7	6.3	6.2	7.3
			benzene	NA	NA	4.3	3.9	3.7	3.4	3	3.9	3.8	3.7	3.4	2.2	1.6	2.1	1.6	1.8
			3-ethyltoluene	NA	NA	1.8	1.6	1.5	1.3	1.2	1.4	1.6	1.5	1.4	0.92	0.72	0.85	0.65	0.76
			4-ethyltoluene	NA	NA	1.2	1.1	1	0.9	0.79	1.1	1.1	1	0.93	0.61	0.48	0.57	0.43	0.51
			n-decane	NA	NA	1.1	1	0.97	0.85	0.75	0.88	1	0.97	0.88	0.58	0.46	0.54	0.41	0.48
			n-propylbenzene	NA	NA	1.1	0.97	0.93	0.81	0.71	0.83	0.94	0.91	0.83	0.55	0.43	0.51	0.39	0.45
			1,3-diethylbenzene	NA	NA	0.9	0.83	0.79	0.69	0.6	0.71	0.81	0.78	0.71	0.47	0.37	0.44	0.33	0.39
			m+p-xylene	NA	NA	0.8	0.74	0.7	0.61	0.53	0.73	0.71	0.69	0.63	0.42	0.33	0.39	0.29	0.34
			isopropylbenzene	NA	NA	0.71	0.65	0.61	0.54	0.47	0.55	0.63	0.61	0.55	0.37	0.29	0.34	0.26	0.3
			toluene	NA	NA	0.67	0.62	0.58	0.51	0.45	0.61	0.6	0.58	0.53	0.35	0.27	0.32	0.25	0.29
			1,2,3-trimethylbenzene	NA	NA	0.36	0.33	0.31	0.27	0.24	0.28	0.32	0.31	0.28	0.18	0.14	0.17	0.13	0.15
			1,2,4-trimethylbenzene	NA	NA	0.34	0.32	0.3	0.26	0.23	0.31	0.31	0.3	0.27	0.18	0.14	0.17	0.13	0.15
			1,3,5-trimethylbenzene	NA	NA	0.34	0.31	0.29	0.26	0.22	0.26	0.3	0.29	0.26	0.17	0.14	0.16	0.12	0.14
			o-xylene	NA	NA	0.25	0.23	0.22	0.19	0.17	0.23	0.22	0.21	0.19	0.13	0.1	0.12	0.091	0.11
			cyclohexane	NA	NA	0.23	0.21	0.2	0.18	0.16	0.21	0.2	0.19	0.18	0.12	0.085	0.11	0.082	0.097
			methylcyclohexane	NA	NA	0.23	0.21	0.2	0.18	0.15	0.21	0.21	0.2	0.18	0.12	0.094	0.11	0.085	0.099
			n-nonane	NA	NA	0.21	0.19	0.18	0.16	0.14	0.19	0.19	0.18	0.16	0.11	0.085	0.1	0.076	0.089
			styrene	NA	NA	0.19	0.18	0.17	0.15	0.13	0.15	0.17	0.17	0.15	0.1	0.078	0.093	0.07	0.082
	Garfield County: Valley (DifA)	Drilling	benzene	NA	NA	10	9.8	8.9	7.3	6.6	6	5.5	5	4.6	3.8	3.4	2.8	2.5	2.3
			toluene	NA	NA	2.4	2.2	2	1.6	1.5	1.3	1.2	1.1	1	0.86	0.77	0.67	0.58	0.52
			2-ethyltoluene	NA	NA	0.17	0.19	0.17	0.12	0.11	0.096	0.088	0.081	0.072	0.061	0.055	0.047	0.042	0.038

(Kilg)	Fracking	benzene	NA	NA	8.4	7.6	7	6.2	5.6	5.1	4.7	4.4	4	3.2	2.9	2.9	2.4	2
		m+p-xylene	NA	NA	1.2	1	0.97	0.86	0.78	0.71	0.65	0.6	0.55	0.45	0.4	0.4	0.33	0.28
		2-ethyltoluene	NA	NA	0.61	0.55	0.5	0.44	0.4	0.36	0.33	0.3	0.28	0.23	0.21	0.21	0.17	0.12
		toluene	NA	NA	0.5	0.45	0.42	0.37	0.34	0.31	0.28	0.26	0.24	0.19	0.17	0.17	0.14	0.12
		3-ethyltoluene	NA	NA	0.38	0.34	0.32	0.28	0.26	0.23	0.21	0.2	0.18	0.15	0.13	0.13	0.11	0.093
		n-decane	NA	NA	0.27	0.24	0.22	0.2	0.18	0.16	0.15	0.14	0.13	0.1	0.091	0.093	0.076	0.065
		methylcyclohexane	NA	NA	0.22	0.2	0.18	0.16	0.15	0.13	0.12	0.11	0.1	0.085	0.075	0.077	0.063	0.054
		cyclohexane	NA	NA	0.21	0.19	0.18	0.16	0.14	0.13	0.12	0.11	0.1	0.086	0.076	0.075	0.062	0.051
		trans-2-butene	NA	NA	0.19	0.17	0.16	0.14	0.13	0.11	0.1	0.096	0.089	0.072	0.065	0.064	0.05	0.047
		n-octane	NA	NA	0.16	0.14	0.13	0.12	0.11	0.096	0.089	0.082	0.075	0.06	0.054	0.055	0.045	0.038
		n-nonane	NA	NA	0.15	0.14	0.13	0.11	0.1	0.092	0.085	0.078	0.072	0.058	0.052	0.052	0.043	0.037
		4-ethyltoluene	NA	NA	0.14	0.13	0.12	0.1	0.094	0.086	0.079	0.073	0.067	0.054	0.048	0.049	0.04	0.034
	Flowback	2-ethyltoluene	NA	NA	19	16	15	13	9	8.1	7.5	6.9	6.3	5.2	4.6	4	3.7	3.1
		benzene	NA	NA	4.7	3.8	3.5	3	2.4	2.2	1.9	1.7	1.8	1.6	1.2	1.1	0.92	0.79
		3-ethyltoluene	NA	NA	1.9	1.7	1.5	1.4	0.94	0.85	0.77	0.71	0.64	0.54	0.47	0.42	0.38	0.33
		4-ethyltoluene	NA	NA	1.3	1.1	1	0.91	0.63	0.57	0.52	0.48	0.44	0.36	0.32	0.28	0.26	0.22
		n-decane	NA	NA	1.2	1.1	0.97	0.86	0.59	0.54	0.49	0.45	0.4	0.34	0.3	0.26	0.24	0.21
		n-propylbenzene	NA	NA	1.2	1	0.92	0.82	0.56	0.51	0.46	0.43	0.39	0.32	0.28	0.25	0.23	0.19
		1,3-diethylbenzene	NA	NA	0.99	0.86	0.78	0.7	0.48	0.43	0.4	0.36	0.33	0.28	0.24	0.21	0.2	0.17
		m+p-xylene	NA	NA	0.88	0.76	0.7	0.62	0.42	0.39	0.35	0.32	0.29	0.24	0.22	0.19	0.17	0.15
		isopropylbenzene	NA	NA	0.78	0.67	0.61	0.54	0.37	0.34	0.31	0.28	0.26	0.21	0.19	0.17	0.15	0.13
		toluene	NA	NA	0.74	0.64	0.58	0.52	0.36	0.32	0.29	0.27	0.24	0.2	0.18	0.16	0.15	0.12
		1,2,3-trimethylbenzene	NA	NA	0.39	0.34	0.31	0.27	0.19	0.17	0.16	0.14	0.13	0.11	0.096	0.084	0.077	0.065
		1,2,4-trimethylbenzene	NA	NA	0.38	0.33	0.3	0.26	0.18	0.16	0.15	0.14	0.13	0.1	0.092	0.081	0.075	0.063
		1,3,5-trimethylbenzene	NA	NA	0.37	0.32	0.29	0.26	0.18	0.16	0.15	0.14	0.12	0.1	0.09	0.079	0.073	0.062
		o-xylene	NA	NA	0.27	0.24	0.22	0.19	0.13	0.12	0.11	0.1	0.09	0.076	0.067	0.058	0.054	0.046
		cyclohexane	NA	NA	0.25	0.2	0.18	0.16	0.13	0.12	0.099	0.09	0.094	0.082	0.065	0.06	0.049	0.041
		methylcyclohexane	NA	NA	0.25	0.22	0.2	0.18	0.12	0.11	0.1	0.093	0.083	0.07	0.062	0.054	0.05	0.043
		n-nonane	NA	NA	0.23	0.2	0.18	0.16	0.11	0.1	0.091	0.084	0.075	0.063	0.056	0.049	0.045	0.038
		styrene	NA	NA	0.21	0.18	0.17	0.15	0.1	0.092	0.084	0.078	0.071	0.059	0.052	0.045	0.042	0.035
Northern Front Range	Drilling	benzene	NA	NA	14	13	12	11	9	7.9	7.1	6.3	5.7	4.8	4.1	3.6	3.1	2.8
		toluene	NA	NA	3.2	3	2.8	2.4	2	1.8	1.6	1.4	1.3	1.1	0.93	0.81	0.71	0.62
		2-ethyltoluene	NA	NA	0.23	0.21	0.2	0.17	0.15	0.13	0.11	0.1	0.092	0.078	0.066	0.058	0.05	0.044
		cyclohexane	NA	NA	0.11	0.1	0.097	0.084	0.072	0.063	0.056	0.05	0.046	0.038	0.033	0.028	0.025	0.022
	Fracking	benzene	NA	NA	0.85	0.79	0.74	0.66	0.73	0.73	0.73	0.66	0.61	0.51	0.49	0.43	0.41	0.38
		2-ethyltoluene	NA	NA	0.19	0.18	0.16	0.14	0.12	0.11	0.093	0.084	0.076	0.059	0.051	0.045	0.043	0.04
	Flowback	benzene	NA	NA	27	25	23	20	17	14	13	12	11	9.1	7.7	6.7	5.9	5.2

			toluene	NA	NA	0.89	0.83	0.77	0.67	0.58	0.49	0.44	0.4	0.36	0.3	0.26	0.23	0.2	0.17
			3-ethyltoluene	NA	NA	0.88	0.82	0.77	0.66	0.57	0.51	0.43	0.39	0.36	0.3	0.26	0.22	0.2	0.17
			cyclohexane	NA	NA	0.78	0.72	0.67	0.58	0.5	0.42	0.38	0.35	0.32	0.26	0.23	0.2	0.17	0.15
			m+p-xylene	NA	NA	0.56	0.52	0.49	0.42	0.36	0.32	0.28	0.25	0.23	0.19	0.16	0.14	0.12	0.11
			methylcyclohexane	NA	NA	0.36	0.34	0.31	0.27	0.23	0.2	0.18	0.16	0.15	0.12	0.1	0.091	0.08	0.07
			n-hexane	NA	NA	0.35	0.32	0.3	0.26	0.23	0.19	0.17	0.16	0.14	0.12	0.1	0.088	0.077	0.068
			n-decane	NA	NA	0.3	0.28	0.26	0.23	0.2	0.18	0.15	0.14	0.12	0.1	0.089	0.077	0.067	0.06
			n-octane	NA	NA	0.25	0.23	0.22	0.19	0.16	0.16	0.12	0.11	0.1	0.085	0.072	0.063	0.055	0.049
			n-nonane	NA	NA	0.21	0.2	0.18	0.16	0.14	0.12	0.1	0.094	0.086	0.072	0.061	0.053	0.047	0.041
			2-ethyltoluene	NA	NA	0.16	0.15	0.14	0.12	0.1	0.091	0.081	0.073	0.066	0.055	0.046	0.04	0.035	0.031
			o-xylene	NA	NA	0.15	0.14	0.13	0.11	0.098	0.094	0.074	0.068	0.062	0.052	0.044	0.038	0.033	0.03
			2-methylheptane	NA	NA	0.14	0.13	0.12	0.11	0.091	0.077	0.069	0.063	0.058	0.048	0.041	0.036	0.031	0.028
			n-heptane	NA	NA	0.13	0.12	0.11	0.095	0.082	0.069	0.062	0.056	0.052	0.043	0.037	0.032	0.028	0.025

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-2. Percentage of Daily-maximum Acute Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	100%	100%	99%	98%	95%	91%	86%	89%	87%	76%	66%	57%	51%	39%
			toluene	NA	NA	71%	62%	53%	32%	16%	6%	3%	14%	12%	4%	1%	0%	0%	1%
		Fracking	benzene	NA	NA	100%	99%	98%	96%	92%	86%	79%	70%	60%	45%	28%	18%	14%	10%
			m+p-xylene	NA	NA	6%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	96%	94%	91%	88%	81%	81%	77%	74%	69%	44%	22%	26%	16%	13%
			2-ethyltoluene	NA	NA	82%	78%	75%	69%	65%	61%	58%	58%	55%	48%	48%	43%	42%	39%
			3-ethyltoluene	NA	NA	21%	14%	10%	7%	3%	4%	3%	3%	3%	0%	0%	0%	0%	0%
			4-ethyltoluene	NA	NA	3%	1%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
			n-decane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			n-propylbenzene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	100%	100%	100%	99%	98%	97%	96%	95%	93%	89%	82%	74%	64%	52%
			toluene	NA	NA	77%	71%	63%	44%	32%	19%	9%	2%	0%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	100%	99%	99%	98%	97%	96%	94%	93%	90%	84%	76%	65%	51%	32%
			m+p-xylene	NA	NA	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	97%	95%	93%	88%	81%	75%	67%	59%	47%	18%	3%	1%	0%	0%
			2-ethyltoluene	NA	NA	86%	82%	78%	72%	67%	66%	65%	65%	64%	62%	59%	57%	55%	51%

18 to 59 Years			3-ethyltoluene	NA	NA	28%	20%	13%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			4-ethyltoluene	NA	NA	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			n-decane	NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			n-propylbenzene	NA	NA	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Northern Front Range	Drilling	benzene	NA	NA	100%	100%	100%	99%	97%	95%	92%	88%	84%	76%	64%	53%	41%	30%	
			toluene	NA	NA	79%	73%	65%	48%	29%	14%	6%	4%	2%	1%	0%	0%	0%	0%	
		Flowback	benzene	NA	NA	100%	100%	100%	100%	100%	100%	100%	99%	99%	97%	94%	90%	86%	80%	
		Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	100%	100%	99%	97%	95%	91%	86%	89%	87%	76%	66%	57%	51%	39%
				toluene	NA	NA	70%	61%	52%	32%	16%	6%	3%	14%	11%	4%	1%	0%	0%	1%
			Fracking	benzene	NA	NA	100%	99%	98%	96%	92%	86%	78%	70%	60%	44%	28%	18%	14%	10%
				m+p-xylene	NA	NA	6%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			Flowback	benzene	NA	NA	96%	94%	91%	87%	81%	80%	76%	73%	69%	43%	22%	26%	15%	13%
				2-ethyltoluene	NA	NA	82%	78%	75%	69%	65%	61%	58%	58%	55%	48%	48%	43%	42%	39%
				3-ethyltoluene	NA	NA	20%	14%	10%	7%	3%	4%	3%	3%	3%	0%	0%	0%	0%	0%
				4-ethyltoluene	NA	NA	3%	1%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
				n-decane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
				n-propylbenzene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Garfield County: Valley (Rifle)		Drilling	benzene	NA	NA	100%	100%	100%	99%	98%	97%	96%	94%	92%	88%	81%	73%	63%	51%	
			toluene	NA	NA	76%	70%	62%	42%	31%	18%	9%	2%	0%	0%	0%	0%	0%	0%	
		Fracking	benzene	NA	NA	100%	99%	99%	98%	97%	96%	94%	92%	90%	83%	74%	63%	49%	31%	
			m+p-xylene	NA	NA	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
		Flowback	benzene	NA	NA	97%	95%	92%	87%	79%	72%	64%	55%	43%	17%	3%	1%	0%	0%	
			2-ethyltoluene	NA	NA	86%	81%	78%	71%	67%	66%	65%	65%	64%	62%	59%	57%	55%	51%	
			3-ethyltoluene	NA	NA	27%	20%	12%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			4-ethyltoluene	NA	NA	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
n-decane	NA		NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
n-propylbenzene	NA		NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
Northern Front Range	Drilling	benzene	NA	NA	100%	100%	100%	98%	97%	94%	91%	88%	84%	75%	63%	52%	40%	30%		
		toluene	NA	NA	78%	71%	64%	46%	28%	14%	6%	4%	2%	1%	0%	0%	0%	0%		
		Flowback	benzene	NA	NA	100%	100%	100%	100%	100%	100%	100%	99%	98%	96%	93%	90%	85%	79%	
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	99%	99%	98%	96%	93%	89%	83%	87%	85%	74%	64%	55%	49%	38%	
			toluene	NA	NA	66%	58%	49%	30%	15%	6%	3%	13%	11%	4%	1%	0%	0%	1%	
		Fracking	benzene	NA	NA	99%	97%	96%	93%	89%	83%	76%	67%	57%	43%	27%	17%	13%	10%	
			m+p-xylene	NA	NA	6%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
		Flowback	benzene	NA	NA	92%	89%	87%	83%	77%	77%	74%	70%	66%	41%	20%	25%	14%	13%	
			2-ethyltoluene	NA	NA	81%	77%	74%	69%	65%	60%	58%	57%	55%	47%	47%	42%	41%	38%	
			3-ethyltoluene	NA	NA	19%	13%	9%	6%	2%	4%	3%	3%	2%	0%	0%	0%	0%	0%	

Garfield County: Valley (Rifle)		4-ethyltoluene	NA	NA	2%	1%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	
		n-decane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
		n-propylbenzene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Drilling	benzene	NA	NA	100%	100%	99%	97%	96%	95%	93%	92%	90%	85%	78%	70%	60%	49%	
		toluene	NA	NA	72%	67%	59%	40%	29%	17%	8%	2%	0%	0%	0%	0%	0%	0%	
	Fracking	benzene	NA	NA	99%	98%	97%	96%	95%	93%	91%	89%	86%	79%	70%	60%	46%	29%	
		m+p-xylene	NA	NA	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Flowback	benzene	NA	NA	94%	90%	88%	82%	74%	67%	60%	51%	41%	16%	3%	1%	0%	0%	
		2-ethyltoluene	NA	NA	85%	80%	77%	71%	67%	66%	65%	64%	63%	61%	59%	56%	54%	50%	
		3-ethyltoluene	NA	NA	26%	19%	12%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
		4-ethyltoluene	NA	NA	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
		n-decane	NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
		n-propylbenzene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Northern Front Range	Drilling	benzene	NA	NA	100%	100%	99%	97%	95%	92%	89%	86%	81%	73%	61%	50%	39%	29%
			toluene	NA	NA	75%	68%	61%	44%	27%	13%	6%	4%	2%	1%	0%	0%	0%	0%
Flowback		benzene	NA	NA	100%	100%	100%	100%	100%	100%	99%	98%	97%	95%	91%	87%	83%	77%	

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity.

Table E-3. Largest Acute Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	12	11	11	9.8	8.9	8.2	7.7	8.5	7.9	5.7	5	4.5	4.1	5.3
			neurotoxicity	NA	NA	3	2.8	2.6	2.4	2.2	2	1.9	2.1	1.9	1.4	1.2	1.1	1	1.3
			respiratory	NA	NA	0.14	0.13	0.12	0.11	0.1	0.095	0.088	0.098	0.091	0.066	0.058	0.051	0.048	0.049
		Fracking	hematological	NA	NA	11	9.7	9	7.8	6.7	5.8	5.3	4.9	4.3	4.3	3.6	3.3	3.1	2.8
			neurotoxicity	NA	NA	2.9	2.7	2.5	2.1	1.9	1.7	1.6	1.4	1.3	1.3	1.1	0.96	0.91	0.83
			respiratory	NA	NA	1.6	1.4	1.3	1.1	0.98	0.87	0.8	0.75	0.7	0.65	0.58	0.5	0.47	0.43
			sensory	NA	NA	0.33	0.3	0.28	0.25	0.23	0.21	0.2	0.18	0.17	0.16	0.14	0.12	0.12	0.11
			systemic	NA	NA	0.25	0.23	0.22	0.2	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.095	0.085	0.077
		Flowback	hematological	NA	NA	4.6	4.2	4	3.7	3.2	4.1	4.1	4	3.6	2.4	1.8	2.2	1.7	2
			neurotoxicity	NA	NA	3.4	3.1	3	2.6	2.3	2.9	3	2.9	2.7	1.8	1.4	1.6	1.2	1.5
			respiratory	NA	NA	1.3	1.2	1.1	0.96	0.84	1.1	1.1	1.1	0.99	0.66	0.51	0.61	0.46	0.54
			sensory	NA	NA	1.2	1.1	1	0.88	0.77	0.91	1	1	0.91	0.6	0.47	0.56	0.42	0.5
	Garfield	Drilling	hematological	NA	NA	10	9.8	8.9	7.3	6.6	6	5.5	5	4.6	3.8	3.4	2.8	2.5	2.3

18 to 59 Years	County: Valley (Rifle)	Fracking	neurotoxicity	NA	NA	2.5	2.4	2.2	1.8	1.6	1.5	1.3	1.2	1.1	0.92	0.83	0.69	0.62	0.56	
			respiratory	NA	NA	0.12	0.11	0.1	0.084	0.075	0.069	0.063	0.058	0.052	0.043	0.039	0.033	0.029	0.026	
			hematological	NA	NA	8.7	7.8	7.2	6.4	5.8	5.3	4.9	4.5	4.1	3.3	3	3	2.5	2.1	
			neurotoxicity	NA	NA	2.4	2.2	2	1.8	1.6	1.5	1.3	1.2	1.1	0.91	0.81	0.83	0.68	0.58	
			respiratory	NA	NA	1.3	1.1	1.1	0.94	0.85	0.77	0.71	0.66	0.6	0.49	0.43	0.44	0.36	0.31	
			sensory	NA	NA	0.27	0.25	0.23	0.2	0.18	0.17	0.15	0.14	0.13	0.1	0.093	0.095	0.078	0.066	
			systemic	NA	NA	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.097	0.09	0.072	0.065	0.064	0.05	0.048	
			hematological	NA	NA	5.1	4.2	3.8	3.4	2.6	2.4	2	1.9	1.9	1.7	1.3	1.2	0.99	0.85	
		Flowback	neurotoxicity	NA	NA	3.7	3.3	3	2.6	1.8	1.6	1.5	1.4	1.2	1	0.91	0.8	0.74	0.63	
			respiratory	NA	NA	1.4	1.2	1.1	0.97	0.67	0.61	0.55	0.51	0.46	0.38	0.34	0.3	0.27	0.23	
			sensory	NA	NA	1.3	1.1	1	0.89	0.61	0.56	0.51	0.47	0.42	0.35	0.31	0.27	0.25	0.21	
			systemic	NA	NA	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.097	0.09	0.072	0.065	0.064	0.05	0.048	
	Northern Front Range	Drilling	hematological	NA	NA	14	13	12	11	9	7.9	7.1	6.4	5.7	4.8	4.1	3.6	3.1	2.8	
			neurotoxicity	NA	NA	3.4	3.2	3	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1	0.87	0.76	0.67	
			respiratory	NA	NA	0.16	0.15	0.14	0.12	0.1	0.081	0.077	0.066	0.058	0.055	0.047	0.041	0.036	0.032	
		Fracking	hematological	NA	NA	0.87	0.81	0.76	0.68	0.75	0.75	0.74	0.67	0.62	0.52	0.5	0.44	0.41	0.39	
			hematological	NA	NA	27	25	23	20	17	15	13	12	11	9.2	7.8	6.8	6	5.3	
		Flowback	neurotoxicity	NA	NA	3.5	3.2	3	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1	0.88	0.77	0.68	
			respiratory	NA	NA	0.79	0.74	0.69	0.6	0.51	0.45	0.39	0.35	0.32	0.27	0.23	0.2	0.18	0.15	
			endocrine	NA	NA	0.35	0.32	0.3	0.26	0.23	0.19	0.17	0.16	0.14	0.12	0.1	0.088	0.077	0.068	
			sensory	NA	NA	0.31	0.29	0.27	0.23	0.2	0.18	0.15	0.14	0.13	0.11	0.09	0.079	0.069	0.061	
			systemic	NA	NA	0.14	0.13	0.12	0.1	0.09	0.076	0.068	0.062	0.057	0.047	0.04	0.035	0.031	0.027	
			hematological	NA	NA	12	11	11	9.8	8.9	8.2	7.7	8.5	7.9	5.7	5	4.5	4.1	5.3	
			neurotoxicity	NA	NA	3	2.8	2.6	2.4	2.2	2	1.9	2.1	1.9	1.4	1.2	1.1	1	1.3	
	Garfield County: Ridge Top (BarD)	Drilling	respiratory	NA	NA	0.14	0.13	0.12	0.11	0.1	0.095	0.088	0.098	0.091	0.066	0.058	0.051	0.048	0.049	
			Fracking	hematological	NA	NA	11	9.7	9	7.8	6.7	5.8	5.3	4.9	4.3	4.3	3.6	3.3	3.1	2.8
				neurotoxicity	NA	NA	2.9	2.7	2.5	2.1	1.9	1.7	1.6	1.4	1.3	1.3	1.1	0.96	0.91	0.83
		respiratory		NA	NA	1.6	1.4	1.3	1.1	0.98	0.87	0.8	0.75	0.7	0.65	0.58	0.5	0.47	0.43	
		sensory		NA	NA	0.33	0.3	0.28	0.25	0.23	0.21	0.2	0.18	0.17	0.16	0.14	0.12	0.12	0.11	
		systemic	NA	NA	0.25	0.23	0.22	0.2	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.095	0.085	0.077		
		Flowback	hematological	NA	NA	4.6	4.2	4	3.7	3.2	4.1	4.1	4	3.6	2.4	1.8	2.2	1.7	2	
			neurotoxicity	NA	NA	3.4	3.1	3	2.6	2.3	2.9	3	2.9	2.7	1.8	1.4	1.6	1.2	1.5	
			respiratory	NA	NA	1.3	1.2	1.1	0.96	0.84	1.1	1.1	1.1	0.99	0.66	0.51	0.61	0.46	0.54	
			sensory	NA	NA	1.2	1.1	1	0.88	0.77	0.91	1	1	0.91	0.6	0.47	0.56	0.42	0.5	
Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	10	9.8	8.9	7.3	6.6	6	5.5	5	4.6	3.8	3.4	2.8	2.5	2.3		
		neurotoxicity	NA	NA	2.5	2.4	2.2	1.8	1.6	1.5	1.3	1.2	1.1	0.92	0.83	0.69	0.62	0.56		
		respiratory	NA	NA	0.12	0.11	0.1	0.084	0.075	0.069	0.063	0.058	0.052	0.043	0.039	0.033	0.029	0.026		
	Fracking	hematological	NA	NA	8.7	7.8	7.2	6.4	5.8	5.3	4.9	4.5	4.1	3.3	3	3	2.5	2.1		

60+ Years	Northern Front Range	Flowback	neurotoxicity	NA	NA	2.4	2.2	2	1.8	1.6	1.5	1.3	1.2	1.1	0.91	0.81	0.83	0.68	0.58
			respiratory	NA	NA	1.3	1.1	1.1	0.94	0.85	0.77	0.71	0.66	0.6	0.49	0.43	0.44	0.36	0.31
			sensory	NA	NA	0.27	0.25	0.23	0.2	0.18	0.17	0.15	0.14	0.13	0.1	0.093	0.095	0.078	0.066
			systemic	NA	NA	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.097	0.09	0.072	0.065	0.064	0.05	0.048
			hematological	NA	NA	5.1	4.2	3.8	3.4	2.6	2.4	2	1.9	1.9	1.7	1.3	1.2	0.99	0.85
			neurotoxicity	NA	NA	3.7	3.3	3	2.6	1.8	1.6	1.5	1.4	1.2	1	0.91	0.8	0.74	0.63
			respiratory	NA	NA	1.4	1.2	1.1	0.97	0.67	0.61	0.55	0.51	0.46	0.38	0.34	0.3	0.27	0.23
			sensory	NA	NA	1.3	1.1	1	0.89	0.61	0.56	0.51	0.47	0.42	0.35	0.31	0.27	0.25	0.21
		Drilling	hematological	NA	NA	14	13	12	11	9	7.9	7.1	6.4	5.7	4.8	4.1	3.6	3.1	2.8
			neurotoxicity	NA	NA	3.4	3.2	3	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1	0.87	0.76	0.67
			respiratory	NA	NA	0.16	0.15	0.14	0.12	0.1	0.081	0.077	0.066	0.058	0.055	0.047	0.041	0.036	0.032
		Fracking	hematological	NA	NA	0.87	0.81	0.76	0.68	0.75	0.75	0.74	0.67	0.62	0.52	0.5	0.44	0.41	0.39
		Flowback	hematological	NA	NA	27	25	23	20	17	15	13	12	11	9.2	7.8	6.8	6	5.3
			neurotoxicity	NA	NA	3.5	3.2	3	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1	0.88	0.77	0.68
			respiratory	NA	NA	0.79	0.74	0.69	0.6	0.51	0.45	0.39	0.35	0.32	0.27	0.23	0.2	0.18	0.15
			endocrine	NA	NA	0.35	0.32	0.3	0.26	0.23	0.19	0.17	0.16	0.14	0.12	0.1	0.088	0.077	0.068
			sensory	NA	NA	0.31	0.29	0.27	0.23	0.2	0.18	0.15	0.14	0.13	0.11	0.09	0.079	0.069	0.061
			systemic	NA	NA	0.14	0.13	0.12	0.1	0.09	0.076	0.068	0.062	0.057	0.047	0.04	0.035	0.031	0.027
	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	12	11	11	9.8	8.9	8.2	7.7	8.5	7.9	5.7	5	4.5	4.1	5.3
			neurotoxicity	NA	NA	3	2.8	2.6	2.4	2.2	2	1.9	2.1	1.9	1.4	1.2	1.1	1	1.3
			respiratory	NA	NA	0.14	0.13	0.12	0.11	0.1	0.095	0.088	0.098	0.091	0.066	0.058	0.051	0.048	0.049
		Fracking	hematological	NA	NA	11	9.7	9	7.8	6.7	5.8	5.3	4.9	4.3	4.3	3.6	3.3	3.1	2.8
			neurotoxicity	NA	NA	2.9	2.7	2.5	2.1	1.9	1.7	1.6	1.4	1.3	1.3	1.1	0.96	0.91	0.83
			respiratory	NA	NA	1.6	1.4	1.3	1.1	0.98	0.87	0.8	0.75	0.7	0.65	0.58	0.5	0.47	0.43
			sensory	NA	NA	0.33	0.3	0.28	0.25	0.23	0.21	0.2	0.18	0.17	0.16	0.14	0.12	0.12	0.11
			systemic	NA	NA	0.25	0.23	0.22	0.2	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.095	0.085	0.077
		Flowback	hematological	NA	NA	4.6	4.2	4	3.7	3.2	4.1	4.1	4	3.6	2.4	1.8	2.2	1.7	2
			neurotoxicity	NA	NA	3.4	3.1	3	2.6	2.3	2.9	3	2.9	2.7	1.8	1.4	1.6	1.2	1.5
			respiratory	NA	NA	1.3	1.2	1.1	0.96	0.84	1.1	1.1	1.1	0.99	0.66	0.51	0.61	0.46	0.54
			sensory	NA	NA	1.2	1.1	1	0.88	0.77	0.91	1	1	0.91	0.6	0.47	0.56	0.42	0.5
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	10	9.8	8.9	7.3	6.6	6	5.5	5	4.6	3.8	3.4	2.8	2.5	2.3
			neurotoxicity	NA	NA	2.5	2.4	2.2	1.8	1.6	1.5	1.3	1.2	1.1	0.92	0.83	0.69	0.62	0.56
			respiratory	NA	NA	0.12	0.11	0.1	0.084	0.075	0.069	0.063	0.058	0.052	0.043	0.039	0.033	0.029	0.026
		Fracking	hematological	NA	NA	8.7	7.8	7.2	6.4	5.8	5.3	4.9	4.5	4.1	3.3	3	3	2.5	2.1
			neurotoxicity	NA	NA	2.4	2.2	2	1.8	1.6	1.5	1.3	1.2	1.1	0.91	0.81	0.83	0.68	0.58
			respiratory	NA	NA	1.3	1.1	1.1	0.94	0.85	0.77	0.71	0.66	0.6	0.49	0.43	0.44	0.36	0.31
			sensory	NA	NA	0.27	0.25	0.23	0.2	0.18	0.17	0.15	0.14	0.13	0.1	0.093	0.095	0.078	0.066

		Flowback	systemic	NA	NA	0.19	0.17	0.16	0.14	0.13	0.12	0.11	0.097	0.09	0.072	0.065	0.064	0.05	0.048
			hematological	NA	NA	5.1	4.2	3.8	3.4	2.6	2.4	2	1.9	1.9	1.7	1.3	1.2	0.99	0.85
			neurotoxicity	NA	NA	3.7	3.3	3	2.6	1.8	1.6	1.5	1.4	1.2	1	0.91	0.8	0.74	0.63
			respiratory	NA	NA	1.4	1.2	1.1	0.97	0.67	0.61	0.55	0.51	0.46	0.38	0.34	0.3	0.27	0.23
			sensory	NA	NA	1.3	1.1	1	0.89	0.61	0.56	0.51	0.47	0.42	0.35	0.31	0.27	0.25	0.21
		Drilling	hematological	NA	NA	14	13	12	11	9	7.9	7.1	6.4	5.7	4.8	4.1	3.6	3.1	2.8
			neurotoxicity	NA	NA	3.4	3.2	3	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1	0.87	0.76	0.67
			respiratory	NA	NA	0.16	0.15	0.14	0.12	0.1	0.081	0.077	0.066	0.058	0.055	0.047	0.041	0.036	0.032
		Fracking	hematological	NA	NA	0.87	0.81	0.76	0.68	0.75	0.75	0.74	0.67	0.62	0.52	0.5	0.44	0.41	0.39
		Flowback	hematological	NA	NA	27	25	23	20	17	15	13	12	11	9.2	7.8	6.8	6	5.3
			neurotoxicity	NA	NA	3.5	3.2	3	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1	0.88	0.77	0.68
			respiratory	NA	NA	0.79	0.74	0.69	0.6	0.51	0.45	0.39	0.35	0.32	0.27	0.23	0.2	0.18	0.15
			endocrine	NA	NA	0.35	0.32	0.3	0.26	0.23	0.19	0.17	0.16	0.14	0.12	0.1	0.088	0.077	0.068
			sensory	NA	NA	0.31	0.29	0.27	0.23	0.2	0.18	0.15	0.14	0.13	0.11	0.09	0.079	0.069	0.061
			systemic	NA	NA	0.14	0.13	0.12	0.1	0.09	0.076	0.068	0.062	0.057	0.047	0.04	0.035	0.031	0.027

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

Table E-4. Percentage of Daily-maximum Acute Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	100%	100%	99%	98%	95%	91%	86%	89%	87%	76%	66%	57%	51%	39%
			neurotoxicity	NA	NA	75%	66%	58%	38%	20%	8%	3%	17%	13%	5%	2%	1%	0%	1%
		Fracking	hematological	NA	NA	100%	99%	98%	96%	93%	87%	80%	72%	62%	47%	31%	20%	15%	11%
			neurotoxicity	NA	NA	68%	58%	48%	28%	14%	6%	3%	1%	1%	1%	1%	0%	0%	0%
			respiratory	NA	NA	10%	5%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	97%	95%	94%	91%	86%	84%	82%	79%	75%	52%	31%	35%	24%	20%
			neurotoxicity	NA	NA	63%	53%	46%	37%	28%	23%	19%	15%	12%	6%	3%	2%	2%	1%
			respiratory	NA	NA	4%	2%	1%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	100%	100%	100%	99%	98%	97%	96%	95%	93%	89%	82%	75%	65%	52%
			neurotoxicity	NA	NA	80%	75%	68%	49%	38%	27%	15%	7%	2%	0%	0%	0%	0%	0%
		Fracking	hematological	NA	NA	100%	100%	99%	98%	97%	96%	95%	93%	91%	85%	77%	67%	53%	36%
			neurotoxicity	NA	NA	75%	66%	58%	43%	28%	15%	7%	3%	1%	0%	0%	0%	0%	0%

18 to 59 Years	Northern Front Range	Flowback	respiratory	NA	NA	7%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	98%	96%	95%	91%	86%	81%	75%	68%	60%	37%	11%	1%	0%	0%
			neurotoxicity	NA	NA	71%	59%	51%	41%	35%	30%	24%	18%	10%	0%	0%	0%	0%	0%
			respiratory	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Drilling	hematological	NA	NA	100%	100%	100%	99%	97%	95%	92%	88%	84%	76%	65%	53%	41%	31%
			neurotoxicity	NA	NA	82%	76%	69%	53%	35%	19%	9%	5%	3%	1%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	100%	100%	100%	100%	100%	100%	100%	99%	99%	97%	94%	91%	86%	81%
			neurotoxicity	NA	NA	85%	78%	71%	54%	39%	21%	12%	8%	5%	1%	0%	0%	0%	0%
			respiratory	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	100%	100%	99%	97%	95%	91%	86%	89%	87%	76%	66%	57%	51%	39%
			neurotoxicity	NA	NA	74%	66%	57%	37%	20%	8%	3%	16%	13%	5%	2%	1%	0%	1%
		Fracking	hematological	NA	NA	100%	99%	98%	96%	93%	87%	80%	71%	62%	47%	31%	20%	15%	11%
			neurotoxicity	NA	NA	68%	57%	48%	28%	13%	6%	3%	1%	1%	1%	1%	0%	0%	0%
			respiratory	NA	NA	10%	5%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	97%	95%	93%	90%	85%	84%	81%	78%	74%	51%	30%	34%	23%	20%
			neurotoxicity	NA	NA	62%	53%	46%	37%	27%	23%	18%	15%	12%	5%	3%	2%	2%	1%
			respiratory	NA	NA	4%	2%	1%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			respiratory	NA	NA	4%	2%	1%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	100%	100%	100%	99%	98%	97%	96%	94%	92%	88%	81%	73%	63%	51%
			neurotoxicity	NA	NA	79%	74%	67%	48%	37%	26%	15%	7%	1%	0%	0%	0%	0%	0%
		Fracking	hematological	NA	NA	100%	100%	99%	98%	97%	96%	95%	93%	91%	84%	76%	65%	52%	34%
			neurotoxicity	NA	NA	73%	64%	56%	42%	27%	15%	6%	2%	1%	0%	0%	0%	0%	0%
			respiratory	NA	NA	6%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	98%	96%	94%	90%	85%	79%	73%	66%	57%	34%	10%	1%	0%	0%
			neurotoxicity	NA	NA	70%	58%	51%	41%	34%	29%	24%	18%	10%	0%	0%	0%	0%	0%
			respiratory	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			respiratory	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Drilling	hematological	NA	NA	100%	100%	100%	99%	97%	94%	91%	88%	84%	75%	64%	52%	40%	30%
			neurotoxicity	NA	NA	81%	75%	68%	52%	34%	19%	8%	5%	3%	1%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	100%	100%	100%	100%	100%	100%	100%	99%	98%	96%	94%	90%	85%	80%
			neurotoxicity	NA	NA	83%	77%	70%	53%	38%	21%	12%	7%	5%	1%	0%	0%	0%	0%
	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	99%	99%	98%	96%	93%	89%	83%	87%	85%	74%	64%	55%	49%	38%
			neurotoxicity	NA	NA	70%	62%	54%	35%	19%	8%	3%	16%	13%	4%	2%	1%	0%	1%
		Fracking	hematological	NA	NA	99%	98%	97%	94%	90%	84%	77%	69%	60%	45%	29%	19%	14%	11%
			neurotoxicity	NA	NA	64%	54%	45%	27%	13%	6%	3%	1%	1%	1%	0%	0%	0%	0%
			respiratory	NA	NA	9%	5%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	94%	92%	89%	86%	81%	81%	78%	75%	72%	49%	29%	33%	22%	19%

			neurotoxicity	NA	NA	60%	51%	44%	36%	26%	22%	18%	15%	12%	5%	3%	2%	2%	1%
			respiratory	NA	NA	4%	2%	1%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	100%	100%	99%	97%	96%	95%	93%	92%	90%	85%	78%	70%	60%	49%
			neurotoxicity	NA	NA	76%	71%	64%	45%	35%	24%	14%	6%	1%	0%	0%	0%	0%	0%
		Fracking	hematological	NA	NA	99%	98%	98%	96%	95%	94%	92%	90%	87%	81%	72%	62%	49%	32%
			neurotoxicity	NA	NA	69%	60%	53%	39%	25%	14%	6%	2%	1%	0%	0%	0%	0%	0%
			respiratory	NA	NA	6%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	95%	92%	90%	86%	80%	74%	68%	61%	53%	32%	10%	1%	0%	0%
			neurotoxicity	NA	NA	68%	57%	49%	40%	33%	28%	22%	17%	9%	0%	0%	0%	0%	0%
			respiratory	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Drilling	hematological	NA	NA	100%	100%	99%	97%	95%	92%	89%	86%	81%	73%	62%	50%	39%	29%
			neurotoxicity	NA	NA	78%	72%	65%	49%	33%	18%	8%	5%	3%	1%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	100%	100%	100%	100%	100%	100%	99%	98%	97%	95%	92%	88%	83%	77%
			neurotoxicity	NA	NA	81%	74%	67%	50%	36%	20%	12%	7%	4%	1%	0%	0%	0%	0%

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

E.1.1.2 3-acre Well Pad

Table E-5. Largest Acute Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	9.5	8.9	8.7	8	6.6	5.6	5	8	7.7	5.1	4.7	4.3	3.9	4.9
			toluene	NA	NA	2.2	2.1	2	1.8	1.5	1.3	1.1	1.8	1.7	1.2	1.1	0.96	0.87	1.1
			2-ethyltoluene	NA	NA	0.16	0.15	0.14	0.12	0.098	0.083	0.072	0.13	0.12	0.059	0.054	0.049	0.045	0.056
		Fracking	benzene	NA	NA	8.4	7.9	7.5	6.7	5.1	4.2	3.6	3.3	3	3.7	3.4	3.1	2.8	2.6
			m+p-xylene	NA	NA	1.2	1.1	1	0.93	0.71	0.59	0.52	0.47	0.43	0.53	0.48	0.44	0.4	0.37
			2-ethyltoluene	NA	NA	0.58	0.56	0.54	0.5	0.4	0.35	0.31	0.28	0.26	0.22	0.19	0.17	0.15	0.13
			toluene	NA	NA	0.5	0.47	0.45	0.4	0.31	0.25	0.22	0.2	0.19	0.23	0.21	0.19	0.17	0.16
			3-ethyltoluene	NA	NA	0.38	0.36	0.34	0.3	0.23	0.19	0.17	0.16	0.15	0.18	0.16	0.15	0.13	0.12
			n-decane	NA	NA	0.27	0.25	0.24	0.21	0.16	0.14	0.12	0.11	0.1	0.12	0.11	0.1	0.093	0.085
			methylcyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.13	0.11	0.1	0.091	0.084	0.098	0.089	0.081	0.074	0.068

	Flowback	cyclohexane	NA	NA	0.21	0.2	0.19	0.17	0.14	0.12	0.11	0.097	0.089	0.093	0.084	0.077	0.07	0.064
		trans-2-butene	NA	NA	0.19	0.18	0.17	0.15	0.13	0.11	0.099	0.089	0.082	0.075	0.065	0.057	0.05	0.044
		n-octane	NA	NA	0.16	0.15	0.14	0.13	0.096	0.08	0.069	0.063	0.058	0.071	0.065	0.059	0.054	0.049
		n-nonane	NA	NA	0.15	0.14	0.13	0.12	0.092	0.076	0.067	0.061	0.056	0.068	0.062	0.057	0.052	0.047
		4-ethyltoluene	NA	NA	0.14	0.13	0.13	0.11	0.087	0.074	0.066	0.06	0.055	0.068	0.062	0.056	0.051	0.047
		2-ethyltoluene	NA	NA	16	16	15	13	13	12	12	12	11	7.6	6.4	7.1	5.3	6.7
		benzene	NA	NA	4.1	3.9	3.7	3.3	3	3.1	3.1	3	2.8	1.9	1.6	1.8	1.4	1.5
		3-ethyltoluene	NA	NA	1.7	1.6	1.5	1.4	1.3	1.3	1.3	1.2	1.2	0.79	0.66	0.74	0.59	0.69
		4-ethyltoluene	NA	NA	1.1	1.1	1	0.92	0.89	0.85	0.85	0.84	0.77	0.53	0.44	0.49	0.39	0.46
		n-decane	NA	NA	1.1	1	0.97	0.87	0.84	0.81	0.8	0.79	0.73	0.5	0.42	0.47	0.37	0.44
		n-propylbenzene	NA	NA	1	0.97	0.92	0.83	0.8	0.76	0.76	0.75	0.69	0.47	0.4	0.44	0.33	0.42
		1,3-diethylbenzene	NA	NA	0.87	0.83	0.78	0.7	0.68	0.65	0.65	0.64	0.59	0.4	0.34	0.38	0.3	0.35
		m+p-xylene	NA	NA	0.77	0.73	0.7	0.62	0.56	0.58	0.57	0.57	0.52	0.36	0.3	0.33	0.27	0.31
		isopropylbenzene	NA	NA	0.68	0.65	0.61	0.55	0.53	0.51	0.51	0.5	0.46	0.31	0.26	0.29	0.23	0.28
		toluene	NA	NA	0.65	0.62	0.58	0.52	0.47	0.48	0.48	0.48	0.44	0.3	0.25	0.28	0.22	0.26
		1,2,3-trimethylbenzene	NA	NA	0.34	0.33	0.31	0.28	0.27	0.26	0.26	0.25	0.23	0.16	0.13	0.15	0.12	0.14
		1,2,4-trimethylbenzene	NA	NA	0.33	0.31	0.3	0.27	0.26	0.25	0.25	0.24	0.22	0.15	0.13	0.14	0.11	0.13
		1,3,5-trimethylbenzene	NA	NA	0.32	0.31	0.29	0.26	0.25	0.24	0.24	0.24	0.22	0.15	0.13	0.14	0.11	0.13
		o-xylene	NA	NA	0.24	0.23	0.22	0.19	0.19	0.18	0.18	0.18	0.16	0.11	0.093	0.1	0.082	0.097
		cyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.16	0.16	0.16	0.16	0.15	0.1	0.084	0.094	0.076	0.079
		methylcyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.16	0.17	0.17	0.16	0.15	0.1	0.086	0.096	0.077	0.091
		n-nonane	NA	NA	0.2	0.19	0.18	0.16	0.15	0.15	0.15	0.15	0.14	0.093	0.078	0.087	0.069	0.082
		styrene	NA	NA	0.19	0.18	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.086	0.072	0.08	0.059	0.075
	Drilling	benzene	NA	NA	8.3	8.7	8.1	7.4	6.2	5.8	5.6	4	3.8	3.4	3.1	2.6	2.4	2.2
		toluene	NA	NA	1.9	2	1.8	1.7	1.4	1.3	1.3	0.91	0.86	0.77	0.71	0.61	0.54	0.5
		2-ethyltoluene	NA	NA	0.14	0.12	0.11	0.1	0.086	0.08	0.076	0.065	0.061	0.055	0.05	0.047	0.038	0.035
		benzene	NA	NA	6	7.5	7	4.4	4.1	3.9	3.7	3.5	3.3	2.9	2.7	2.2	1.9	1.8
		m+p-xylene	NA	NA	0.83	1	0.96	0.61	0.56	0.53	0.51	0.48	0.45	0.4	0.37	0.32	0.27	0.25
		2-ethyltoluene	NA	NA	0.5	0.54	0.5	0.32	0.3	0.28	0.26	0.25	0.24	0.21	0.2	0.16	0.14	0.13
		toluene	NA	NA	0.36	0.45	0.42	0.26	0.24	0.23	0.22	0.21	0.2	0.17	0.16	0.14	0.12	0.11
		3-ethyltoluene	NA	NA	0.27	0.34	0.32	0.2	0.19	0.17	0.17	0.16	0.15	0.13	0.12	0.11	0.09	0.081
		n-decane	NA	NA	0.19	0.24	0.22	0.14	0.13	0.12	0.12	0.11	0.1	0.092	0.086	0.074	0.062	0.057
		methylcyclohexane	NA	NA	0.16	0.2	0.18	0.11	0.11	0.1	0.096	0.091	0.086	0.076	0.071	0.059	0.05	0.047
		cyclohexane	NA	NA	0.17	0.19	0.17	0.11	0.11	0.1	0.095	0.09	0.084	0.075	0.07	0.058	0.052	0.049
		trans-2-butene	NA	NA	0.16	0.15	0.14	0.12	0.092	0.086	0.081	0.077	0.072	0.072	0.06	0.047	0.042	0.045
	Fracking	n-nonane	NA	NA	0.11	0.14	0.13	0.079	0.074	0.069	0.066	0.062	0.059	0.052	0.049	0.041	0.035	0.032
		n-octane	NA	NA	0.11	0.14	0.13	0.082	0.077	0.072	0.069	0.065	0.061	0.054	0.051	0.043	0.036	0.034

	Flowback	4-ethyltoluene	NA	NA	0.1	0.13	0.12	0.073	0.069	0.065	0.061	0.058	0.055	0.049	0.045	0.041	0.034	0.03	
		2-ethyltoluene	NA	NA	14	13	12	11	8.5	7.9	6.5	5.8	5.5	5.2	4.4	4.4	3.4	2.9	
		benzene	NA	NA	3.4	3.2	3	2.5	2.4	2.2	1.9	1.5	1.4	1.3	1.1	1.1	0.86	0.74	
		3-ethyltoluene	NA	NA	1.4	1.3	1.3	1.1	0.88	0.81	0.67	0.61	0.57	0.54	0.46	0.46	0.36	0.3	
		4-ethyltoluene	NA	NA	0.95	0.89	0.84	0.75	0.59	0.54	0.45	0.4	0.38	0.36	0.31	0.3	0.24	0.2	
		n-decane	NA	NA	0.9	0.85	0.8	0.61	0.56	0.52	0.43	0.38	0.36	0.34	0.29	0.29	0.23	0.19	
		n-propylbenzene	NA	NA	0.85	0.8	0.75	0.67	0.53	0.49	0.4	0.36	0.34	0.32	0.27	0.27	0.21	0.18	
		1,3-diethylbenzene	NA	NA	0.72	0.68	0.64	0.57	0.45	0.42	0.34	0.31	0.29	0.28	0.23	0.23	0.18	0.16	
		m+p-xylene	NA	NA	0.64	0.61	0.57	0.44	0.4	0.37	0.3	0.27	0.26	0.25	0.21	0.21	0.16	0.14	
		isopropylbenzene	NA	NA	0.56	0.53	0.5	0.45	0.35	0.32	0.27	0.24	0.23	0.22	0.18	0.18	0.14	0.12	
		toluene	NA	NA	0.54	0.51	0.48	0.37	0.33	0.31	0.26	0.23	0.22	0.21	0.17	0.17	0.14	0.12	
		1,2,3-trimethylbenzene	NA	NA	0.28	0.27	0.25	0.23	0.18	0.16	0.14	0.12	0.11	0.11	0.092	0.092	0.072	0.061	
		1,2,4-trimethylbenzene	NA	NA	0.27	0.26	0.24	0.22	0.17	0.16	0.13	0.12	0.11	0.11	0.089	0.088	0.069	0.059	
		1,3,5-trimethylbenzene	NA	NA	0.27	0.25	0.24	0.21	0.17	0.15	0.13	0.11	0.11	0.1	0.087	0.087	0.067	0.058	
		o-xylene	NA	NA	0.2	0.19	0.18	0.14	0.12	0.11	0.094	0.085	0.08	0.076	0.064	0.064	0.05	0.043	
		cyclohexane	NA	NA	0.18	0.17	0.16	0.13	0.12	0.12	0.1	0.077	0.073	0.069	0.058	0.058	0.045	0.039	
		methylcyclohexane	NA	NA	0.18	0.17	0.16	0.13	0.12	0.11	0.088	0.079	0.075	0.071	0.06	0.06	0.046	0.04	
		n-nonane	NA	NA	0.17	0.16	0.15	0.11	0.1	0.096	0.079	0.071	0.067	0.064	0.054	0.054	0.042	0.036	
		styrene	NA	NA	0.15	0.15	0.14	0.12	0.096	0.088	0.073	0.066	0.062	0.059	0.05	0.05	0.039	0.033	
		Northern Front Range	Drilling	benzene	NA	NA	9.3	8.8	8.4	7.7	7.1	6.5	5.9	5.5	4.2	4.2	3.7	3.2	2.9
	toluene			NA	NA	2.1	2	1.9	1.7	1.6	1.5	1.2	1.2	0.98	0.95	0.83	0.73	0.65	0.58
	2-ethyltoluene			NA	NA	0.16	0.16	0.15	0.13	0.12	0.11	0.098	0.085	0.079	0.068	0.059	0.052	0.046	0.041
	Fracking		benzene	NA	NA	0.59	0.56	0.53	0.51	0.55	0.57	0.58	0.53	0.51	0.43	0.36	0.31	0.29	0.27
			2-ethyltoluene	NA	NA	0.13	0.13	0.12	0.13	0.14	0.14	0.14	0.13	0.13	0.092	0.09	0.078	0.073	0.067
	Flowback		benzene	NA	NA	19	18	18	18	19	20	20	19	18	15	15	13	13	12
			toluene	NA	NA	0.63	0.62	0.59	0.6	0.64	0.66	0.67	0.62	0.59	0.5	0.49	0.45	0.43	0.41
			3-ethyltoluene	NA	NA	0.62	0.61	0.59	0.59	0.63	0.65	0.66	0.61	0.58	0.49	0.49	0.44	0.42	0.4
			cyclohexane	NA	NA	0.55	0.54	0.52	0.52	0.56	0.57	0.58	0.54	0.51	0.43	0.43	0.39	0.37	0.35
			m+p-xylene	NA	NA	0.4	0.39	0.37	0.38	0.4	0.41	0.42	0.39	0.37	0.31	0.31	0.28	0.27	0.26
			methylcyclohexane	NA	NA	0.25	0.25	0.24	0.24	0.26	0.27	0.27	0.25	0.24	0.2	0.2	0.18	0.17	0.16
			n-hexane	NA	NA	0.25	0.24	0.23	0.23	0.25	0.26	0.26	0.24	0.23	0.19	0.19	0.17	0.17	0.16
			n-decane	NA	NA	0.22	0.21	0.2	0.2	0.22	0.22	0.23	0.21	0.2	0.17	0.17	0.15	0.15	0.14
			n-octane	NA	NA	0.18	0.17	0.17	0.17	0.18	0.18	0.19	0.17	0.16	0.14	0.14	0.12	0.12	0.11
			n-nonane	NA	NA	0.15	0.15	0.14	0.14	0.15	0.16	0.16	0.15	0.14	0.12	0.12	0.11	0.1	0.096
			2-ethyltoluene	NA	NA	0.12	0.12	0.11	0.11	0.11	0.12	0.12	0.11	0.1	0.088	0.087	0.079	0.075	0.072
			2-methylheptane	NA	NA	0.099	0.098	0.094	0.095	0.1	0.1	0.11	0.098	0.093	0.079	0.078	0.07	0.067	0.064
	o-xylene	NA	NA	0.11	0.1	0.1	0.1	0.11	0.11	0.11	0.11	0.1	0.084	0.084	0.075	0.072	0.069		

18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	9.5	8.9	8.7	8	6.6	5.6	5	8	7.7	5.1	4.7	4.3	3.9	4.9
			toluene	NA	NA	2.2	2.1	2	1.8	1.5	1.3	1.1	1.8	1.7	1.2	1.1	0.96	0.87	1.1
			2-ethyltoluene	NA	NA	0.16	0.15	0.14	0.12	0.098	0.083	0.072	0.13	0.12	0.059	0.054	0.049	0.045	0.056
		Fracking	benzene	NA	NA	8.4	7.9	7.5	6.7	5.1	4.2	3.6	3.3	3	3.7	3.4	3.1	2.8	2.6
			m+p-xylene	NA	NA	1.2	1.1	1	0.93	0.71	0.59	0.52	0.47	0.43	0.53	0.48	0.44	0.4	0.37
			2-ethyltoluene	NA	NA	0.58	0.56	0.54	0.5	0.4	0.35	0.31	0.28	0.26	0.22	0.19	0.17	0.15	0.13
			toluene	NA	NA	0.5	0.47	0.45	0.4	0.31	0.25	0.22	0.2	0.19	0.23	0.21	0.19	0.17	0.16
			3-ethyltoluene	NA	NA	0.38	0.36	0.34	0.3	0.23	0.19	0.17	0.16	0.15	0.18	0.16	0.15	0.13	0.12
			n-decane	NA	NA	0.27	0.25	0.24	0.21	0.16	0.14	0.12	0.11	0.1	0.12	0.11	0.1	0.093	0.085
			methylcyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.13	0.11	0.1	0.091	0.084	0.098	0.089	0.081	0.074	0.068
			cyclohexane	NA	NA	0.21	0.2	0.19	0.17	0.14	0.12	0.11	0.097	0.089	0.093	0.084	0.077	0.07	0.064
			trans-2-butene	NA	NA	0.19	0.18	0.17	0.15	0.13	0.11	0.099	0.089	0.082	0.075	0.065	0.057	0.05	0.044
			n-octane	NA	NA	0.16	0.15	0.14	0.13	0.096	0.08	0.069	0.063	0.058	0.071	0.065	0.059	0.054	0.049
			n-nonane	NA	NA	0.15	0.14	0.13	0.12	0.092	0.076	0.067	0.061	0.056	0.068	0.062	0.057	0.052	0.047
			4-ethyltoluene	NA	NA	0.14	0.13	0.13	0.11	0.087	0.074	0.066	0.06	0.055	0.068	0.062	0.056	0.051	0.047
		Flowback	2-ethyltoluene	NA	NA	16	16	15	13	13	12	12	12	11	7.6	6.4	7.1	5.3	6.7
			benzene	NA	NA	4.1	3.9	3.7	3.3	3	3.1	3.1	3	2.8	1.9	1.6	1.8	1.4	1.5
			3-ethyltoluene	NA	NA	1.7	1.6	1.5	1.4	1.3	1.3	1.3	1.2	1.2	0.79	0.66	0.74	0.59	0.69
			4-ethyltoluene	NA	NA	1.1	1.1	1	0.92	0.89	0.85	0.85	0.84	0.77	0.53	0.44	0.49	0.39	0.46
			n-decane	NA	NA	1.1	1	0.97	0.87	0.84	0.81	0.8	0.79	0.73	0.5	0.42	0.47	0.37	0.44
			n-propylbenzene	NA	NA	1	0.97	0.92	0.83	0.8	0.76	0.76	0.75	0.69	0.47	0.4	0.44	0.33	0.42
			1,3-diethylbenzene	NA	NA	0.87	0.83	0.78	0.7	0.68	0.65	0.65	0.64	0.59	0.4	0.34	0.38	0.3	0.35
			m+p-xylene	NA	NA	0.77	0.73	0.7	0.62	0.56	0.58	0.57	0.57	0.52	0.36	0.3	0.33	0.27	0.31
			isopropylbenzene	NA	NA	0.68	0.65	0.61	0.55	0.53	0.51	0.51	0.5	0.46	0.31	0.26	0.29	0.23	0.28
			toluene	NA	NA	0.65	0.62	0.58	0.52	0.47	0.48	0.48	0.48	0.44	0.3	0.25	0.28	0.22	0.26
			1,2,3-trimethylbenzene	NA	NA	0.34	0.33	0.31	0.28	0.27	0.26	0.26	0.25	0.23	0.16	0.13	0.15	0.12	0.14
			1,2,4-trimethylbenzene	NA	NA	0.33	0.31	0.3	0.27	0.26	0.25	0.25	0.24	0.22	0.15	0.13	0.14	0.11	0.13
			1,3,5-trimethylbenzene	NA	NA	0.32	0.31	0.29	0.26	0.25	0.24	0.24	0.24	0.22	0.15	0.13	0.14	0.11	0.13
			o-xylene	NA	NA	0.24	0.23	0.22	0.19	0.19	0.18	0.18	0.18	0.16	0.11	0.093	0.1	0.082	0.097
			cyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.16	0.16	0.16	0.16	0.15	0.1	0.084	0.094	0.076	0.079
			methylcyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.16	0.17	0.17	0.16	0.15	0.1	0.086	0.096	0.077	0.091
			n-nonane	NA	NA	0.2	0.19	0.18	0.16	0.15	0.15	0.15	0.15	0.14	0.093	0.078	0.087	0.069	0.082
			styrene	NA	NA	0.19	0.18	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.086	0.072	0.08	0.059	0.075
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	8.3	8.7	8.1	7.4	6.2	5.8	5.6	4	3.8	3.4	3.1	2.6	2.4	2.2
			toluene	NA	NA	1.9	2	1.8	1.7	1.4	1.3	1.3	0.91	0.86	0.77	0.71	0.61	0.54	0.5
			2-ethyltoluene	NA	NA	0.14	0.12	0.11	0.1	0.086	0.08	0.076	0.065	0.061	0.055	0.05	0.047	0.038	0.035
		Fracking	benzene	NA	NA	6	7.5	7	4.4	4.1	3.9	3.7	3.5	3.3	2.9	2.7	2.2	1.9	1.8

Northern Front Range		m+p-xylene	NA	NA	0.83	1	0.96	0.61	0.56	0.53	0.51	0.48	0.45	0.4	0.37	0.32	0.27	0.25
		2-ethyltoluene	NA	NA	0.5	0.54	0.5	0.32	0.3	0.28	0.26	0.25	0.24	0.21	0.2	0.16	0.14	0.13
		toluene	NA	NA	0.36	0.45	0.42	0.26	0.24	0.23	0.22	0.21	0.2	0.17	0.16	0.14	0.12	0.11
		3-ethyltoluene	NA	NA	0.27	0.34	0.32	0.2	0.19	0.17	0.17	0.16	0.15	0.13	0.12	0.11	0.09	0.081
		n-decane	NA	NA	0.19	0.24	0.22	0.14	0.13	0.12	0.12	0.11	0.1	0.092	0.086	0.074	0.062	0.057
		methylcyclohexane	NA	NA	0.16	0.2	0.18	0.11	0.11	0.1	0.096	0.091	0.086	0.076	0.071	0.059	0.05	0.047
		cyclohexane	NA	NA	0.17	0.19	0.17	0.11	0.11	0.1	0.095	0.09	0.084	0.075	0.07	0.058	0.052	0.049
		trans-2-butene	NA	NA	0.16	0.15	0.14	0.12	0.092	0.086	0.081	0.077	0.072	0.072	0.06	0.047	0.042	0.045
		n-nonane	NA	NA	0.11	0.14	0.13	0.079	0.074	0.069	0.066	0.062	0.059	0.052	0.049	0.041	0.035	0.032
		n-octane	NA	NA	0.11	0.14	0.13	0.082	0.077	0.072	0.069	0.065	0.061	0.054	0.051	0.043	0.036	0.034
		4-ethyltoluene	NA	NA	0.1	0.13	0.12	0.073	0.069	0.065	0.061	0.058	0.055	0.049	0.045	0.041	0.034	0.03
	Flowback	2-ethyltoluene	NA	NA	14	13	12	11	8.5	7.9	6.5	5.8	5.5	5.2	4.4	4.4	3.4	2.9
		benzene	NA	NA	3.4	3.2	3	2.5	2.4	2.2	1.9	1.5	1.4	1.3	1.1	1.1	0.86	0.74
		3-ethyltoluene	NA	NA	1.4	1.3	1.3	1.1	0.88	0.81	0.67	0.61	0.57	0.54	0.46	0.46	0.36	0.3
		4-ethyltoluene	NA	NA	0.95	0.89	0.84	0.75	0.59	0.54	0.45	0.4	0.38	0.36	0.31	0.3	0.24	0.2
		n-decane	NA	NA	0.9	0.85	0.8	0.61	0.56	0.52	0.43	0.38	0.36	0.34	0.29	0.29	0.23	0.19
		n-propylbenzene	NA	NA	0.85	0.8	0.75	0.67	0.53	0.49	0.4	0.36	0.34	0.32	0.27	0.27	0.21	0.18
		1,3-diethylbenzene	NA	NA	0.72	0.68	0.64	0.57	0.45	0.42	0.34	0.31	0.29	0.28	0.23	0.23	0.18	0.16
		m+p-xylene	NA	NA	0.64	0.61	0.57	0.44	0.4	0.37	0.3	0.27	0.26	0.25	0.21	0.21	0.16	0.14
		isopropylbenzene	NA	NA	0.56	0.53	0.5	0.45	0.35	0.32	0.27	0.24	0.23	0.22	0.18	0.18	0.14	0.12
		toluene	NA	NA	0.54	0.51	0.48	0.37	0.33	0.31	0.26	0.23	0.22	0.21	0.17	0.17	0.14	0.12
		1,2,3-trimethylbenzene	NA	NA	0.28	0.27	0.25	0.23	0.18	0.16	0.14	0.12	0.11	0.11	0.092	0.092	0.072	0.061
		1,2,4-trimethylbenzene	NA	NA	0.27	0.26	0.24	0.22	0.17	0.16	0.13	0.12	0.11	0.11	0.089	0.088	0.069	0.059
		1,3,5-trimethylbenzene	NA	NA	0.27	0.25	0.24	0.21	0.17	0.15	0.13	0.11	0.11	0.1	0.087	0.087	0.067	0.058
		o-xylene	NA	NA	0.2	0.19	0.18	0.14	0.12	0.11	0.094	0.085	0.08	0.076	0.064	0.064	0.05	0.043
		cyclohexane	NA	NA	0.18	0.17	0.16	0.13	0.12	0.12	0.1	0.077	0.073	0.069	0.058	0.058	0.045	0.039
		methylcyclohexane	NA	NA	0.18	0.17	0.16	0.13	0.12	0.11	0.088	0.079	0.075	0.071	0.06	0.06	0.046	0.04
		n-nonane	NA	NA	0.17	0.16	0.15	0.11	0.1	0.096	0.079	0.071	0.067	0.064	0.054	0.054	0.042	0.036
		styrene	NA	NA	0.15	0.15	0.14	0.12	0.096	0.088	0.073	0.066	0.062	0.059	0.05	0.05	0.039	0.033
		Drilling	benzene	NA	NA	9.3	8.8	8.4	7.7	7.1	6.5	5.9	5.5	4.2	4.2	3.7	3.2	2.9
	toluene		NA	NA	2.1	2	1.9	1.7	1.6	1.5	1.2	1.2	0.98	0.95	0.83	0.73	0.65	0.58
	2-ethyltoluene		NA	NA	0.16	0.16	0.15	0.13	0.12	0.11	0.098	0.085	0.079	0.068	0.059	0.052	0.046	0.041
	Fracking		benzene	NA	NA	0.59	0.56	0.53	0.51	0.55	0.57	0.58	0.53	0.51	0.43	0.36	0.31	0.29
2-ethyltoluene			NA	NA	0.13	0.13	0.12	0.13	0.14	0.14	0.14	0.13	0.13	0.092	0.09	0.078	0.073	0.067
Flowback	benzene		NA	NA	19	18	18	18	19	20	20	19	18	15	15	13	13	12
	toluene		NA	NA	0.63	0.62	0.59	0.6	0.64	0.66	0.67	0.62	0.59	0.5	0.49	0.45	0.43	0.41
	3-ethyltoluene	NA	NA	0.62	0.61	0.59	0.59	0.63	0.65	0.66	0.61	0.58	0.49	0.49	0.44	0.42	0.4	

60+ Years	Garfield County: Ridge Top (BarD)		cyclohexane	NA	NA	0.55	0.54	0.52	0.52	0.56	0.57	0.58	0.54	0.51	0.43	0.43	0.39	0.37	0.35
			m+p-xylene	NA	NA	0.4	0.39	0.37	0.38	0.4	0.41	0.42	0.39	0.37	0.31	0.31	0.28	0.27	0.26
			methylcyclohexane	NA	NA	0.25	0.25	0.24	0.24	0.26	0.27	0.27	0.25	0.24	0.2	0.2	0.18	0.17	0.16
			n-hexane	NA	NA	0.25	0.24	0.23	0.23	0.25	0.26	0.26	0.24	0.23	0.19	0.19	0.17	0.17	0.16
			n-decane	NA	NA	0.22	0.21	0.2	0.2	0.22	0.22	0.23	0.21	0.2	0.17	0.17	0.15	0.15	0.14
			n-octane	NA	NA	0.18	0.17	0.17	0.17	0.18	0.18	0.19	0.17	0.16	0.14	0.14	0.12	0.12	0.11
			n-nonane	NA	NA	0.15	0.15	0.14	0.14	0.15	0.16	0.16	0.15	0.14	0.12	0.12	0.11	0.1	0.096
			2-ethyltoluene	NA	NA	0.12	0.12	0.11	0.11	0.11	0.12	0.12	0.11	0.1	0.088	0.087	0.079	0.075	0.072
			2-methylheptane	NA	NA	0.099	0.098	0.094	0.095	0.1	0.1	0.11	0.098	0.093	0.079	0.078	0.07	0.067	0.064
			o-xylene	NA	NA	0.11	0.1	0.1	0.1	0.11	0.11	0.11	0.11	0.1	0.084	0.084	0.075	0.072	0.069
		Drilling	benzene	NA	NA	9.5	8.9	8.7	8	6.6	5.6	5	8	7.7	5.1	4.7	4.3	3.9	4.9
			toluene	NA	NA	2.2	2.1	2	1.8	1.5	1.3	1.1	1.8	1.7	1.2	1.1	0.96	0.87	1.1
			2-ethyltoluene	NA	NA	0.16	0.15	0.14	0.12	0.098	0.083	0.072	0.13	0.12	0.059	0.054	0.049	0.045	0.056
		Fracking	benzene	NA	NA	8.4	7.9	7.5	6.7	5.1	4.2	3.6	3.3	3	3.7	3.4	3.1	2.8	2.6
			m+p-xylene	NA	NA	1.2	1.1	1	0.93	0.71	0.59	0.52	0.47	0.43	0.53	0.48	0.44	0.4	0.37
			2-ethyltoluene	NA	NA	0.58	0.56	0.54	0.5	0.4	0.35	0.31	0.28	0.26	0.22	0.19	0.17	0.15	0.13
			toluene	NA	NA	0.5	0.47	0.45	0.4	0.31	0.25	0.22	0.2	0.19	0.23	0.21	0.19	0.17	0.16
			3-ethyltoluene	NA	NA	0.38	0.36	0.34	0.3	0.23	0.19	0.17	0.16	0.15	0.18	0.16	0.15	0.13	0.12
			n-decane	NA	NA	0.27	0.25	0.24	0.21	0.16	0.14	0.12	0.11	0.1	0.12	0.11	0.1	0.093	0.085
			methylcyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.13	0.11	0.1	0.091	0.084	0.098	0.089	0.081	0.074	0.068
			cyclohexane	NA	NA	0.21	0.2	0.19	0.17	0.14	0.12	0.11	0.097	0.089	0.093	0.084	0.077	0.07	0.064
			trans-2-butene	NA	NA	0.19	0.18	0.17	0.15	0.13	0.11	0.099	0.089	0.082	0.075	0.065	0.057	0.05	0.044
			n-octane	NA	NA	0.16	0.15	0.14	0.13	0.096	0.08	0.069	0.063	0.058	0.071	0.065	0.059	0.054	0.049
			n-nonane	NA	NA	0.15	0.14	0.13	0.12	0.092	0.076	0.067	0.061	0.056	0.068	0.062	0.057	0.052	0.047
			4-ethyltoluene	NA	NA	0.14	0.13	0.13	0.11	0.087	0.074	0.066	0.06	0.055	0.068	0.062	0.056	0.051	0.047
		Flowback	2-ethyltoluene	NA	NA	16	16	15	13	13	12	12	12	11	7.6	6.4	7.1	5.3	6.7
			benzene	NA	NA	4.1	3.9	3.7	3.3	3	3.1	3.1	3	2.8	1.9	1.6	1.8	1.4	1.5
			3-ethyltoluene	NA	NA	1.7	1.6	1.5	1.4	1.3	1.3	1.3	1.2	1.2	0.79	0.66	0.74	0.59	0.69
			4-ethyltoluene	NA	NA	1.1	1.1	1	0.92	0.89	0.85	0.85	0.84	0.77	0.53	0.44	0.49	0.39	0.46
			n-decane	NA	NA	1.1	1	0.97	0.87	0.84	0.81	0.8	0.79	0.73	0.5	0.42	0.47	0.37	0.44
			n-propylbenzene	NA	NA	1	0.97	0.92	0.83	0.8	0.76	0.76	0.75	0.69	0.47	0.4	0.44	0.33	0.42
			1,3-diethylbenzene	NA	NA	0.87	0.83	0.78	0.7	0.68	0.65	0.65	0.64	0.59	0.4	0.34	0.38	0.3	0.35
			m+p-xylene	NA	NA	0.77	0.73	0.7	0.62	0.56	0.58	0.57	0.57	0.52	0.36	0.3	0.33	0.27	0.31
			isopropylbenzene	NA	NA	0.68	0.65	0.61	0.55	0.53	0.51	0.51	0.5	0.46	0.31	0.26	0.29	0.23	0.28
			toluene	NA	NA	0.65	0.62	0.58	0.52	0.47	0.48	0.48	0.48	0.44	0.3	0.25	0.28	0.22	0.26
			1,2,3-trimethylbenzene	NA	NA	0.34	0.33	0.31	0.28	0.27	0.26	0.26	0.25	0.23	0.16	0.13	0.15	0.12	0.14
			1,2,4-trimethylbenzene	NA	NA	0.33	0.31	0.3	0.27	0.26	0.25	0.25	0.24	0.22	0.15	0.13	0.14	0.11	0.13

Garfield County: Valley (Rifle)	Drilling	1,3,5-trimethylbenzene	NA	NA	0.32	0.31	0.29	0.26	0.25	0.24	0.24	0.24	0.22	0.15	0.13	0.14	0.11	0.13
		o-xylene	NA	NA	0.24	0.23	0.22	0.19	0.19	0.18	0.18	0.18	0.16	0.11	0.093	0.1	0.082	0.097
		cyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.16	0.16	0.16	0.16	0.15	0.1	0.084	0.094	0.076	0.079
		methylcyclohexane	NA	NA	0.22	0.21	0.2	0.18	0.16	0.17	0.17	0.16	0.15	0.1	0.086	0.096	0.077	0.091
		n-nonane	NA	NA	0.2	0.19	0.18	0.16	0.15	0.15	0.15	0.15	0.14	0.093	0.078	0.087	0.069	0.082
		styrene	NA	NA	0.19	0.18	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.086	0.072	0.08	0.059	0.075
	Fracking	benzene	NA	NA	8.3	8.7	8.1	7.4	6.2	5.8	5.6	4	3.8	3.4	3.1	2.6	2.4	2.2
		toluene	NA	NA	1.9	2	1.8	1.7	1.4	1.3	1.3	0.91	0.86	0.77	0.71	0.61	0.54	0.5
		2-ethyltoluene	NA	NA	0.14	0.12	0.11	0.1	0.086	0.08	0.076	0.065	0.061	0.055	0.05	0.047	0.038	0.035
		benzene	NA	NA	6	7.5	7	4.4	4.1	3.9	3.7	3.5	3.3	2.9	2.7	2.2	1.9	1.8
		m+p-xylene	NA	NA	0.83	1	0.96	0.61	0.56	0.53	0.51	0.48	0.45	0.4	0.37	0.32	0.27	0.25
		2-ethyltoluene	NA	NA	0.5	0.54	0.5	0.32	0.3	0.28	0.26	0.25	0.24	0.21	0.2	0.16	0.14	0.13
		toluene	NA	NA	0.36	0.45	0.42	0.26	0.24	0.23	0.22	0.21	0.2	0.17	0.16	0.14	0.12	0.11
		3-ethyltoluene	NA	NA	0.27	0.34	0.32	0.2	0.19	0.17	0.17	0.16	0.15	0.13	0.12	0.11	0.09	0.081
		n-decane	NA	NA	0.19	0.24	0.22	0.14	0.13	0.12	0.12	0.11	0.1	0.092	0.086	0.074	0.062	0.057
		methylcyclohexane	NA	NA	0.16	0.2	0.18	0.11	0.11	0.1	0.096	0.091	0.086	0.076	0.071	0.059	0.05	0.047
		cyclohexane	NA	NA	0.17	0.19	0.17	0.11	0.11	0.1	0.095	0.09	0.084	0.075	0.07	0.058	0.052	0.049
		trans-2-butene	NA	NA	0.16	0.15	0.14	0.12	0.092	0.086	0.081	0.077	0.072	0.072	0.06	0.047	0.042	0.045
		n-nonane	NA	NA	0.11	0.14	0.13	0.079	0.074	0.069	0.066	0.062	0.059	0.052	0.049	0.041	0.035	0.032
		n-octane	NA	NA	0.11	0.14	0.13	0.082	0.077	0.072	0.069	0.065	0.061	0.054	0.051	0.043	0.036	0.034
		4-ethyltoluene	NA	NA	0.1	0.13	0.12	0.073	0.069	0.065	0.061	0.058	0.055	0.049	0.045	0.041	0.034	0.03
	Flowback	2-ethyltoluene	NA	NA	14	13	12	11	8.5	7.9	6.5	5.8	5.5	5.2	4.4	4.4	3.4	2.9
		benzene	NA	NA	3.4	3.2	3	2.5	2.4	2.2	1.9	1.5	1.4	1.3	1.1	1.1	0.86	0.74
		3-ethyltoluene	NA	NA	1.4	1.3	1.3	1.1	0.88	0.81	0.67	0.61	0.57	0.54	0.46	0.46	0.36	0.3
		4-ethyltoluene	NA	NA	0.95	0.89	0.84	0.75	0.59	0.54	0.45	0.4	0.38	0.36	0.31	0.3	0.24	0.2
		n-decane	NA	NA	0.9	0.85	0.8	0.61	0.56	0.52	0.43	0.38	0.36	0.34	0.29	0.29	0.23	0.19
		n-propylbenzene	NA	NA	0.85	0.8	0.75	0.67	0.53	0.49	0.4	0.36	0.34	0.32	0.27	0.27	0.21	0.18
		1,3-diethylbenzene	NA	NA	0.72	0.68	0.64	0.57	0.45	0.42	0.34	0.31	0.29	0.28	0.23	0.23	0.18	0.16
		m+p-xylene	NA	NA	0.64	0.61	0.57	0.44	0.4	0.37	0.3	0.27	0.26	0.25	0.21	0.21	0.16	0.14
		isopropylbenzene	NA	NA	0.56	0.53	0.5	0.45	0.35	0.32	0.27	0.24	0.23	0.22	0.18	0.18	0.14	0.12
		toluene	NA	NA	0.54	0.51	0.48	0.37	0.33	0.31	0.26	0.23	0.22	0.21	0.17	0.17	0.14	0.12
		1,2,3-trimethylbenzene	NA	NA	0.28	0.27	0.25	0.23	0.18	0.16	0.14	0.12	0.11	0.11	0.092	0.092	0.072	0.061
		1,2,4-trimethylbenzene	NA	NA	0.27	0.26	0.24	0.22	0.17	0.16	0.13	0.12	0.11	0.11	0.089	0.088	0.069	0.059
		1,3,5-trimethylbenzene	NA	NA	0.27	0.25	0.24	0.21	0.17	0.15	0.13	0.11	0.11	0.1	0.087	0.087	0.067	0.058
		o-xylene	NA	NA	0.2	0.19	0.18	0.14	0.12	0.11	0.094	0.085	0.08	0.076	0.064	0.064	0.05	0.043
		cyclohexane	NA	NA	0.18	0.17	0.16	0.13	0.12	0.12	0.1	0.077	0.073	0.069	0.058	0.058	0.045	0.039
		methylcyclohexane	NA	NA	0.18	0.17	0.16	0.13	0.12	0.11	0.088	0.079	0.075	0.071	0.06	0.06	0.046	0.04

	Northern Front Range	Drilling	n-nonane	NA	NA	0.17	0.16	0.15	0.11	0.1	0.096	0.079	0.071	0.067	0.064	0.054	0.054	0.042	0.036
			styrene	NA	NA	0.15	0.15	0.14	0.12	0.096	0.088	0.073	0.066	0.062	0.059	0.05	0.05	0.039	0.033
		Fracking	benzene	NA	NA	9.3	8.8	8.4	7.7	7.1	6.5	5.9	5.5	4.2	4.2	3.7	3.2	2.9	2.6
			toluene	NA	NA	2.1	2	1.9	1.7	1.6	1.5	1.2	1.2	0.98	0.95	0.83	0.73	0.65	0.58
		Flowback	2-ethyltoluene	NA	NA	0.16	0.16	0.15	0.13	0.12	0.11	0.098	0.085	0.079	0.068	0.059	0.052	0.046	0.041
			benzene	NA	NA	0.59	0.56	0.53	0.51	0.55	0.57	0.58	0.53	0.51	0.43	0.36	0.31	0.29	0.27
		Flowback	2-ethyltoluene	NA	NA	0.13	0.13	0.12	0.13	0.14	0.14	0.14	0.13	0.13	0.092	0.09	0.078	0.073	0.067
			benzene	NA	NA	19	18	18	18	19	20	20	19	18	15	15	13	13	12
			toluene	NA	NA	0.63	0.62	0.59	0.6	0.64	0.66	0.67	0.62	0.59	0.5	0.49	0.45	0.43	0.41
			3-ethyltoluene	NA	NA	0.62	0.61	0.59	0.59	0.63	0.65	0.66	0.61	0.58	0.49	0.49	0.44	0.42	0.4
			cyclohexane	NA	NA	0.55	0.54	0.52	0.52	0.56	0.57	0.58	0.54	0.51	0.43	0.43	0.39	0.37	0.35
			m+p-xylene	NA	NA	0.4	0.39	0.37	0.38	0.4	0.41	0.42	0.39	0.37	0.31	0.31	0.28	0.27	0.26
			methylcyclohexane	NA	NA	0.25	0.25	0.24	0.24	0.26	0.27	0.27	0.25	0.24	0.2	0.2	0.18	0.17	0.16
			n-hexane	NA	NA	0.25	0.24	0.23	0.23	0.25	0.26	0.26	0.24	0.23	0.19	0.19	0.17	0.17	0.16
			n-decane	NA	NA	0.22	0.21	0.2	0.2	0.22	0.22	0.23	0.21	0.2	0.17	0.17	0.15	0.15	0.14
			n-octane	NA	NA	0.18	0.17	0.17	0.17	0.18	0.18	0.19	0.17	0.16	0.14	0.14	0.12	0.12	0.11
			n-nonane	NA	NA	0.15	0.15	0.14	0.14	0.15	0.16	0.16	0.15	0.14	0.12	0.12	0.11	0.1	0.096
			2-ethyltoluene	NA	NA	0.12	0.12	0.11	0.11	0.11	0.12	0.12	0.11	0.1	0.088	0.087	0.079	0.075	0.072
			2-methylheptane	NA	NA	0.099	0.098	0.094	0.095	0.1	0.1	0.11	0.098	0.093	0.079	0.078	0.07	0.067	0.064
			o-xylene	NA	NA	0.11	0.1	0.1	0.1	0.11	0.11	0.11	0.11	0.1	0.084	0.084	0.075	0.072	0.069

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-6. Percentage of Daily-maximum Acute Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	99%	98%	97%	94%	92%	86%	80%	84%	82%	55%	41%	29%	19%	38%
			toluene	NA	NA	45%	35%	27%	16%	8%	3%	1%	8%	7%	1%	1%	0%	0%	1%
		Fracking	benzene	NA	NA	97%	95%	94%	89%	85%	77%	67%	55%	43%	29%	17%	10%	5%	4%
			m+p-xylene	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	91%	89%	86%	81%	74%	68%	64%	60%	56%	28%	13%	15%	11%	7%
			2-ethyltoluene	NA	NA	71%	68%	66%	62%	60%	58%	56%	55%	53%	47%	40%	35%	34%	31%
			3-ethyltoluene	NA	NA	11%	8%	6%	5%	3%	2%	2%	2%	1%	0%	0%	0%	0%	0%
			4-ethyltoluene	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			n-decane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	100%	99%	99%	98%	96%	95%	93%	91%	88%	84%	79%	70%	62%	47%
			toluene	NA	NA	59%	51%	43%	29%	14%	4%	1%	0%	0%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	99%	98%	97%	95%	93%	91%	88%	86%	83%	75%	68%	56%	41%	24%
			benzene	NA	NA	93%	90%	87%	77%	68%	58%	43%	22%	13%	5%	1%	1%	0%	0%
			2-ethyltoluene	NA	NA	75%	71%	68%	65%	62%	61%	60%	59%	58%	57%	55%	53%	50%	47%
	Northern Front Range	Drilling	benzene	NA	NA	100%	99%	98%	97%	95%	92%	88%	84%	79%	71%	59%	46%	34%	23%
			toluene	NA	NA	61%	53%	43%	27%	13%	5%	2%	2%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	100%	100%	100%	100%	100%	100%	99%	98%	98%	95%	92%	88%	82%	76%
			benzene	NA	NA	100%	100%	100%	100%	100%	100%	99%	98%	98%	95%	92%	88%	82%	76%
			2-ethyltoluene	NA	NA	100%	100%	100%	100%	100%	100%	99%	98%	98%	95%	92%	88%	82%	76%
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	99%	98%	97%	94%	91%	86%	79%	84%	81%	54%	41%	28%	19%	38%
			toluene	NA	NA	44%	35%	27%	16%	8%	3%	1%	8%	8%	1%	1%	0%	0%	1%
		Fracking	benzene	NA	NA	97%	95%	94%	89%	85%	76%	66%	54%	43%	29%	17%	10%	5%	3%
			m+p-xylene	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	90%	88%	86%	80%	73%	67%	63%	59%	56%	28%	13%	15%	10%	7%
			2-ethyltoluene	NA	NA	71%	68%	66%	62%	60%	58%	56%	55%	53%	47%	40%	35%	33%	31%
			3-ethyltoluene	NA	NA	10%	8%	7%	5%	3%	2%	2%	2%	1%	0%	0%	0%	0%	0%
			4-ethyltoluene	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			n-decane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	99%	99%	99%	97%	96%	95%	93%	90%	88%	83%	78%	69%	61%	46%
			toluene	NA	NA	57%	50%	42%	28%	14%	3%	1%	0%	0%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	98%	98%	97%	94%	92%	90%	88%	85%	82%	73%	67%	54%	40%	23%
			benzene	NA	NA	92%	89%	86%	75%	65%	55%	40%	20%	11%	5%	1%	1%	0%	0%
			2-ethyltoluene	NA	NA	74%	71%	68%	65%	62%	61%	60%	59%	58%	57%	55%	53%	50%	47%
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	99%	99%	98%	97%	94%	92%	87%	83%	78%	69%	57%	45%	33%	22%
			toluene	NA	NA	59%	51%	41%	26%	13%	5%	2%	2%	0%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	100%	100%	100%	100%	100%	100%	99%	98%	97%	95%	91%	87%	81%	75%
			benzene	NA	NA	97%	96%	95%	92%	89%	83%	77%	82%	79%	52%	39%	27%	18%	37%
		Flowback	toluene	NA	NA	41%	33%	25%	15%	7%	3%	1%	8%	7%	1%	1%	0%	0%	1%
			benzene	NA	NA	95%	93%	91%	86%	82%	73%	63%	51%	41%	27%	16%	9%	5%	3%
			m+p-xylene	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	86%	84%	82%	76%	69%	64%	60%	57%	53%	26%	12%	14%	9%	7%
			2-ethyltoluene	NA	NA	71%	68%	65%	62%	59%	57%	56%	54%	52%	47%	39%	34%	33%	31%
	Garfield	Drilling	3-ethyltoluene	NA	NA	10%	7%	6%	5%	3%	2%	2%	2%	1%	0%	0%	0%	0%	0%
			4-ethyltoluene	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			n-decane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	99%	98%	97%	96%	94%	92%	91%	87%	85%	80%	75%	66%	58%	44%
			benzene	NA	NA	99%	98%	97%	96%	94%	92%	91%	87%	85%	80%	75%	66%	58%	44%

	County: Valley (Rifle)		toluene	NA	NA	54%	47%	39%	26%	13%	3%	1%	0%	0%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	97%	96%	95%	91%	89%	87%	84%	81%	78%	70%	63%	51%	38%	22%
		Flowback	benzene	NA	NA	88%	85%	82%	70%	61%	51%	38%	19%	11%	5%	1%	1%	0%	0%
			2-ethyltoluene	NA	NA	74%	70%	68%	65%	62%	61%	60%	58%	57%	56%	54%	52%	49%	46%
			3-ethyltoluene	NA	NA	12%	8%	5%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Drilling	benzene	NA	NA	99%	98%	97%	95%	92%	89%	85%	81%	76%	67%	55%	44%	32%	21%
			toluene	NA	NA	57%	48%	40%	25%	13%	5%	2%	2%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	100%	100%	100%	100%	100%	99%	98%	97%	96%	93%	89%	84%	79%	73%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity.

Table E-7. Largest Acute Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	9.5	9	8.7	8	6.6	5.6	5	8	7.7	5.1	4.7	4.3	3.9	4.9
			neurotoxicity	NA	NA	2.3	2.2	2.1	2	1.6	1.4	1.2	1.9	1.9	1.3	1.1	1	0.93	1.1
			respiratory	NA	NA	0.11	0.1	0.1	0.093	0.076	0.065	0.058	0.085	0.089	0.059	0.054	0.049	0.027	0.041
		Fracking	hematological	NA	NA	8.6	8.1	7.7	6.9	5.3	4.4	3.8	3.4	3.1	3.9	3.5	3.2	2.9	2.7
			neurotoxicity	NA	NA	2.4	2.2	2.1	1.9	1.5	1.2	1.1	0.96	0.88	1.1	0.99	0.9	0.82	0.75
			respiratory	NA	NA	1.3	1.2	1.1	1	0.77	0.64	0.56	0.51	0.47	0.58	0.52	0.48	0.44	0.4
			sensory	NA	NA	0.27	0.26	0.24	0.22	0.17	0.14	0.12	0.11	0.1	0.13	0.11	0.1	0.095	0.087
			systemic	NA	NA	0.19	0.18	0.17	0.15	0.13	0.11	0.1	0.09	0.083	0.075	0.065	0.057	0.05	0.045
		Flowback	hematological	NA	NA	4.5	4.2	4	3.6	3.2	3.3	3.3	3.3	3	2.1	1.7	1.9	1.6	1.7
			neurotoxicity	NA	NA	3.3	3.1	3	2.7	2.4	2.4	2.4	2.4	2.2	1.5	1.3	1.4	1.1	1.3
			respiratory	NA	NA	1.2	1.2	1.1	0.98	0.89	0.91	0.91	0.89	0.83	0.56	0.47	0.53	0.39	0.5
			sensory	NA	NA	1.1	1.1	1	0.9	0.87	0.83	0.83	0.82	0.76	0.52	0.43	0.48	0.38	0.45
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	8.3	8.7	8.1	7.4	6.2	5.8	5.6	4	3.8	3.4	3.1	2.6	2.4	2.2
			neurotoxicity	NA	NA	2	2.1	2	1.8	1.5	1.4	1.4	0.98	0.92	0.84	0.76	0.64	0.58	0.53
		Fracking	hematological	NA	NA	6.2	7.8	7.2	4.5	4.2	4	3.8	3.6	3.4	3	2.8	2.3	1.9	1.8
			neurotoxicity	NA	NA	1.7	2.1	2	1.2	1.2	1.1	1	0.99	0.93	0.82	0.77	0.65	0.55	0.51
			respiratory	NA	NA	0.9	1.1	1.1	0.66	0.62	0.58	0.55	0.52	0.49	0.44	0.41	0.35	0.29	0.27
			sensory	NA	NA	0.19	0.24	0.23	0.14	0.13	0.12	0.12	0.11	0.11	0.094	0.088	0.075	0.063	0.058
			systemic	NA	NA	0.16	0.15	0.14	0.12	0.093	0.087	0.082	0.077	0.073	0.073	0.06	0.048	0.043	0.046
		Flowback	hematological	NA	NA	3.7	3.5	3.3	2.7	2.5	2.4	2.1	1.6	1.5	1.4	1.2	1.2	0.93	0.79
			neurotoxicity	NA	NA	2.7	2.6	2.4	1.9	1.7	1.6	1.3	1.2	1.1	1	0.88	0.88	0.68	0.59

	Northern Front Range	Drilling	respiratory	NA	NA	1	0.95	0.9	0.69	0.63	0.58	0.48	0.43	0.41	0.39	0.33	0.33	0.25	0.22
			sensory	NA	NA	0.93	0.87	0.82	0.63	0.58	0.53	0.44	0.4	0.37	0.35	0.3	0.3	0.23	0.2
			hematological	NA	NA	9.3	8.9	8.4	7.7	7.1	6.5	5.9	5.5	4.2	4.2	3.7	3.3	2.9	2.6
			neurotoxicity	NA	NA	2.3	2.2	2	1.8	1.7	1.6	1.2	1.3	1	1	0.89	0.79	0.7	0.62
			respiratory	NA	NA	0.11	0.1	0.096	0.085	0.082	0.075	0.06	0.06	0.056	0.048	0.042	0.037	0.033	0.03
		Fracking	hematological	NA	NA	0.61	0.57	0.54	0.53	0.56	0.58	0.59	0.55	0.52	0.44	0.38	0.32	0.3	0.28
			neurotoxicity	NA	NA	19	19	18	18	19	20	20	19	18	15	15	13	13	12
		Flowback	hematological	NA	NA	2.4	2.4	2.3	2.3	2.5	2.6	2.6	2.4	2.3	1.9	1.9	1.7	1.7	1.6
			respiratory	NA	NA	0.56	0.55	0.53	0.53	0.57	0.58	0.59	0.55	0.52	0.44	0.44	0.4	0.38	0.36
			endocrine	NA	NA	0.25	0.24	0.23	0.23	0.25	0.26	0.26	0.24	0.23	0.19	0.19	0.17	0.17	0.16
			sensory	NA	NA	0.22	0.22	0.21	0.21	0.22	0.23	0.23	0.22	0.21	0.17	0.17	0.16	0.15	0.14
			hematological	NA	NA	9.5	9	8.7	8	6.6	5.6	5	8	7.7	5.1	4.7	4.3	3.9	4.9
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	neurotoxicity	NA	NA	2.3	2.2	2.1	2	1.6	1.4	1.2	1.9	1.9	1.3	1.1	1	0.93	1.1
			respiratory	NA	NA	0.11	0.1	0.1	0.093	0.076	0.065	0.058	0.085	0.089	0.059	0.054	0.049	0.027	0.041
			hematological	NA	NA	8.6	8.1	7.7	6.9	5.3	4.4	3.8	3.4	3.1	3.9	3.5	3.2	2.9	2.7
		Fracking	neurotoxicity	NA	NA	2.4	2.2	2.1	1.9	1.5	1.2	1.1	0.96	0.88	1.1	0.99	0.9	0.82	0.75
			respiratory	NA	NA	1.3	1.2	1.1	1	0.77	0.64	0.56	0.51	0.47	0.58	0.52	0.48	0.44	0.4
			sensory	NA	NA	0.27	0.26	0.24	0.22	0.17	0.14	0.12	0.11	0.1	0.13	0.11	0.1	0.095	0.087
			systemic	NA	NA	0.19	0.18	0.17	0.15	0.13	0.11	0.1	0.09	0.083	0.075	0.065	0.057	0.05	0.045
		Flowback	hematological	NA	NA	4.5	4.2	4	3.6	3.2	3.3	3.3	3.3	3	2.1	1.7	1.9	1.6	1.7
			neurotoxicity	NA	NA	3.3	3.1	3	2.7	2.4	2.4	2.4	2.4	2.2	1.5	1.3	1.4	1.1	1.3
			respiratory	NA	NA	1.2	1.2	1.1	0.98	0.89	0.91	0.91	0.89	0.83	0.56	0.47	0.53	0.39	0.5
			sensory	NA	NA	1.1	1.1	1	0.9	0.87	0.83	0.83	0.82	0.76	0.52	0.43	0.48	0.38	0.45
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	8.3	8.7	8.1	7.4	6.2	5.8	5.6	4	3.8	3.4	3.1	2.6	2.4	2.2
			neurotoxicity	NA	NA	2	2.1	2	1.8	1.5	1.4	1.4	0.98	0.92	0.84	0.76	0.64	0.58	0.53
		Fracking	hematological	NA	NA	6.2	7.8	7.2	4.5	4.2	4	3.8	3.6	3.4	3	2.8	2.3	1.9	1.8
			neurotoxicity	NA	NA	1.7	2.1	2	1.2	1.2	1.1	1	0.99	0.93	0.82	0.77	0.65	0.55	0.51
			respiratory	NA	NA	0.9	1.1	1.1	0.66	0.62	0.58	0.55	0.52	0.49	0.44	0.41	0.35	0.29	0.27
			sensory	NA	NA	0.19	0.24	0.23	0.14	0.13	0.12	0.12	0.11	0.11	0.094	0.088	0.075	0.063	0.058
			systemic	NA	NA	0.16	0.15	0.14	0.12	0.093	0.087	0.082	0.077	0.073	0.073	0.06	0.048	0.043	0.046
		Flowback	hematological	NA	NA	3.7	3.5	3.3	2.7	2.5	2.4	2.1	1.6	1.5	1.4	1.2	1.2	0.93	0.79
			neurotoxicity	NA	NA	2.7	2.6	2.4	1.9	1.7	1.6	1.3	1.2	1.1	1	0.88	0.88	0.68	0.59
			respiratory	NA	NA	1	0.95	0.9	0.69	0.63	0.58	0.48	0.43	0.41	0.39	0.33	0.33	0.25	0.22
			sensory	NA	NA	0.93	0.87	0.82	0.63	0.58	0.53	0.44	0.4	0.37	0.35	0.3	0.3	0.23	0.2
	Northern Front Range	Drilling	hematological	NA	NA	9.3	8.9	8.4	7.7	7.1	6.5	5.9	5.5	4.2	4.2	3.7	3.3	2.9	2.6
			neurotoxicity	NA	NA	2.3	2.2	2	1.8	1.7	1.6	1.2	1.3	1	1	0.89	0.79	0.7	0.62
			respiratory	NA	NA	0.11	0.1	0.096	0.085	0.082	0.075	0.06	0.06	0.056	0.048	0.042	0.037	0.033	0.03

60+ Years		Fracking	hematological	NA	NA	0.61	0.57	0.54	0.53	0.56	0.58	0.59	0.55	0.52	0.44	0.38	0.32	0.3	0.28
		Flowback	hematological	NA	NA	19	19	18	18	19	20	20	19	18	15	15	13	13	12
			neurotoxicity	NA	NA	2.4	2.4	2.3	2.3	2.5	2.6	2.6	2.4	2.3	1.9	1.9	1.7	1.7	1.6
			respiratory	NA	NA	0.56	0.55	0.53	0.53	0.57	0.58	0.59	0.55	0.52	0.44	0.44	0.4	0.38	0.36
			endocrine	NA	NA	0.25	0.24	0.23	0.23	0.25	0.26	0.26	0.24	0.23	0.19	0.19	0.17	0.17	0.16
			sensory	NA	NA	0.22	0.22	0.21	0.21	0.22	0.23	0.23	0.22	0.21	0.17	0.17	0.16	0.15	0.14
	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	9.5	9	8.7	8	6.6	5.6	5	8	7.7	5.1	4.7	4.3	3.9	4.9
			neurotoxicity	NA	NA	2.3	2.2	2.1	2	1.6	1.4	1.2	1.9	1.9	1.3	1.1	1	0.93	1.1
			respiratory	NA	NA	0.11	0.1	0.1	0.093	0.076	0.065	0.058	0.085	0.089	0.059	0.054	0.049	0.027	0.041
		Fracking	hematological	NA	NA	8.6	8.1	7.7	6.9	5.3	4.4	3.8	3.4	3.1	3.9	3.5	3.2	2.9	2.7
			neurotoxicity	NA	NA	2.4	2.2	2.1	1.9	1.5	1.2	1.1	0.96	0.88	1.1	0.99	0.9	0.82	0.75
			respiratory	NA	NA	1.3	1.2	1.1	1	0.77	0.64	0.56	0.51	0.47	0.58	0.52	0.48	0.44	0.4
			sensory	NA	NA	0.27	0.26	0.24	0.22	0.17	0.14	0.12	0.11	0.1	0.13	0.11	0.1	0.095	0.087
			systemic	NA	NA	0.19	0.18	0.17	0.15	0.13	0.11	0.1	0.09	0.083	0.075	0.065	0.057	0.05	0.045
		Flowback	hematological	NA	NA	4.5	4.2	4	3.6	3.2	3.3	3.3	3.3	3	2.1	1.7	1.9	1.6	1.7
			neurotoxicity	NA	NA	3.3	3.1	3	2.7	2.4	2.4	2.4	2.4	2.2	1.5	1.3	1.4	1.1	1.3
			respiratory	NA	NA	1.2	1.2	1.1	0.98	0.89	0.91	0.91	0.89	0.83	0.56	0.47	0.53	0.39	0.5
			sensory	NA	NA	1.1	1.1	1	0.9	0.87	0.83	0.83	0.82	0.76	0.52	0.43	0.48	0.38	0.45
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	8.3	8.7	8.1	7.4	6.2	5.8	5.6	4	3.8	3.4	3.1	2.6	2.4	2.2
			neurotoxicity	NA	NA	2	2.1	2	1.8	1.5	1.4	1.4	0.98	0.92	0.84	0.76	0.64	0.58	0.53
		Fracking	hematological	NA	NA	6.2	7.8	7.2	4.5	4.2	4	3.8	3.6	3.4	3	2.8	2.3	1.9	1.8
			neurotoxicity	NA	NA	1.7	2.1	2	1.2	1.2	1.1	1	0.99	0.93	0.82	0.77	0.65	0.55	0.51
			respiratory	NA	NA	0.9	1.1	1.1	0.66	0.62	0.58	0.55	0.52	0.49	0.44	0.41	0.35	0.29	0.27
			sensory	NA	NA	0.19	0.24	0.23	0.14	0.13	0.12	0.12	0.11	0.11	0.094	0.088	0.075	0.063	0.058
			systemic	NA	NA	0.16	0.15	0.14	0.12	0.093	0.087	0.082	0.077	0.073	0.073	0.06	0.048	0.043	0.046
		Flowback	hematological	NA	NA	3.7	3.5	3.3	2.7	2.5	2.4	2.1	1.6	1.5	1.4	1.2	1.2	0.93	0.79
			neurotoxicity	NA	NA	2.7	2.6	2.4	1.9	1.7	1.6	1.3	1.2	1.1	1	0.88	0.88	0.68	0.59
			respiratory	NA	NA	1	0.95	0.9	0.69	0.63	0.58	0.48	0.43	0.41	0.39	0.33	0.33	0.25	0.22
			sensory	NA	NA	0.93	0.87	0.82	0.63	0.58	0.53	0.44	0.4	0.37	0.35	0.3	0.3	0.23	0.2
	Northern Front Range	Drilling	hematological	NA	NA	9.3	8.9	8.4	7.7	7.1	6.5	5.9	5.5	4.2	4.2	3.7	3.3	2.9	2.6
			neurotoxicity	NA	NA	2.3	2.2	2	1.8	1.7	1.6	1.2	1.3	1	1	0.89	0.79	0.7	0.62
			respiratory	NA	NA	0.11	0.1	0.096	0.085	0.082	0.075	0.06	0.06	0.056	0.048	0.042	0.037	0.033	0.03
		Fracking	hematological	NA	NA	0.61	0.57	0.54	0.53	0.56	0.58	0.59	0.55	0.52	0.44	0.38	0.32	0.3	0.28
		Flowback	hematological	NA	NA	19	19	18	18	19	20	20	19	18	15	15	13	13	12
			neurotoxicity	NA	NA	2.4	2.4	2.3	2.3	2.5	2.6	2.6	2.4	2.3	1.9	1.9	1.7	1.7	1.6
			respiratory	NA	NA	0.56	0.55	0.53	0.53	0.57	0.58	0.59	0.55	0.52	0.44	0.44	0.4	0.38	0.36
			endocrine	NA	NA	0.25	0.24	0.23	0.23	0.25	0.26	0.26	0.24	0.23	0.19	0.19	0.17	0.17	0.16

			sensory	NA	NA	0.22	0.22	0.21	0.21	0.22	0.23	0.23	0.22	0.21	0.17	0.17	0.16	0.15	0.14
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Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

Table E-8. Percentage of Daily-maximum Acute Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	99%	98%	97%	94%	92%	86%	80%	84%	82%	55%	41%	29%	19%	38%
			neurotoxicity	NA	NA	50%	41%	33%	20%	11%	4%	2%	10%	9%	1%	1%	0%	0%	1%
		Fracking	hematological	NA	NA	97%	96%	94%	90%	86%	78%	69%	57%	46%	31%	19%	11%	6%	4%
			neurotoxicity	NA	NA	35%	25%	18%	10%	5%	2%	1%	0%	0%	1%	0%	0%	0%	0%
			respiratory	NA	NA	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	93%	91%	89%	85%	79%	75%	71%	67%	64%	37%	19%	21%	18%	11%
			neurotoxicity	NA	NA	45%	40%	35%	27%	19%	15%	13%	12%	10%	4%	2%	2%	1%	1%
			respiratory	NA	NA	2%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			sensory	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	100%	99%	99%	98%	96%	95%	93%	91%	89%	84%	79%	70%	62%	48%
			neurotoxicity	NA	NA	64%	57%	48%	36%	21%	10%	2%	0%	0%	0%	0%	0%	0%	0%
		Fracking	hematological	NA	NA	99%	98%	97%	95%	93%	91%	89%	87%	84%	76%	70%	58%	45%	27%
			neurotoxicity	NA	NA	48%	43%	32%	6%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%
			respiratory	NA	NA	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	95%	93%	90%	82%	76%	68%	57%	40%	29%	16%	2%	1%	0%	0%
			neurotoxicity	NA	NA	48%	42%	37%	29%	22%	15%	8%	1%	1%	0%	0%	0%	0%	0%
	Northern Front Range	Drilling	hematological	NA	NA	100%	99%	98%	97%	95%	92%	88%	84%	79%	71%	59%	47%	34%	23%
			neurotoxicity	NA	NA	66%	58%	49%	32%	18%	8%	3%	3%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	100%	100%	100%	100%	100%	100%	99%	99%	98%	95%	92%	88%	83%	77%
			neurotoxicity	NA	NA	66%	57%	48%	32%	20%	11%	8%	7%	6%	3%	3%	2%	2%	2%
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	99%	98%	97%	94%	91%	86%	80%	84%	82%	55%	41%	29%	19%	38%
			neurotoxicity	NA	NA	49%	40%	32%	20%	11%	4%	2%	10%	9%	1%	1%	0%	0%	1%
		Fracking	hematological	NA	NA	97%	96%	94%	90%	86%	78%	68%	56%	45%	31%	19%	11%	6%	4%
			neurotoxicity	NA	NA	34%	25%	18%	10%	5%	2%	1%	0%	0%	1%	0%	0%	0%	0%
			respiratory	NA	NA	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	93%	91%	89%	84%	78%	74%	70%	67%	63%	36%	19%	21%	17%	11%
			neurotoxicity	NA	NA	45%	40%	35%	26%	19%	15%	13%	12%	10%	4%	2%	2%	1%	1%

60+ Years	Garfield County: Valley (Rifle)		respiratory	NA	NA	2%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			sensory	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
		Drilling	hematological	NA	NA	99%	99%	99%	97%	96%	95%	93%	90%	88%	84%	78%	69%	61%	46%	
				neurotoxicity	NA	NA	62%	55%	47%	35%	20%	9%	2%	0%	0%	0%	0%	0%	0%	0%
			Fracking	hematological	NA	NA	99%	98%	97%	95%	93%	91%	89%	86%	83%	75%	69%	57%	43%	26%
				neurotoxicity	NA	NA	47%	41%	31%	6%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%
				respiratory	NA	NA	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
				Flowback	hematological	NA	NA	94%	92%	89%	81%	73%	65%	54%	37%	27%	15%	2%	1%	0%
		neurotoxicity	NA		NA	48%	42%	37%	29%	22%	15%	7%	1%	1%	0%	0%	0%	0%	0%	
		Northern Front Range	Drilling	hematological	NA	NA	99%	99%	98%	97%	94%	92%	87%	83%	78%	70%	58%	45%	33%	22%
	neurotoxicity			NA	NA	64%	56%	47%	31%	17%	8%	3%	3%	0%	0%	0%	0%	0%	0%	
	Flowback		hematological	NA	NA	100%	100%	100%	100%	100%	100%	99%	98%	97%	95%	91%	87%	82%	76%	
			neurotoxicity	NA	NA	64%	55%	46%	31%	20%	11%	8%	7%	6%	3%	3%	2%	2%	2%	
	60+ Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	97%	96%	95%	92%	89%	83%	77%	82%	80%	52%	39%	27%	18%	37%
				neurotoxicity	NA	NA	47%	38%	30%	19%	10%	4%	2%	10%	9%	1%	1%	0%	0%	1%
			Fracking	hematological	NA	NA	95%	94%	92%	87%	83%	74%	65%	54%	43%	30%	18%	10%	6%	4%
				neurotoxicity	NA	NA	32%	23%	17%	10%	4%	2%	1%	0%	0%	1%	0%	0%	0%	0%
				respiratory	NA	NA	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
				Flowback	hematological	NA	NA	89%	88%	86%	81%	75%	70%	67%	64%	60%	34%	18%	20%	16%
neurotoxicity			NA		NA	43%	38%	34%	26%	18%	14%	12%	11%	10%	4%	2%	2%	1%	1%	
respiratory			NA		NA	2%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
sensory			NA		NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Garfield County: Valley (Rifle)			Drilling	hematological	NA	NA	99%	98%	97%	96%	94%	92%	91%	87%	85%	80%	75%	66%	58%	44%
		neurotoxicity		NA	NA	59%	52%	45%	33%	19%	8%	2%	0%	0%	0%	0%	0%	0%	0%	
		Fracking	hematological	NA	NA	97%	96%	95%	92%	90%	88%	85%	82%	79%	71%	65%	54%	41%	25%	
			neurotoxicity	NA	NA	44%	39%	29%	5%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			Flowback	hematological	NA	NA	91%	88%	85%	76%	69%	61%	51%	35%	25%	14%	2%	1%	0%	0%
neurotoxicity		NA		NA	47%	41%	36%	28%	21%	14%	7%	1%	1%	0%	0%	0%	0%	0%		
Northern Front Range		Drilling	hematological	NA	NA	99%	98%	97%	95%	92%	89%	85%	81%	76%	67%	55%	44%	32%	21%	
			neurotoxicity	NA	NA	61%	53%	45%	29%	17%	8%	3%	3%	0%	0%	0%	0%	0%	0%	
		Flowback	hematological	NA	NA	100%	100%	100%	100%	100%	99%	98%	97%	96%	93%	89%	85%	79%	73%	
			neurotoxicity	NA	NA	62%	53%	45%	30%	19%	11%	8%	6%	5%	3%	3%	2%	2%	2%	

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

E.1.1.3 5-acre Well Pad

Table E-9. Largest Acute Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	7.3	6.6	6.4	6	5.8	5.6	5.2	5.9	5.8	4.6	4.2	3.9	3.6	3.3
			toluene	NA	NA	1.7	1.5	1.4	1.4	1.3	1.3	1.2	1.6	1.5	1	0.95	0.88	0.81	0.75
			2-ethyltoluene	NA	NA	0.12	0.11	0.1	0.097	0.093	0.09	0.084	0.083	0.08	0.074	0.068	0.063	0.058	0.054
		Fracking	benzene	NA	NA	6.2	5.7	5.4	4.8	4.2	3.6	3.2	3.1	2.9	2.6	2.4	2.1	1.9	1.8
			m+p-xylene	NA	NA	0.85	0.79	0.75	0.66	0.58	0.5	0.44	0.36	0.33	0.27	0.24	0.22	0.19	0.17
			2-ethyltoluene	NA	NA	0.45	0.41	0.39	0.35	0.31	0.28	0.26	0.27	0.25	0.23	0.2	0.18	0.17	0.15
			toluene	NA	NA	0.37	0.34	0.32	0.29	0.25	0.22	0.19	0.2	0.19	0.17	0.15	0.14	0.12	0.11
			3-ethyltoluene	NA	NA	0.28	0.26	0.25	0.22	0.19	0.17	0.15	0.12	0.11	0.093	0.084	0.076	0.069	0.064
			n-decane	NA	NA	0.2	0.18	0.17	0.15	0.13	0.12	0.1	0.083	0.076	0.067	0.062	0.057	0.052	0.048
			cyclohexane	NA	NA	0.16	0.15	0.14	0.12	0.11	0.1	0.095	0.098	0.093	0.084	0.075	0.068	0.062	0.056
			methylcyclohexane	NA	NA	0.16	0.15	0.14	0.13	0.11	0.096	0.089	0.092	0.087	0.079	0.071	0.064	0.058	0.053
			trans-2-butene	NA	NA	0.14	0.13	0.12	0.11	0.095	0.084	0.075	0.077	0.072	0.063	0.056	0.05	0.045	0.04
			n-octane	NA	NA	0.12	0.11	0.1	0.09	0.079	0.068	0.06	0.054	0.052	0.047	0.042	0.038	0.034	0.031
			n-nonane	NA	NA	0.11	0.1	0.097	0.086	0.076	0.066	0.058	0.047	0.043	0.039	0.035	0.032	0.029	0.026
		Flowback	2-ethyltoluene	NA	NA	14	13	13	11	10	9.6	9.3	11	9.8	6.8	5.9	5.2	5	6.2
			benzene	NA	NA	3.4	3.3	3.1	2.8	2.6	2.6	2.6	2.6	2.5	1.7	1.5	1.6	1.4	1.6
			3-ethyltoluene	NA	NA	1.4	1.4	1.3	1.2	1.1	0.99	1.1	1.1	1	0.7	0.61	0.66	0.57	0.64
			4-ethyltoluene	NA	NA	0.96	0.91	0.87	0.78	0.71	0.67	0.73	0.73	0.68	0.47	0.41	0.44	0.38	0.43
			n-decane	NA	NA	0.91	0.86	0.82	0.74	0.67	0.63	0.69	0.69	0.64	0.44	0.39	0.42	0.36	0.41
			n-propylbenzene	NA	NA	0.86	0.82	0.78	0.7	0.64	0.6	0.58	0.56	0.61	0.42	0.36	0.32	0.34	0.39
			1,3-diethylbenzene	NA	NA	0.73	0.7	0.66	0.6	0.54	0.51	0.49	0.48	0.52	0.36	0.31	0.28	0.29	0.33
			m+p-xylene	NA	NA	0.64	0.62	0.59	0.53	0.48	0.49	0.5	0.49	0.46	0.32	0.28	0.3	0.26	0.29
			isopropylbenzene	NA	NA	0.57	0.54	0.52	0.47	0.42	0.4	0.44	0.43	0.41	0.28	0.24	0.26	0.23	0.26
			toluene	NA	NA	0.54	0.52	0.49	0.44	0.4	0.41	0.42	0.41	0.39	0.27	0.23	0.25	0.22	0.24
			1,2,3-trimethylbenzene	NA	NA	0.29	0.27	0.26	0.24	0.21	0.2	0.19	0.19	0.2	0.14	0.12	0.13	0.11	0.13
			1,2,4-trimethylbenzene	NA	NA	0.28	0.26	0.25	0.23	0.21	0.19	0.21	0.21	0.2	0.14	0.12	0.13	0.11	0.12
			1,3,5-trimethylbenzene	NA	NA	0.27	0.26	0.25	0.22	0.2	0.19	0.21	0.21	0.19	0.13	0.12	0.12	0.11	0.12
			o-xylene	NA	NA	0.2	0.19	0.18	0.16	0.15	0.14	0.15	0.15	0.14	0.099	0.085	0.092	0.08	0.09
			cyclohexane	NA	NA	0.18	0.17	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.09	0.077	0.084	0.073	0.082
			methylcyclohexane	NA	NA	0.18	0.18	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.092	0.079	0.086	0.075	0.084

Garfield County: Valley (Rifle)	Drilling	n-nonane	NA	NA	0.17	0.16	0.15	0.14	0.13	0.13	0.13	0.13	0.12	0.083	0.072	0.077	0.067	0.076
		styrene	NA	NA	0.16	0.15	0.14	0.13	0.12	0.11	0.1	0.1	0.11	0.076	0.066	0.059	0.062	0.07
		benzene	NA	NA	7.2	6.1	5.7	5.2	4.6	4.3	4.1	3.6	3.4	3.2	2.9	2.9	2.2	2.1
		toluene	NA	NA	1.6	1.6	1.5	1.4	1.2	1.2	1.1	0.81	0.77	0.72	0.66	0.65	0.51	0.47
		2-ethyltoluene	NA	NA	0.12	0.1	0.095	0.086	0.074	0.069	0.066	0.058	0.055	0.05	0.047	0.043	0.036	0.034
	Fracking	benzene	NA	NA	5.1	5.3	5	4.5	3.6	3.3	3.1	2.9	2.8	2.5	2.4	2.3	1.9	1.8
		m+p-xylene	NA	NA	0.71	0.74	0.69	0.62	0.49	0.46	0.43	0.41	0.38	0.34	0.33	0.32	0.26	0.25
		2-ethyltoluene	NA	NA	0.41	0.38	0.36	0.32	0.26	0.24	0.23	0.22	0.21	0.19	0.18	0.18	0.15	0.13
		toluene	NA	NA	0.31	0.32	0.3	0.27	0.21	0.2	0.19	0.18	0.17	0.15	0.14	0.14	0.11	0.11
		3-ethyltoluene	NA	NA	0.23	0.24	0.23	0.2	0.16	0.15	0.14	0.13	0.13	0.11	0.11	0.11	0.087	0.082
		n-decane	NA	NA	0.16	0.17	0.16	0.14	0.11	0.11	0.1	0.094	0.088	0.079	0.076	0.074	0.061	0.057
		cyclohexane	NA	NA	0.13	0.14	0.13	0.12	0.091	0.087	0.084	0.08	0.076	0.068	0.065	0.058	0.048	0.046
		methylcyclohexane	NA	NA	0.13	0.14	0.13	0.12	0.094	0.088	0.082	0.077	0.073	0.065	0.062	0.061	0.05	0.047
		trans-2-butene	NA	NA	0.12	0.12	0.11	0.1	0.082	0.077	0.072	0.068	0.064	0.057	0.055	0.045	0.04	0.041
		2-ethyltoluene	NA	NA	11	11	10	9.3	6.4	5.8	5.4	4.9	4.7	4.3	3.9	3.4	3.2	2.8
	Flowback	benzene	NA	NA	2.9	2.7	2.6	2.3	2	1.9	1.7	1.2	1.1	1.1	0.97	0.94	0.81	0.7
		3-ethyltoluene	NA	NA	1.2	1.1	1.1	0.97	0.66	0.6	0.56	0.51	0.48	0.45	0.4	0.36	0.33	0.29
		4-ethyltoluene	NA	NA	0.8	0.76	0.72	0.65	0.44	0.4	0.38	0.34	0.32	0.3	0.27	0.24	0.22	0.19
		n-decane	NA	NA	0.75	0.72	0.68	0.61	0.42	0.38	0.36	0.32	0.31	0.28	0.25	0.23	0.21	0.18
		n-propylbenzene	NA	NA	0.71	0.68	0.64	0.58	0.4	0.36	0.34	0.3	0.29	0.27	0.24	0.21	0.2	0.17
		1,3-diethylbenzene	NA	NA	0.61	0.58	0.55	0.49	0.34	0.31	0.29	0.26	0.25	0.23	0.2	0.18	0.17	0.15
		m+p-xylene	NA	NA	0.54	0.51	0.49	0.44	0.3	0.27	0.25	0.23	0.22	0.2	0.18	0.16	0.15	0.13
		isopropylbenzene	NA	NA	0.47	0.45	0.43	0.39	0.26	0.24	0.22	0.2	0.19	0.18	0.16	0.14	0.13	0.12
		toluene	NA	NA	0.45	0.43	0.41	0.37	0.25	0.23	0.21	0.19	0.18	0.17	0.15	0.14	0.13	0.11
		1,2,3-trimethylbenzene	NA	NA	0.24	0.23	0.22	0.19	0.13	0.12	0.11	0.1	0.097	0.09	0.081	0.072	0.067	0.058
		1,2,4-trimethylbenzene	NA	NA	0.23	0.22	0.21	0.19	0.13	0.12	0.11	0.098	0.093	0.087	0.078	0.069	0.065	0.056
		1,3,5-trimethylbenzene	NA	NA	0.23	0.22	0.2	0.18	0.13	0.11	0.11	0.096	0.091	0.085	0.076	0.068	0.063	0.055
		o-xylene	NA	NA	0.17	0.16	0.15	0.14	0.093	0.085	0.079	0.071	0.068	0.063	0.056	0.05	0.047	0.041
		methylcyclohexane	NA	NA	0.16	0.15	0.14	0.13	0.091	0.088	0.078	0.066	0.063	0.059	0.052	0.046	0.044	0.038
		cyclohexane	NA	NA	0.15	0.14	0.14	0.12	0.11	0.1	0.091	0.063	0.059	0.058	0.051	0.049	0.042	0.037
		n-nonane	NA	NA	0.14	0.13	0.13	0.11	0.078	0.071	0.066	0.06	0.057	0.053	0.047	0.042	0.039	0.034
		styrene	NA	NA	0.13	0.12	0.12	0.11	0.072	0.065	0.061	0.055	0.052	0.049	0.044	0.039	0.036	0.031
Northern Front Range	Drilling	benzene	NA	NA	8.3	8	7.7	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3
		toluene	NA	NA	1.9	1.8	1.8	1.5	1.5	1.3	1.2	1.1	1	0.84	0.74	0.66	0.59	0.53
		2-ethyltoluene	NA	NA	0.13	0.13	0.12	0.11	0.097	0.089	0.081	0.076	0.071	0.059	0.051	0.045	0.04	0.036
	Fracking	benzene	NA	NA	0.45	0.43	0.41	0.41	0.43	0.45	0.46	0.43	0.41	0.35	0.36	0.18	0.31	0.3
	Flowback	benzene	NA	NA	15	15	15	12	13	12	10	9.8	8.1	7.1	6.2	5.5	4.9	4.4

18 to 59 Years	Garfield County: Ridge Top (BarD)		3-ethyltoluene	NA	NA	0.5	0.51	0.49	0.4	0.42	0.38	0.35	0.32	0.27	0.24	0.21	0.18	0.16	0.15
			toluene	NA	NA	0.51	0.51	0.5	0.41	0.42	0.39	0.36	0.34	0.27	0.24	0.21	0.19	0.16	0.15
			cyclohexane	NA	NA	0.44	0.45	0.43	0.4	0.37	0.34	0.35	0.33	0.27	0.21	0.18	0.16	0.14	0.13
			m+p-xylene	NA	NA	0.32	0.32	0.31	0.26	0.27	0.24	0.22	0.21	0.17	0.15	0.13	0.12	0.1	0.093
			methylcyclohexane	NA	NA	0.2	0.21	0.2	0.19	0.17	0.16	0.16	0.15	0.12	0.096	0.084	0.075	0.067	0.06
			n-hexane	NA	NA	0.2	0.2	0.19	0.16	0.16	0.16	0.16	0.15	0.12	0.092	0.081	0.072	0.064	0.058
			n-decane	NA	NA	0.17	0.18	0.17	0.16	0.14	0.13	0.12	0.11	0.093	0.081	0.071	0.063	0.056	0.051
			n-octane	NA	NA	0.14	0.14	0.14	0.13	0.12	0.11	0.1	0.095	0.085	0.066	0.058	0.052	0.046	0.041
			n-nonane	NA	NA	0.12	0.12	0.12	0.11	0.1	0.091	0.083	0.077	0.064	0.056	0.049	0.044	0.039	0.035
		Drilling	benzene	NA	NA	7.3	6.6	6.4	6	5.8	5.6	5.2	5.9	5.8	4.6	4.2	3.9	3.6	3.3
			toluene	NA	NA	1.7	1.5	1.4	1.4	1.3	1.3	1.2	1.6	1.5	1	0.95	0.88	0.81	0.75
		Fracking	2-ethyltoluene	NA	NA	0.12	0.11	0.1	0.097	0.093	0.09	0.084	0.083	0.08	0.074	0.068	0.063	0.058	0.054
			benzene	NA	NA	6.2	5.7	5.4	4.8	4.2	3.6	3.2	3.1	2.9	2.6	2.4	2.1	1.9	1.8
			m+p-xylene	NA	NA	0.85	0.79	0.75	0.66	0.58	0.5	0.44	0.36	0.33	0.27	0.24	0.22	0.19	0.17
			2-ethyltoluene	NA	NA	0.45	0.41	0.39	0.35	0.31	0.28	0.26	0.27	0.25	0.23	0.2	0.18	0.17	0.15
			toluene	NA	NA	0.37	0.34	0.32	0.29	0.25	0.22	0.19	0.2	0.19	0.17	0.15	0.14	0.12	0.11
			3-ethyltoluene	NA	NA	0.28	0.26	0.25	0.22	0.19	0.17	0.15	0.12	0.11	0.093	0.084	0.076	0.069	0.064
			n-decane	NA	NA	0.2	0.18	0.17	0.15	0.13	0.12	0.1	0.083	0.076	0.067	0.062	0.057	0.052	0.048
			cyclohexane	NA	NA	0.16	0.15	0.14	0.12	0.11	0.1	0.095	0.098	0.093	0.084	0.075	0.068	0.062	0.056
			methylcyclohexane	NA	NA	0.16	0.15	0.14	0.13	0.11	0.096	0.089	0.092	0.087	0.079	0.071	0.064	0.058	0.053
			trans-2-butene	NA	NA	0.14	0.13	0.12	0.11	0.095	0.084	0.075	0.077	0.072	0.063	0.056	0.05	0.045	0.04
			n-octane	NA	NA	0.12	0.11	0.1	0.09	0.079	0.068	0.06	0.054	0.052	0.047	0.042	0.038	0.034	0.031
			n-nonane	NA	NA	0.11	0.1	0.097	0.086	0.076	0.066	0.058	0.047	0.043	0.039	0.035	0.032	0.029	0.026
		Flowback	2-ethyltoluene	NA	NA	14	13	13	11	10	9.6	9.3	11	9.8	6.8	5.9	5.2	5	6.2
			benzene	NA	NA	3.4	3.3	3.1	2.8	2.6	2.6	2.6	2.6	2.5	1.7	1.5	1.6	1.4	1.6
			3-ethyltoluene	NA	NA	1.4	1.4	1.3	1.2	1.1	0.99	1.1	1.1	1	0.7	0.61	0.66	0.57	0.64
			4-ethyltoluene	NA	NA	0.96	0.91	0.87	0.78	0.71	0.67	0.73	0.73	0.68	0.47	0.41	0.44	0.38	0.43
			n-decane	NA	NA	0.91	0.86	0.82	0.74	0.67	0.63	0.69	0.69	0.64	0.44	0.39	0.42	0.36	0.41
			n-propylbenzene	NA	NA	0.86	0.82	0.78	0.7	0.64	0.6	0.58	0.56	0.61	0.42	0.36	0.32	0.34	0.39
			1,3-diethylbenzene	NA	NA	0.73	0.7	0.66	0.6	0.54	0.51	0.49	0.48	0.52	0.36	0.31	0.28	0.29	0.33
			m+p-xylene	NA	NA	0.64	0.62	0.59	0.53	0.48	0.49	0.5	0.49	0.46	0.32	0.28	0.3	0.26	0.29
			isopropylbenzene	NA	NA	0.57	0.54	0.52	0.47	0.42	0.4	0.44	0.43	0.41	0.28	0.24	0.26	0.23	0.26
			toluene	NA	NA	0.54	0.52	0.49	0.44	0.4	0.41	0.42	0.41	0.39	0.27	0.23	0.25	0.22	0.24
			1,2,3-trimethylbenzene	NA	NA	0.29	0.27	0.26	0.24	0.21	0.2	0.19	0.19	0.2	0.14	0.12	0.13	0.11	0.13
			1,2,4-trimethylbenzene	NA	NA	0.28	0.26	0.25	0.23	0.21	0.19	0.21	0.21	0.2	0.14	0.12	0.13	0.11	0.12
			1,3,5-trimethylbenzene	NA	NA	0.27	0.26	0.25	0.22	0.2	0.19	0.21	0.21	0.19	0.13	0.12	0.12	0.11	0.12
			o-xylene	NA	NA	0.2	0.19	0.18	0.16	0.15	0.14	0.15	0.15	0.14	0.099	0.085	0.092	0.08	0.09

Garfield County: Valley (Rifle)		cyclohexane	NA	NA	0.18	0.17	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.09	0.077	0.084	0.073	0.082
		methylcyclohexane	NA	NA	0.18	0.18	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.092	0.079	0.086	0.075	0.084
		n-nonane	NA	NA	0.17	0.16	0.15	0.14	0.13	0.13	0.13	0.13	0.12	0.083	0.072	0.077	0.067	0.076
		styrene	NA	NA	0.16	0.15	0.14	0.13	0.12	0.11	0.1	0.1	0.11	0.076	0.066	0.059	0.062	0.07
	Drilling	benzene	NA	NA	7.2	6.1	5.7	5.2	4.6	4.3	4.1	3.6	3.4	3.2	2.9	2.9	2.2	2.1
		toluene	NA	NA	1.6	1.6	1.5	1.4	1.2	1.2	1.1	0.81	0.77	0.72	0.66	0.65	0.51	0.47
		2-ethyltoluene	NA	NA	0.12	0.1	0.095	0.086	0.074	0.069	0.066	0.058	0.055	0.05	0.047	0.043	0.036	0.034
	Fracking	benzene	NA	NA	5.1	5.3	5	4.5	3.6	3.3	3.1	2.9	2.8	2.5	2.4	2.3	1.9	1.8
		m+p-xylene	NA	NA	0.71	0.74	0.69	0.62	0.49	0.46	0.43	0.41	0.38	0.34	0.33	0.32	0.26	0.25
		2-ethyltoluene	NA	NA	0.41	0.38	0.36	0.32	0.26	0.24	0.23	0.22	0.21	0.19	0.18	0.18	0.15	0.13
		toluene	NA	NA	0.31	0.32	0.3	0.27	0.21	0.2	0.19	0.18	0.17	0.15	0.14	0.14	0.11	0.11
		3-ethyltoluene	NA	NA	0.23	0.24	0.23	0.2	0.16	0.15	0.14	0.13	0.13	0.11	0.11	0.11	0.087	0.082
		n-decane	NA	NA	0.16	0.17	0.16	0.14	0.11	0.11	0.1	0.094	0.088	0.079	0.076	0.074	0.061	0.057
		cyclohexane	NA	NA	0.13	0.14	0.13	0.12	0.091	0.087	0.084	0.08	0.076	0.068	0.065	0.058	0.048	0.046
		methylcyclohexane	NA	NA	0.13	0.14	0.13	0.12	0.094	0.088	0.082	0.077	0.073	0.065	0.062	0.061	0.05	0.047
		trans-2-butene	NA	NA	0.12	0.12	0.11	0.1	0.082	0.077	0.072	0.068	0.064	0.057	0.055	0.045	0.04	0.041
	Flowback	2-ethyltoluene	NA	NA	11	11	10	9.3	6.4	5.8	5.4	4.9	4.7	4.3	3.9	3.4	3.2	2.8
		benzene	NA	NA	2.9	2.7	2.6	2.3	2	1.9	1.7	1.2	1.1	1.1	0.97	0.94	0.81	0.7
		3-ethyltoluene	NA	NA	1.2	1.1	1.1	0.97	0.66	0.6	0.56	0.51	0.48	0.45	0.4	0.36	0.33	0.29
		4-ethyltoluene	NA	NA	0.8	0.76	0.72	0.65	0.44	0.4	0.38	0.34	0.32	0.3	0.27	0.24	0.22	0.19
		n-decane	NA	NA	0.75	0.72	0.68	0.61	0.42	0.38	0.36	0.32	0.31	0.28	0.25	0.23	0.21	0.18
		n-propylbenzene	NA	NA	0.71	0.68	0.64	0.58	0.4	0.36	0.34	0.3	0.29	0.27	0.24	0.21	0.2	0.17
		1,3-diethylbenzene	NA	NA	0.61	0.58	0.55	0.49	0.34	0.31	0.29	0.26	0.25	0.23	0.2	0.18	0.17	0.15
		m+p-xylene	NA	NA	0.54	0.51	0.49	0.44	0.3	0.27	0.25	0.23	0.22	0.2	0.18	0.16	0.15	0.13
		isopropylbenzene	NA	NA	0.47	0.45	0.43	0.39	0.26	0.24	0.22	0.2	0.19	0.18	0.16	0.14	0.13	0.12
		toluene	NA	NA	0.45	0.43	0.41	0.37	0.25	0.23	0.21	0.19	0.18	0.17	0.15	0.14	0.13	0.11
		1,2,3-trimethylbenzene	NA	NA	0.24	0.23	0.22	0.19	0.13	0.12	0.11	0.1	0.097	0.09	0.081	0.072	0.067	0.058
		1,2,4-trimethylbenzene	NA	NA	0.23	0.22	0.21	0.19	0.13	0.12	0.11	0.098	0.093	0.087	0.078	0.069	0.065	0.056
		1,3,5-trimethylbenzene	NA	NA	0.23	0.22	0.2	0.18	0.13	0.11	0.11	0.096	0.091	0.085	0.076	0.068	0.063	0.055
		o-xylene	NA	NA	0.17	0.16	0.15	0.14	0.093	0.085	0.079	0.071	0.068	0.063	0.056	0.05	0.047	0.041
		methylcyclohexane	NA	NA	0.16	0.15	0.14	0.13	0.091	0.088	0.078	0.066	0.063	0.059	0.052	0.046	0.044	0.038
		cyclohexane	NA	NA	0.15	0.14	0.14	0.12	0.11	0.1	0.091	0.063	0.059	0.058	0.051	0.049	0.042	0.037
		n-nonane	NA	NA	0.14	0.13	0.13	0.11	0.078	0.071	0.066	0.06	0.057	0.053	0.047	0.042	0.039	0.034
		styrene	NA	NA	0.13	0.12	0.12	0.11	0.072	0.065	0.061	0.055	0.052	0.049	0.044	0.039	0.036	0.031
	Drilling	benzene	NA	NA	8.3	8	7.7	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3
		toluene	NA	NA	1.9	1.8	1.8	1.5	1.5	1.3	1.2	1.1	1	0.84	0.74	0.66	0.59	0.53
		2-ethyltoluene	NA	NA	0.13	0.13	0.12	0.11	0.097	0.089	0.081	0.076	0.071	0.059	0.051	0.045	0.04	0.036
Northern Front Range	Drilling	benzene	NA	NA	8.3	8	7.7	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3
		toluene	NA	NA	1.9	1.8	1.8	1.5	1.5	1.3	1.2	1.1	1	0.84	0.74	0.66	0.59	0.53
		2-ethyltoluene	NA	NA	0.13	0.13	0.12	0.11	0.097	0.089	0.081	0.076	0.071	0.059	0.051	0.045	0.04	0.036

60+ Years	Garfield County: Ridge Top (BarD)	Fracking	benzene	NA	NA	0.45	0.43	0.41	0.41	0.43	0.45	0.46	0.43	0.41	0.35	0.36	0.18	0.31	0.3
		Flowback	benzene	NA	NA	15	15	15	12	13	12	10	9.8	8.1	7.1	6.2	5.5	4.9	4.4
			3-ethyltoluene	NA	NA	0.5	0.51	0.49	0.4	0.42	0.38	0.35	0.32	0.27	0.24	0.21	0.18	0.16	0.15
			toluene	NA	NA	0.51	0.51	0.5	0.41	0.42	0.39	0.36	0.34	0.27	0.24	0.21	0.19	0.16	0.15
			cyclohexane	NA	NA	0.44	0.45	0.43	0.4	0.37	0.34	0.35	0.33	0.27	0.21	0.18	0.16	0.14	0.13
			m+p-xylene	NA	NA	0.32	0.32	0.31	0.26	0.27	0.24	0.22	0.21	0.17	0.15	0.13	0.12	0.1	0.093
			methylcyclohexane	NA	NA	0.2	0.21	0.2	0.19	0.17	0.16	0.16	0.15	0.12	0.096	0.084	0.075	0.067	0.06
			n-hexane	NA	NA	0.2	0.2	0.19	0.16	0.16	0.16	0.16	0.15	0.12	0.092	0.081	0.072	0.064	0.058
			n-decane	NA	NA	0.17	0.18	0.17	0.16	0.14	0.13	0.12	0.11	0.093	0.081	0.071	0.063	0.056	0.051
			n-octane	NA	NA	0.14	0.14	0.14	0.13	0.12	0.11	0.1	0.095	0.085	0.066	0.058	0.052	0.046	0.041
			n-nonane	NA	NA	0.12	0.12	0.12	0.11	0.1	0.091	0.083	0.077	0.064	0.056	0.049	0.044	0.039	0.035
		Drilling	benzene	NA	NA	7.3	6.6	6.4	6	5.8	5.6	5.2	5.9	5.8	4.6	4.2	3.9	3.6	3.3
			toluene	NA	NA	1.7	1.5	1.4	1.4	1.3	1.3	1.2	1.6	1.5	1	0.95	0.88	0.81	0.75
		Fracking	2-ethyltoluene	NA	NA	0.12	0.11	0.1	0.097	0.093	0.09	0.084	0.083	0.08	0.074	0.068	0.063	0.058	0.054
			benzene	NA	NA	6.2	5.7	5.4	4.8	4.2	3.6	3.2	3.1	2.9	2.6	2.4	2.1	1.9	1.8
			m+p-xylene	NA	NA	0.85	0.79	0.75	0.66	0.58	0.5	0.44	0.36	0.33	0.27	0.24	0.22	0.19	0.17
			2-ethyltoluene	NA	NA	0.45	0.41	0.39	0.35	0.31	0.28	0.26	0.27	0.25	0.23	0.2	0.18	0.17	0.15
			toluene	NA	NA	0.37	0.34	0.32	0.29	0.25	0.22	0.19	0.2	0.19	0.17	0.15	0.14	0.12	0.11
			3-ethyltoluene	NA	NA	0.28	0.26	0.25	0.22	0.19	0.17	0.15	0.12	0.11	0.093	0.084	0.076	0.069	0.064
			n-decane	NA	NA	0.2	0.18	0.17	0.15	0.13	0.12	0.1	0.083	0.076	0.067	0.062	0.057	0.052	0.048
			cyclohexane	NA	NA	0.16	0.15	0.14	0.12	0.11	0.1	0.095	0.098	0.093	0.084	0.075	0.068	0.062	0.056
			methylcyclohexane	NA	NA	0.16	0.15	0.14	0.13	0.11	0.096	0.089	0.092	0.087	0.079	0.071	0.064	0.058	0.053
			trans-2-butene	NA	NA	0.14	0.13	0.12	0.11	0.095	0.084	0.075	0.077	0.072	0.063	0.056	0.05	0.045	0.04
			n-octane	NA	NA	0.12	0.11	0.1	0.09	0.079	0.068	0.06	0.054	0.052	0.047	0.042	0.038	0.034	0.031
			n-nonane	NA	NA	0.11	0.1	0.097	0.086	0.076	0.066	0.058	0.047	0.043	0.039	0.035	0.032	0.029	0.026
		Flowback	2-ethyltoluene	NA	NA	14	13	13	11	10	9.6	9.3	11	9.8	6.8	5.9	5.2	5	6.2
			benzene	NA	NA	3.4	3.3	3.1	2.8	2.6	2.6	2.6	2.6	2.5	1.7	1.5	1.6	1.4	1.6
			3-ethyltoluene	NA	NA	1.4	1.4	1.3	1.2	1.1	0.99	1.1	1.1	1	0.7	0.61	0.66	0.57	0.64
			4-ethyltoluene	NA	NA	0.96	0.91	0.87	0.78	0.71	0.67	0.73	0.73	0.68	0.47	0.41	0.44	0.38	0.43
			n-decane	NA	NA	0.91	0.86	0.82	0.74	0.67	0.63	0.69	0.69	0.64	0.44	0.39	0.42	0.36	0.41
			n-propylbenzene	NA	NA	0.86	0.82	0.78	0.7	0.64	0.6	0.58	0.56	0.61	0.42	0.36	0.32	0.34	0.39
			1,3-diethylbenzene	NA	NA	0.73	0.7	0.66	0.6	0.54	0.51	0.49	0.48	0.52	0.36	0.31	0.28	0.29	0.33
			m+p-xylene	NA	NA	0.64	0.62	0.59	0.53	0.48	0.49	0.5	0.49	0.46	0.32	0.28	0.3	0.26	0.29
			isopropylbenzene	NA	NA	0.57	0.54	0.52	0.47	0.42	0.4	0.44	0.43	0.41	0.28	0.24	0.26	0.23	0.26
			toluene	NA	NA	0.54	0.52	0.49	0.44	0.4	0.41	0.42	0.41	0.39	0.27	0.23	0.25	0.22	0.24
			1,2,3-trimethylbenzene	NA	NA	0.29	0.27	0.26	0.24	0.21	0.2	0.19	0.19	0.2	0.14	0.12	0.13	0.11	0.13
			1,2,4-trimethylbenzene	NA	NA	0.28	0.26	0.25	0.23	0.21	0.19	0.21	0.21	0.2	0.14	0.12	0.13	0.11	0.12

Garfield County: Valley (Rifle)	Drilling	1,3,5-trimethylbenzene	NA	NA	0.27	0.26	0.25	0.22	0.2	0.19	0.21	0.21	0.19	0.13	0.12	0.12	0.11	0.12
		o-xylene	NA	NA	0.2	0.19	0.18	0.16	0.15	0.14	0.15	0.15	0.14	0.099	0.085	0.092	0.08	0.09
		cyclohexane	NA	NA	0.18	0.17	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.09	0.077	0.084	0.073	0.082
		methylcyclohexane	NA	NA	0.18	0.18	0.17	0.15	0.14	0.14	0.14	0.14	0.13	0.092	0.079	0.086	0.075	0.084
		n-nonane	NA	NA	0.17	0.16	0.15	0.14	0.13	0.13	0.13	0.13	0.12	0.083	0.072	0.077	0.067	0.076
		styrene	NA	NA	0.16	0.15	0.14	0.13	0.12	0.11	0.1	0.1	0.11	0.076	0.066	0.059	0.062	0.07
	Fracking	benzene	NA	NA	7.2	6.1	5.7	5.2	4.6	4.3	4.1	3.6	3.4	3.2	2.9	2.9	2.2	2.1
		toluene	NA	NA	1.6	1.6	1.5	1.4	1.2	1.2	1.1	0.81	0.77	0.72	0.66	0.65	0.51	0.47
		2-ethyltoluene	NA	NA	0.12	0.1	0.095	0.086	0.074	0.069	0.066	0.058	0.055	0.05	0.047	0.043	0.036	0.034
		benzene	NA	NA	5.1	5.3	5	4.5	3.6	3.3	3.1	2.9	2.8	2.5	2.4	2.3	1.9	1.8
		m+p-xylene	NA	NA	0.71	0.74	0.69	0.62	0.49	0.46	0.43	0.41	0.38	0.34	0.33	0.32	0.26	0.25
		2-ethyltoluene	NA	NA	0.41	0.38	0.36	0.32	0.26	0.24	0.23	0.22	0.21	0.19	0.18	0.18	0.15	0.13
		toluene	NA	NA	0.31	0.32	0.3	0.27	0.21	0.2	0.19	0.18	0.17	0.15	0.14	0.14	0.11	0.11
		3-ethyltoluene	NA	NA	0.23	0.24	0.23	0.2	0.16	0.15	0.14	0.13	0.13	0.11	0.11	0.11	0.087	0.082
		n-decane	NA	NA	0.16	0.17	0.16	0.14	0.11	0.11	0.1	0.094	0.088	0.079	0.076	0.074	0.061	0.057
		cyclohexane	NA	NA	0.13	0.14	0.13	0.12	0.091	0.087	0.084	0.08	0.076	0.068	0.065	0.058	0.048	0.046
		methylcyclohexane	NA	NA	0.13	0.14	0.13	0.12	0.094	0.088	0.082	0.077	0.073	0.065	0.062	0.061	0.05	0.047
		trans-2-butene	NA	NA	0.12	0.12	0.11	0.1	0.082	0.077	0.072	0.068	0.064	0.057	0.055	0.045	0.04	0.041
	Flowback	2-ethyltoluene	NA	NA	11	11	10	9.3	6.4	5.8	5.4	4.9	4.7	4.3	3.9	3.4	3.2	2.8
		benzene	NA	NA	2.9	2.7	2.6	2.3	2	1.9	1.7	1.2	1.1	1.1	0.97	0.94	0.81	0.7
		3-ethyltoluene	NA	NA	1.2	1.1	1.1	0.97	0.66	0.6	0.56	0.51	0.48	0.45	0.4	0.36	0.33	0.29
		4-ethyltoluene	NA	NA	0.8	0.76	0.72	0.65	0.44	0.4	0.38	0.34	0.32	0.3	0.27	0.24	0.22	0.19
		n-decane	NA	NA	0.75	0.72	0.68	0.61	0.42	0.38	0.36	0.32	0.31	0.28	0.25	0.23	0.21	0.18
		n-propylbenzene	NA	NA	0.71	0.68	0.64	0.58	0.4	0.36	0.34	0.3	0.29	0.27	0.24	0.21	0.2	0.17
		1,3-diethylbenzene	NA	NA	0.61	0.58	0.55	0.49	0.34	0.31	0.29	0.26	0.25	0.23	0.2	0.18	0.17	0.15
		m+p-xylene	NA	NA	0.54	0.51	0.49	0.44	0.3	0.27	0.25	0.23	0.22	0.2	0.18	0.16	0.15	0.13
		isopropylbenzene	NA	NA	0.47	0.45	0.43	0.39	0.26	0.24	0.22	0.2	0.19	0.18	0.16	0.14	0.13	0.12
		toluene	NA	NA	0.45	0.43	0.41	0.37	0.25	0.23	0.21	0.19	0.18	0.17	0.15	0.14	0.13	0.11
		1,2,3-trimethylbenzene	NA	NA	0.24	0.23	0.22	0.19	0.13	0.12	0.11	0.1	0.097	0.09	0.081	0.072	0.067	0.058
		1,2,4-trimethylbenzene	NA	NA	0.23	0.22	0.21	0.19	0.13	0.12	0.11	0.098	0.093	0.087	0.078	0.069	0.065	0.056
		1,3,5-trimethylbenzene	NA	NA	0.23	0.22	0.2	0.18	0.13	0.11	0.11	0.096	0.091	0.085	0.076	0.068	0.063	0.055
		o-xylene	NA	NA	0.17	0.16	0.15	0.14	0.093	0.085	0.079	0.071	0.068	0.063	0.056	0.05	0.047	0.041
		methylcyclohexane	NA	NA	0.16	0.15	0.14	0.13	0.091	0.088	0.078	0.066	0.063	0.059	0.052	0.046	0.044	0.038
		cyclohexane	NA	NA	0.15	0.14	0.14	0.12	0.11	0.1	0.091	0.063	0.059	0.058	0.051	0.049	0.042	0.037
		n-nonane	NA	NA	0.14	0.13	0.13	0.11	0.078	0.071	0.066	0.06	0.057	0.053	0.047	0.042	0.039	0.034
		styrene	NA	NA	0.13	0.12	0.12	0.11	0.072	0.065	0.061	0.055	0.052	0.049	0.044	0.039	0.036	0.031
		benzene	NA	NA	8.3	8	7.7	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3
Northern	Drilling	benzene	NA	NA	8.3	8	7.7	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3

Front Range	Fracking	toluene	NA	NA	1.9	1.8	1.8	1.5	1.5	1.3	1.2	1.1	1	0.84	0.74	0.66	0.59	0.53
		2-ethyltoluene	NA	NA	0.13	0.13	0.12	0.11	0.097	0.089	0.081	0.076	0.071	0.059	0.051	0.045	0.04	0.036
	Flowback	benzene	NA	NA	0.45	0.43	0.41	0.41	0.43	0.45	0.46	0.43	0.41	0.35	0.36	0.18	0.31	0.3
		benzene	NA	NA	15	15	15	12	13	12	10	9.8	8.1	7.1	6.2	5.5	4.9	4.4
		3-ethyltoluene	NA	NA	0.5	0.51	0.49	0.4	0.42	0.38	0.35	0.32	0.27	0.24	0.21	0.18	0.16	0.15
		toluene	NA	NA	0.51	0.51	0.5	0.41	0.42	0.39	0.36	0.34	0.27	0.24	0.21	0.19	0.16	0.15
		cyclohexane	NA	NA	0.44	0.45	0.43	0.4	0.37	0.34	0.35	0.33	0.27	0.21	0.18	0.16	0.14	0.13
		m+p-xylene	NA	NA	0.32	0.32	0.31	0.26	0.27	0.24	0.22	0.21	0.17	0.15	0.13	0.12	0.1	0.093
		methylcyclohexane	NA	NA	0.2	0.21	0.2	0.19	0.17	0.16	0.16	0.15	0.12	0.096	0.084	0.075	0.067	0.06
		n-hexane	NA	NA	0.2	0.2	0.19	0.16	0.16	0.16	0.16	0.15	0.12	0.092	0.081	0.072	0.064	0.058
		n-decane	NA	NA	0.17	0.18	0.17	0.16	0.14	0.13	0.12	0.11	0.093	0.081	0.071	0.063	0.056	0.051
		n-octane	NA	NA	0.14	0.14	0.14	0.13	0.12	0.11	0.1	0.095	0.085	0.066	0.058	0.052	0.046	0.041
		n-nonane	NA	NA	0.12	0.12	0.12	0.11	0.1	0.091	0.083	0.077	0.064	0.056	0.049	0.044	0.039	0.035

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-10. Percentage of Daily-maximum Acute Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	98%	97%	96%	93%	90%	84%	78%	83%	80%	51%	37%	25%	16%	10%
			toluene	NA	NA	33%	25%	19%	6%	2%	1%	1%	5%	4%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	96%	95%	93%	89%	83%	75%	65%	55%	45%	29%	16%	8%	4%	2%
			benzene	NA	NA	86%	84%	81%	74%	66%	60%	57%	54%	50%	21%	10%	9%	6%	7%
			2-ethyltoluene	NA	NA	66%	64%	63%	60%	59%	57%	56%	55%	53%	47%	44%	40%	37%	34%
	Garfield County: Valley (Rifle)	Flowback	3-ethyltoluene	NA	NA	7%	6%	4%	2%	1%	0%	1%	1%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	99%	98%	97%	96%	95%	93%	91%	88%	85%	83%	75%	68%	59%	46%
			toluene	NA	NA	44%	34%	25%	10%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	98%	97%	96%	94%	90%	87%	85%	82%	78%	70%	64%	53%	38%	22%
			2-ethyltoluene	NA	NA	71%	69%	68%	66%	64%	63%	62%	61%	60%	59%	57%	54%	51%	49%
			3-ethyltoluene	NA	NA	3%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Drilling	benzene	NA	NA	99%	98%	98%	96%	93%	90%	86%	82%	77%	67%	56%	45%	34%	24%
			toluene	NA	NA	47%	39%	31%	16%	6%	3%	1%	1%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	100%	100%	100%	100%	100%	99%	99%	98%	97%	94%	91%	87%	82%	76%
18 to 59	Garfield	Drilling	benzene	NA	NA	98%	97%	96%	93%	89%	84%	78%	82%	80%	50%	37%	25%	16%	10%

Years	County: Ridge Top (BarD)		toluene	NA	NA	33%	25%	18%	6%	2%	1%	1%	5%	4%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	96%	95%	93%	88%	83%	74%	64%	54%	45%	29%	15%	8%	4%	2%
		Flowback	benzene	NA	NA	85%	83%	80%	73%	65%	59%	56%	53%	50%	21%	10%	9%	6%	7%
			2-ethyltoluene	NA	NA	66%	64%	62%	60%	59%	57%	56%	54%	53%	47%	44%	40%	37%	34%
			3-ethyltoluene	NA	NA	7%	6%	4%	2%	1%	0%	1%	1%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	99%	98%	97%	96%	94%	93%	91%	87%	84%	82%	74%	67%	58%	44%
			toluene	NA	NA	42%	32%	24%	9%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	98%	97%	96%	94%	89%	86%	84%	81%	77%	68%	62%	51%	37%	21%
			benzene	NA	NA	87%	83%	78%	73%	50%	37%	22%	6%	2%	1%	0%	0%	0%	0%
			2-ethyltoluene	NA	NA	71%	69%	67%	65%	64%	63%	62%	61%	60%	58%	56%	54%	51%	49%
	Northern Front Range	Drilling	benzene	NA	NA	99%	98%	97%	95%	93%	89%	85%	81%	76%	66%	55%	44%	33%	23%
			toluene	NA	NA	46%	37%	29%	15%	6%	2%	1%	1%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	100%	100%	100%	100%	100%	99%	99%	98%	97%	94%	90%	86%	81%	75%
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	96%	95%	94%	91%	87%	81%	75%	80%	77%	48%	35%	23%	15%	10%
			toluene	NA	NA	31%	23%	17%	6%	1%	1%	1%	4%	4%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	93%	92%	90%	85%	79%	71%	61%	51%	42%	27%	15%	7%	4%	2%
			benzene	NA	NA	81%	79%	76%	69%	62%	56%	53%	51%	47%	20%	9%	8%	6%	7%
			2-ethyltoluene	NA	NA	65%	63%	62%	60%	58%	57%	55%	54%	52%	47%	43%	39%	36%	33%
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	97%	96%	95%	94%	92%	90%	88%	84%	81%	79%	71%	64%	55%	42%
			toluene	NA	NA	40%	30%	22%	9%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%
		Fracking	benzene	NA	NA	95%	95%	93%	91%	85%	83%	80%	77%	73%	65%	59%	48%	35%	20%
			benzene	NA	NA	82%	78%	74%	68%	47%	35%	21%	6%	2%	1%	0%	0%	0%	0%
			2-ethyltoluene	NA	NA	71%	69%	67%	65%	64%	63%	62%	60%	59%	58%	56%	53%	49%	47%
	Northern Front Range	Drilling	benzene	NA	NA	98%	97%	96%	93%	91%	87%	83%	78%	73%	64%	53%	42%	32%	22%
			toluene	NA	NA	44%	35%	28%	15%	5%	2%	1%	1%	0%	0%	0%	0%	0%	0%
		Flowback	benzene	NA	NA	100%	100%	100%	100%	99%	98%	97%	96%	95%	92%	88%	84%	78%	72%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity.

Table E-11. Largest Acute Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	7.3	6.6	6.4	6.1	5.8	5.6	5.2	5.9	5.8	4.6	4.2	3.9	3.6	3.3
			neurotoxicity	NA	NA	1.8	1.6	1.5	1.5	1.4	1.4	1.3	1.7	1.6	1.1	1	0.94	0.82	0.81
		Fracking	hematological	NA	NA	6.4	5.9	5.6	4.9	4.3	3.8	3.3	3.2	3	2.7	2.4	2.2	2	1.8
			neurotoxicity	NA	NA	1.7	1.6	1.5	1.4	1.2	1	0.91	0.77	0.72	0.65	0.59	0.53	0.48	0.44
			respiratory	NA	NA	0.93	0.86	0.81	0.72	0.63	0.55	0.48	0.39	0.36	0.3	0.26	0.24	0.21	0.19
			sensory	NA	NA	0.2	0.19	0.18	0.16	0.14	0.12	0.1	0.085	0.078	0.069	0.063	0.058	0.053	0.049
			systemic	NA	NA	0.14	0.13	0.12	0.11	0.096	0.084	0.076	0.078	0.073	0.064	0.057	0.05	0.045	0.041
		Flowback	hematological	NA	NA	3.7	3.6	3.4	3	2.8	2.8	2.8	2.8	2.6	1.8	1.6	1.7	1.5	1.7
			neurotoxicity	NA	NA	2.7	2.6	2.5	2.3	2.1	2	2.1	2	2	1.3	1.2	1.2	1.1	1.2
			respiratory	NA	NA	1	0.97	0.93	0.83	0.76	0.74	0.76	0.75	0.73	0.49	0.43	0.44	0.41	0.46
			sensory	NA	NA	0.94	0.89	0.85	0.76	0.7	0.65	0.72	0.71	0.66	0.46	0.4	0.43	0.37	0.42
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	7.2	6.1	5.7	5.2	4.6	4.3	4.1	3.6	3.4	3.2	2.9	2.9	2.3	2.1
			neurotoxicity	NA	NA	1.8	1.7	1.6	1.5	1.3	1.2	1.2	0.87	0.83	0.77	0.71	0.7	0.55	0.51
		Fracking	hematological	NA	NA	5.3	5.5	5.1	4.6	3.7	3.4	3.2	3	2.9	2.6	2.4	2.4	2	1.9
			neurotoxicity	NA	NA	1.5	1.5	1.4	1.3	1	0.95	0.89	0.84	0.79	0.7	0.67	0.66	0.54	0.51
			respiratory	NA	NA	0.77	0.8	0.75	0.67	0.54	0.5	0.47	0.44	0.42	0.37	0.36	0.35	0.29	0.27
			sensory	NA	NA	0.17	0.17	0.16	0.14	0.12	0.11	0.1	0.095	0.09	0.08	0.077	0.075	0.062	0.058
			systemic	NA	NA	0.12	0.12	0.11	0.1	0.083	0.078	0.073	0.068	0.065	0.058	0.055	0.045	0.041	0.042
		Flowback	hematological	NA	NA	3.1	3	2.8	2.5	2.2	2.1	1.9	1.3	1.2	1.2	1	1	0.87	0.75
			neurotoxicity	NA	NA	2.3	2.2	2.1	1.9	1.3	1.2	1.1	0.98	0.93	0.87	0.77	0.69	0.64	0.56
			respiratory	NA	NA	0.85	0.81	0.77	0.69	0.47	0.43	0.4	0.36	0.34	0.32	0.29	0.25	0.24	0.21
			sensory	NA	NA	0.78	0.74	0.7	0.63	0.43	0.39	0.37	0.33	0.32	0.29	0.26	0.23	0.22	0.19
	Northern Front Range	Drilling	hematological	NA	NA	8.3	8.1	7.8	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3
			neurotoxicity	NA	NA	2	2	1.9	1.7	1.6	1.4	1.3	1.2	1.1	0.91	0.8	0.71	0.64	0.57
		Fracking	hematological	NA	NA	0.46	0.44	0.43	0.42	0.44	0.46	0.47	0.44	0.42	0.36	0.36	0.19	0.32	0.31
			hematological	NA	NA	15	16	15	12	13	12	11	9.9	8.2	7.2	6.3	5.6	5	4.5
		Flowback	neurotoxicity	NA	NA	2	2	1.9	1.7	1.6	1.5	1.4	1.3	1	0.92	0.81	0.72	0.64	0.57
			respiratory	NA	NA	0.45	0.46	0.44	0.37	0.37	0.34	0.31	0.29	0.24	0.21	0.18	0.16	0.15	0.13
			endocrine	NA	NA	0.2	0.2	0.19	0.16	0.16	0.16	0.16	0.15	0.12	0.092	0.081	0.072	0.064	0.058
			sensory	NA	NA	0.18	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.094	0.083	0.073	0.065	0.057	0.052
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	7.3	6.6	6.4	6.1	5.8	5.6	5.2	5.9	5.8	4.6	4.2	3.9	3.6	3.3
			neurotoxicity	NA	NA	1.8	1.6	1.5	1.5	1.4	1.4	1.3	1.7	1.6	1.1	1	0.94	0.82	0.81

	Ridge Top (BarD)	Fracking	hematological	NA	NA	6.4	5.9	5.6	4.9	4.3	3.8	3.3	3.2	3	2.7	2.4	2.2	2	1.8
			neurotoxicity	NA	NA	1.7	1.6	1.5	1.4	1.2	1	0.91	0.77	0.72	0.65	0.59	0.53	0.48	0.44
			respiratory	NA	NA	0.93	0.86	0.81	0.72	0.63	0.55	0.48	0.39	0.36	0.3	0.26	0.24	0.21	0.19
			sensory	NA	NA	0.2	0.19	0.18	0.16	0.14	0.12	0.1	0.085	0.078	0.069	0.063	0.058	0.053	0.049
			systemic	NA	NA	0.14	0.13	0.12	0.11	0.096	0.084	0.076	0.078	0.073	0.064	0.057	0.05	0.045	0.041
		Flowback	hematological	NA	NA	3.7	3.6	3.4	3	2.8	2.8	2.8	2.8	2.6	1.8	1.6	1.7	1.5	1.7
			neurotoxicity	NA	NA	2.7	2.6	2.5	2.3	2.1	2	2.1	2	2	1.3	1.2	1.2	1.1	1.2
			respiratory	NA	NA	1	0.97	0.93	0.83	0.76	0.74	0.76	0.75	0.73	0.49	0.43	0.44	0.41	0.46
			sensory	NA	NA	0.94	0.89	0.85	0.76	0.7	0.65	0.72	0.71	0.66	0.46	0.4	0.43	0.37	0.42
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	7.2	6.1	5.7	5.2	4.6	4.3	4.1	3.6	3.4	3.2	2.9	2.9	2.3	2.1
			neurotoxicity	NA	NA	1.8	1.7	1.6	1.5	1.3	1.2	1.2	0.87	0.83	0.77	0.71	0.7	0.55	0.51
		Fracking	hematological	NA	NA	5.3	5.5	5.1	4.6	3.7	3.4	3.2	3	2.9	2.6	2.4	2.4	2	1.9
			neurotoxicity	NA	NA	1.5	1.5	1.4	1.3	1	0.95	0.89	0.84	0.79	0.7	0.67	0.66	0.54	0.51
			respiratory	NA	NA	0.77	0.8	0.75	0.67	0.54	0.5	0.47	0.44	0.42	0.37	0.36	0.35	0.29	0.27
			sensory	NA	NA	0.17	0.17	0.16	0.14	0.12	0.11	0.1	0.095	0.09	0.08	0.077	0.075	0.062	0.058
			systemic	NA	NA	0.12	0.12	0.11	0.1	0.083	0.078	0.073	0.068	0.065	0.058	0.055	0.045	0.041	0.042
		Flowback	hematological	NA	NA	3.1	3	2.8	2.5	2.2	2.1	1.9	1.3	1.2	1.2	1	1	0.87	0.75
			neurotoxicity	NA	NA	2.3	2.2	2.1	1.9	1.3	1.2	1.1	0.98	0.93	0.87	0.77	0.69	0.64	0.56
			respiratory	NA	NA	0.85	0.81	0.77	0.69	0.47	0.43	0.4	0.36	0.34	0.32	0.29	0.25	0.24	0.21
			sensory	NA	NA	0.78	0.74	0.7	0.63	0.43	0.39	0.37	0.33	0.32	0.29	0.26	0.23	0.22	0.19
	Northern Front Range	Drilling	hematological	NA	NA	8.3	8.1	7.8	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3
			neurotoxicity	NA	NA	2	2	1.9	1.7	1.6	1.4	1.3	1.2	1.1	0.91	0.8	0.71	0.64	0.57
		Fracking	hematological	NA	NA	0.46	0.44	0.43	0.42	0.44	0.46	0.47	0.44	0.42	0.36	0.36	0.19	0.32	0.31
			neurotoxicity	NA	NA	15	16	15	12	13	12	11	9.9	8.2	7.2	6.3	5.6	5	4.5
		Flowback	neurotoxicity	NA	NA	2	2	1.9	1.7	1.6	1.5	1.4	1.3	1	0.92	0.81	0.72	0.64	0.57
			respiratory	NA	NA	0.45	0.46	0.44	0.37	0.37	0.34	0.31	0.29	0.24	0.21	0.18	0.16	0.15	0.13
			endocrine	NA	NA	0.2	0.2	0.19	0.16	0.16	0.16	0.16	0.15	0.12	0.092	0.081	0.072	0.064	0.058
			sensory	NA	NA	0.18	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.094	0.083	0.073	0.065	0.057	0.052
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	7.3	6.6	6.4	6.1	5.8	5.6	5.2	5.9	5.8	4.6	4.2	3.9	3.6	3.3
			neurotoxicity	NA	NA	1.8	1.6	1.5	1.5	1.4	1.4	1.3	1.7	1.6	1.1	1	0.94	0.82	0.81
		Fracking	hematological	NA	NA	6.4	5.9	5.6	4.9	4.3	3.8	3.3	3.2	3	2.7	2.4	2.2	2	1.8
			neurotoxicity	NA	NA	1.7	1.6	1.5	1.4	1.2	1	0.91	0.77	0.72	0.65	0.59	0.53	0.48	0.44
			respiratory	NA	NA	0.93	0.86	0.81	0.72	0.63	0.55	0.48	0.39	0.36	0.3	0.26	0.24	0.21	0.19
			sensory	NA	NA	0.2	0.19	0.18	0.16	0.14	0.12	0.1	0.085	0.078	0.069	0.063	0.058	0.053	0.049
			systemic	NA	NA	0.14	0.13	0.12	0.11	0.096	0.084	0.076	0.078	0.073	0.064	0.057	0.05	0.045	0.041
		Flowback	hematological	NA	NA	3.7	3.6	3.4	3	2.8	2.8	2.8	2.8	2.6	1.8	1.6	1.7	1.5	1.7
			neurotoxicity	NA	NA	2.7	2.6	2.5	2.3	2.1	2	2.1	2	2	1.3	1.2	1.2	1.1	1.2

	Garfield County: Valley (Rifle)	Drilling	respiratory	NA	NA	1	0.97	0.93	0.83	0.76	0.74	0.76	0.75	0.73	0.49	0.43	0.44	0.41	0.46
			sensory	NA	NA	0.94	0.89	0.85	0.76	0.7	0.65	0.72	0.71	0.66	0.46	0.4	0.43	0.37	0.42
		Fracking	hematological	NA	NA	7.2	6.1	5.7	5.2	4.6	4.3	4.1	3.6	3.4	3.2	2.9	2.9	2.3	2.1
			neurotoxicity	NA	NA	1.8	1.7	1.6	1.5	1.3	1.2	1.2	0.87	0.83	0.77	0.71	0.7	0.55	0.51
			hematological	NA	NA	5.3	5.5	5.1	4.6	3.7	3.4	3.2	3	2.9	2.6	2.4	2.4	2	1.9
			neurotoxicity	NA	NA	1.5	1.5	1.4	1.3	1	0.95	0.89	0.84	0.79	0.7	0.67	0.66	0.54	0.51
			respiratory	NA	NA	0.77	0.8	0.75	0.67	0.54	0.5	0.47	0.44	0.42	0.37	0.36	0.35	0.29	0.27
			sensory	NA	NA	0.17	0.17	0.16	0.14	0.12	0.11	0.1	0.095	0.09	0.08	0.077	0.075	0.062	0.058
			systemic	NA	NA	0.12	0.12	0.11	0.1	0.083	0.078	0.073	0.068	0.065	0.058	0.055	0.045	0.041	0.042
		Flowback	hematological	NA	NA	3.1	3	2.8	2.5	2.2	2.1	1.9	1.3	1.2	1.2	1	1	0.87	0.75
			neurotoxicity	NA	NA	2.3	2.2	2.1	1.9	1.3	1.2	1.1	0.98	0.93	0.87	0.77	0.69	0.64	0.56
			respiratory	NA	NA	0.85	0.81	0.77	0.69	0.47	0.43	0.4	0.36	0.34	0.32	0.29	0.25	0.24	0.21
			sensory	NA	NA	0.78	0.74	0.7	0.63	0.43	0.39	0.37	0.33	0.32	0.29	0.26	0.23	0.22	0.19
	Northern Front Range	Drilling	hematological	NA	NA	8.3	8.1	7.8	6.8	6.5	5.9	5.3	4.9	4.6	3.8	3.3	2.9	2.6	2.3
			neurotoxicity	NA	NA	2	2	1.9	1.7	1.6	1.4	1.3	1.2	1.1	0.91	0.8	0.71	0.64	0.57
		Fracking	hematological	NA	NA	0.46	0.44	0.43	0.42	0.44	0.46	0.47	0.44	0.42	0.36	0.36	0.19	0.32	0.31
			hematological	NA	NA	15	16	15	12	13	12	11	9.9	8.2	7.2	6.3	5.6	5	4.5
		Flowback	neurotoxicity	NA	NA	2	2	1.9	1.7	1.6	1.5	1.4	1.3	1	0.92	0.81	0.72	0.64	0.57
			respiratory	NA	NA	0.45	0.46	0.44	0.37	0.37	0.34	0.31	0.29	0.24	0.21	0.18	0.16	0.15	0.13
			endocrine	NA	NA	0.2	0.2	0.19	0.16	0.16	0.16	0.16	0.15	0.12	0.092	0.081	0.072	0.064	0.058
			sensory	NA	NA	0.18	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.094	0.083	0.073	0.065	0.057	0.052

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

Table E-12. Percentage of Daily-maximum Acute Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	98%	97%	96%	93%	90%	84%	78%	83%	80%	51%	37%	25%	16%	10%
			neurotoxicity	NA	NA	39%	30%	24%	11%	3%	1%	1%	6%	5%	1%	0%	0%	0%	0%
		Fracking	hematological	NA	NA	97%	95%	94%	90%	84%	77%	67%	57%	48%	32%	18%	9%	5%	3%
			neurotoxicity	NA	NA	24%	15%	10%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	89%	87%	85%	80%	73%	68%	65%	62%	59%	30%	19%	13%	13%	12%
			neurotoxicity	NA	NA	34%	30%	27%	21%	16%	12%	11%	10%	10%	4%	2%	1%	1%	1%
	Garfield	Drilling	hematological	NA	NA	99%	98%	98%	96%	95%	93%	91%	88%	85%	83%	76%	68%	59%	46%

	County: Valley (Rifle)	Fracking	neurotoxicity	NA	NA	49%	40%	32%	17%	5%	1%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	98%	97%	96%	94%	90%	88%	86%	83%	80%	72%	66%	55%	42%	25%
		Flowback	neurotoxicity	NA	NA	33%	29%	18%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	91%	88%	85%	81%	65%	55%	42%	22%	12%	5%	0%	0%	0%	0%
	Northern Front Range	Drilling	neurotoxicity	NA	NA	41%	36%	31%	25%	15%	6%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	99%	98%	98%	96%	93%	90%	86%	82%	77%	67%	56%	45%	34%	24%
		Flowback	neurotoxicity	NA	NA	53%	44%	36%	22%	10%	4%	2%	2%	1%	0%	0%	0%	0%	0%
			hematological	NA	NA	100%	100%	100%	100%	100%	99%	99%	98%	97%	95%	92%	87%	82%	77%
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	neurotoxicity	NA	NA	53%	44%	36%	19%	10%	4%	3%	2%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	98%	97%	96%	93%	89%	84%	78%	82%	80%	50%	37%	25%	16%	10%
		Fracking	neurotoxicity	NA	NA	39%	30%	23%	10%	3%	1%	1%	6%	5%	1%	0%	0%	0%	0%
			hematological	NA	NA	97%	95%	93%	89%	84%	76%	66%	56%	47%	31%	17%	9%	5%	3%
	Garfield County: Valley (Rifle)	Flowback	neurotoxicity	NA	NA	23%	15%	10%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	89%	87%	84%	79%	72%	67%	64%	61%	58%	30%	18%	13%	13%	12%
		Drilling	neurotoxicity	NA	NA	33%	30%	27%	21%	16%	12%	11%	10%	9%	4%	2%	1%	1%	1%
			hematological	NA	NA	99%	98%	97%	96%	94%	93%	91%	87%	84%	82%	74%	67%	58%	44%
	Northern Front Range	Fracking	neurotoxicity	NA	NA	48%	39%	31%	16%	4%	1%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	98%	97%	96%	94%	90%	87%	85%	82%	79%	70%	64%	54%	40%	24%
		Flowback	neurotoxicity	NA	NA	31%	27%	17%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	90%	87%	84%	79%	62%	52%	39%	20%	10%	5%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	neurotoxicity	NA	NA	41%	35%	30%	24%	14%	6%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	99%	98%	97%	95%	93%	89%	85%	81%	76%	67%	55%	44%	33%	23%
		Fracking	neurotoxicity	NA	NA	51%	43%	35%	21%	9%	4%	2%	1%	1%	0%	0%	0%	0%	0%
			hematological	NA	NA	100%	100%	100%	100%	100%	99%	99%	98%	97%	94%	91%	86%	81%	75%
	Garfield County: Valley (Rifle)	Flowback	neurotoxicity	NA	NA	52%	43%	35%	19%	10%	4%	3%	2%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	97%	96%	95%	94%	92%	90%	88%	84%	81%	79%	71%	64%	55%	42%
		Drilling	neurotoxicity	NA	NA	45%	37%	29%	15%	4%	1%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	96%	95%	94%	92%	86%	84%	81%	79%	75%	67%	61%	51%	38%	23%
		Fracking	neurotoxicity	NA	NA	30%	26%	17%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	86%	83%	79%	75%	57%	49%	37%	19%	10%	5%	0%	0%	0%	0%
		Flowback	neurotoxicity	NA	NA	39%	34%	29%	23%	13%	6%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	96%	95%	94%	91%	87%	81%	75%	80%	78%	48%	35%	23%	15%	10%

	Northern Front Range	Drilling	hematological	NA	NA	98%	97%	96%	93%	91%	87%	83%	78%	73%	64%	53%	43%	32%	22%
			neurotoxicity	NA	NA	49%	41%	33%	20%	9%	4%	2%	1%	1%	0%	0%	0%	0%	0%
		Flowback	hematological	NA	NA	100%	100%	100%	100%	99%	98%	97%	96%	95%	92%	88%	84%	79%	73%
			neurotoxicity	NA	NA	50%	41%	34%	18%	9%	4%	2%	2%	0%	0%	0%	0%	0%	0%

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

E.1.2 Subchronic Non-cancer Hazards

E.1.2.1 1-acre Well Pad

Table E-13. Largest Subchronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.62	0.51	0.43	0.32	0.24	0.19	0.15	0.065	0.057	0.04	0.032	0.026	0.023	0.022
			toluene	NA	NA	0.21	0.17	0.14	0.11	0.081	0.063	0.051	0.02	0.018	0.013	0.01	<0.01	<0.01	<0.01
		Fracking	m+p-xylene	NA	NA	2	1.6	1.4	1	0.78	0.61	0.49	0.4	0.34	0.26	0.21	0.17	0.14	0.12
			n-nonane	NA	NA	1.1	0.95	0.8	0.59	0.46	0.36	0.29	0.24	0.2	0.15	0.12	0.1	0.085	0.074
			benzene	NA	NA	0.99	0.82	0.69	0.52	0.4	0.31	0.25	0.21	0.18	0.14	0.11	0.095	0.079	0.068
			1,2,4-trimethylbenzene	NA	NA	0.43	0.36	0.3	0.23	0.17	0.14	0.11	0.092	0.08	0.061	0.05	0.041	0.034	0.029
			1,3,5-trimethylbenzene	NA	NA	0.33	0.27	0.23	0.17	0.14	0.11	0.085	0.07	0.059	0.046	0.036	0.03	0.026	0.022
			o-xylene	NA	NA	0.17	0.14	0.12	0.087	0.068	0.053	0.042	0.035	0.029	0.023	0.018	0.015	0.012	0.011
			1,2,3-trimethylbenzene	NA	NA	0.12	0.1	0.085	0.064	0.049	0.039	0.031	0.025	0.021	0.017	0.014	0.011	<0.01	<0.01
		Flowback	n-nonane	NA	NA	0.59	0.48	0.41	0.23	0.17	0.075	0.064	0.056	0.05	0.035	0.029	0.016	0.022	0.016
			m+p-xylene	NA	NA	0.54	0.45	0.37	0.21	0.16	0.07	0.06	0.052	0.046	0.032	0.027	0.015	0.02	0.014
			1,3,5-trimethylbenzene	NA	NA	0.48	0.4	0.33	0.19	0.14	0.061	0.052	0.045	0.04	0.028	0.025	0.013	0.018	0.013
			1,2,4-trimethylbenzene	NA	NA	0.47	0.39	0.32	0.18	0.14	0.06	0.051	0.044	0.039	0.028	0.024	0.012	0.018	0.013
			1,2,3-trimethylbenzene	NA	NA	0.34	0.28	0.19	0.13	0.1	0.043	0.037	0.032	0.028	0.02	0.018	<0.01	0.013	0.01
			benzene	NA	NA	0.32	0.26	0.22	0.12	0.095	0.04	0.034	0.03	0.027	0.019	0.016	<0.01	0.012	<0.01
			2-ethyltoluene	NA	NA	0.23	0.19	0.13	0.091	0.069	0.029	0.025	0.022	0.019	0.013	0.012	0.01	<0.01	<0.01
			o-xylene	NA	NA	0.11	0.087	0.073	0.041	0.031	0.013	0.012	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Garfield County: Valley (BarD)	Drilling	benzene	NA	NA	0.42	0.31	0.26	0.28	0.22	0.19	0.16	0.14	0.13	0.1	0.094	0.072	0.05	0.03
			toluene	NA	NA	0.13	0.1	0.084	0.09	0.073	0.061	0.053	0.046	0.041	0.034	0.03	0.023	0.016	<0.01
		Fracking	m+p-xylene	NA	NA	1.6	1.3	1.1	0.85	0.69	0.59	0.51	0.45	0.4	0.33	0.32	0.26	0.21	0.12

	(Kille)		n-nonane	NA	NA	0.91	0.74	0.63	0.49	0.41	0.35	0.3	0.27	0.24	0.19	0.19	0.15	0.12	0.07
			benzene	NA	NA	0.8	0.65	0.56	0.43	0.36	0.3	0.27	0.23	0.21	0.17	0.16	0.13	0.11	0.063
			1,2,4-trimethylbenzene	NA	NA	0.36	0.29	0.25	0.19	0.16	0.13	0.11	0.1	0.09	0.073	0.071	0.057	0.046	0.028
			1,3,5-trimethylbenzene	NA	NA	0.27	0.22	0.19	0.15	0.12	0.1	0.089	0.079	0.07	0.056	0.056	0.045	0.037	0.022
			o-xylene	NA	NA	0.13	0.11	0.094	0.073	0.06	0.051	0.045	0.04	0.035	0.029	0.027	0.022	0.018	0.01
		Flowback	n-nonane	NA	NA	0.25	0.24	0.2	0.15	0.17	0.14	0.13	0.11	0.11	0.082	0.077	0.054	0.034	0.027
			m+p-xylene	NA	NA	0.23	0.23	0.18	0.14	0.15	0.13	0.12	0.11	0.097	0.076	0.071	0.05	0.032	0.025
			1,3,5-trimethylbenzene	NA	NA	0.2	0.19	0.16	0.11	0.13	0.11	0.1	0.089	0.078	0.064	0.06	0.042	0.027	0.021
			1,2,4-trimethylbenzene	NA	NA	0.19	0.19	0.15	0.11	0.13	0.11	0.098	0.086	0.076	0.062	0.058	0.041	0.026	0.02
			1,2,3-trimethylbenzene	NA	NA	0.14	0.13	0.11	0.081	0.089	0.075	0.07	0.062	0.055	0.045	0.041	0.029	0.018	0.015
			benzene	NA	NA	0.14	0.13	0.11	0.08	0.093	0.077	0.072	0.063	0.058	0.045	0.042	0.03	0.019	0.015
	Northern Front Range	Drilling	benzene	NA	NA	0.49	0.39	0.32	0.23	0.17	0.14	0.11	0.092	0.078	0.057	0.044	0.036	0.03	0.025
			toluene	NA	NA	0.16	0.13	0.1	0.075	0.057	0.045	0.036	0.03	0.026	0.018	0.014	0.012	<0.01	<0.01
		Flowback	benzene	NA	NA	1.1	0.9	0.75	0.53	0.4	0.31	0.25	0.21	0.18	0.13	0.11	0.085	0.07	0.059
			n-nonane	NA	NA	0.58	0.47	0.39	0.28	0.21	0.16	0.13	0.11	0.092	0.07	0.055	0.044	0.037	0.031
			m+p-xylene	NA	NA	0.35	0.29	0.24	0.17	0.13	0.099	0.079	0.066	0.056	0.042	0.033	0.027	0.022	0.019
			1,3,5-trimethylbenzene	NA	NA	0.25	0.2	0.17	0.12	0.089	0.07	0.056	0.047	0.04	0.03	0.024	0.019	0.016	0.013
			1,2,4-trimethylbenzene	NA	NA	0.22	0.18	0.15	0.1	0.079	0.062	0.049	0.041	0.035	0.027	0.021	0.017	0.014	0.012
			n-hexane	NA	NA	0.12	0.097	0.08	0.057	0.044	0.033	0.027	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.63	0.51	0.43	0.32	0.24	0.19	0.15	0.065	0.057	0.04	0.032	0.026	0.023	0.022
			toluene	NA	NA	0.21	0.17	0.14	0.11	0.081	0.064	0.051	0.02	0.018	0.013	0.01	<0.01	<0.01	<0.01
		Fracking	m+p-xylene	NA	NA	2	1.6	1.4	1	0.78	0.61	0.49	0.4	0.34	0.26	0.21	0.17	0.14	0.12
			n-nonane	NA	NA	1.1	0.95	0.8	0.59	0.46	0.36	0.29	0.24	0.2	0.15	0.12	0.1	0.085	0.073
			benzene	NA	NA	0.99	0.82	0.69	0.52	0.4	0.31	0.25	0.21	0.18	0.14	0.11	0.094	0.079	0.068
			1,2,4-trimethylbenzene	NA	NA	0.43	0.36	0.3	0.23	0.17	0.14	0.11	0.092	0.08	0.061	0.05	0.041	0.034	0.029
			1,3,5-trimethylbenzene	NA	NA	0.33	0.27	0.23	0.17	0.14	0.11	0.085	0.07	0.059	0.046	0.036	0.03	0.026	0.022
			o-xylene	NA	NA	0.17	0.14	0.12	0.087	0.068	0.053	0.042	0.035	0.029	0.023	0.018	0.015	0.012	0.011
			1,2,3-trimethylbenzene	NA	NA	0.12	0.1	0.085	0.064	0.049	0.039	0.031	0.025	0.021	0.017	0.014	0.011	<0.01	<0.01
		Flowback	n-nonane	NA	NA	0.59	0.48	0.41	0.23	0.17	0.076	0.064	0.056	0.05	0.035	0.029	0.016	0.022	0.016
			m+p-xylene	NA	NA	0.54	0.45	0.37	0.21	0.16	0.07	0.06	0.052	0.046	0.032	0.027	0.015	0.02	0.014
			1,3,5-trimethylbenzene	NA	NA	0.48	0.4	0.33	0.19	0.14	0.061	0.052	0.045	0.04	0.028	0.025	0.013	0.018	0.013
			1,2,4-trimethylbenzene	NA	NA	0.47	0.39	0.32	0.18	0.14	0.06	0.051	0.044	0.039	0.028	0.024	0.012	0.018	0.013
			1,2,3-trimethylbenzene	NA	NA	0.34	0.28	0.19	0.13	0.1	0.043	0.037	0.032	0.028	0.02	0.018	<0.01	0.013	0.01
			benzene	NA	NA	0.32	0.26	0.22	0.12	0.095	0.04	0.034	0.03	0.027	0.019	0.016	<0.01	0.012	<0.01
			2-ethyltoluene	NA	NA	0.23	0.19	0.13	0.091	0.069	0.029	0.025	0.022	0.019	0.013	0.012	0.01	<0.01	<0.01
			o-xylene	NA	NA	0.11	0.087	0.073	0.041	0.031	0.013	0.012	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Garfield	Drilling	benzene	NA	NA	0.42	0.31	0.26	0.27	0.22	0.19	0.16	0.14	0.13	0.1	0.094	0.072	0.05	0.03

60+ Years	County: Valley (Rifle)	Fracking	toluene	NA	NA	0.14	0.1	0.084	0.089	0.073	0.061	0.053	0.046	0.041	0.034	0.03	0.023	0.016	<0.01
			m+p-xylene	NA	NA	1.5	1.3	1.1	0.84	0.69	0.58	0.51	0.45	0.4	0.33	0.32	0.26	0.21	0.12
			n-nonane	NA	NA	0.91	0.74	0.63	0.49	0.41	0.35	0.3	0.27	0.24	0.19	0.19	0.15	0.12	0.07
			benzene	NA	NA	0.8	0.65	0.56	0.43	0.36	0.3	0.26	0.23	0.21	0.17	0.16	0.13	0.11	0.063
			1,2,4-trimethylbenzene	NA	NA	0.36	0.29	0.25	0.19	0.16	0.13	0.11	0.1	0.09	0.073	0.071	0.056	0.046	0.028
			1,3,5-trimethylbenzene	NA	NA	0.27	0.22	0.18	0.15	0.12	0.1	0.089	0.079	0.07	0.056	0.056	0.045	0.037	0.022
			o-xylene	NA	NA	0.13	0.11	0.093	0.073	0.06	0.051	0.045	0.04	0.035	0.029	0.027	0.022	0.018	0.01
		Flowback	n-nonane	NA	NA	0.25	0.24	0.2	0.14	0.17	0.14	0.13	0.11	0.11	0.082	0.077	0.054	0.034	0.027
			m+p-xylene	NA	NA	0.23	0.22	0.18	0.14	0.15	0.13	0.12	0.11	0.097	0.076	0.071	0.05	0.032	0.025
			1,3,5-trimethylbenzene	NA	NA	0.2	0.19	0.15	0.11	0.13	0.11	0.1	0.088	0.078	0.064	0.06	0.042	0.027	0.021
			1,2,4-trimethylbenzene	NA	NA	0.19	0.19	0.15	0.11	0.13	0.11	0.098	0.086	0.076	0.062	0.058	0.041	0.026	0.02
			1,2,3-trimethylbenzene	NA	NA	0.14	0.13	0.11	0.081	0.089	0.074	0.07	0.062	0.054	0.045	0.041	0.029	0.018	0.015
			benzene	NA	NA	0.14	0.13	0.11	0.08	0.093	0.077	0.072	0.063	0.058	0.045	0.042	0.03	0.019	0.015
	Northern Front Range	Drilling	benzene	NA	NA	0.49	0.39	0.32	0.23	0.17	0.14	0.11	0.092	0.078	0.057	0.044	0.036	0.03	0.025
			toluene	NA	NA	0.16	0.13	0.1	0.074	0.057	0.045	0.036	0.03	0.026	0.018	0.014	0.012	<0.01	<0.01
		Flowback	benzene	NA	NA	1.1	0.91	0.75	0.53	0.4	0.31	0.25	0.21	0.18	0.13	0.11	0.085	0.07	0.059
			n-nonane	NA	NA	0.59	0.47	0.39	0.28	0.21	0.16	0.13	0.11	0.092	0.07	0.055	0.044	0.037	0.031
			m+p-xylene	NA	NA	0.35	0.29	0.24	0.17	0.13	0.099	0.079	0.066	0.056	0.042	0.033	0.027	0.022	0.019
			1,3,5-trimethylbenzene	NA	NA	0.25	0.2	0.17	0.12	0.089	0.07	0.056	0.047	0.04	0.03	0.024	0.019	0.016	0.013
			1,2,4-trimethylbenzene	NA	NA	0.22	0.18	0.15	0.1	0.079	0.062	0.049	0.041	0.035	0.027	0.021	0.017	0.014	0.012
			n-hexane	NA	NA	0.12	0.097	0.08	0.057	0.044	0.033	0.027	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.63	0.51	0.43	0.32	0.25	0.19	0.15	0.065	0.057	0.04	0.032	0.026	0.023	0.022
			toluene	NA	NA	0.21	0.17	0.14	0.11	0.081	0.064	0.051	0.02	0.018	0.013	0.01	<0.01	<0.01	<0.01
		Fracking	m+p-xylene	NA	NA	2	1.6	1.4	1	0.78	0.61	0.49	0.4	0.34	0.26	0.21	0.17	0.14	0.12
			n-nonane	NA	NA	1.1	0.95	0.8	0.59	0.46	0.36	0.29	0.24	0.2	0.15	0.12	0.1	0.085	0.074
			benzene	NA	NA	0.99	0.82	0.69	0.52	0.4	0.31	0.25	0.21	0.18	0.14	0.11	0.095	0.079	0.068
			1,2,4-trimethylbenzene	NA	NA	0.43	0.35	0.3	0.23	0.17	0.14	0.11	0.092	0.08	0.061	0.05	0.041	0.034	0.029
			1,3,5-trimethylbenzene	NA	NA	0.33	0.27	0.23	0.17	0.13	0.11	0.085	0.07	0.059	0.046	0.036	0.03	0.026	0.022
			o-xylene	NA	NA	0.17	0.14	0.12	0.087	0.068	0.053	0.042	0.035	0.029	0.022	0.018	0.015	0.012	0.011
			1,2,3-trimethylbenzene	NA	NA	0.12	0.1	0.085	0.064	0.049	0.039	0.031	0.025	0.021	0.017	0.014	0.011	<0.01	<0.01
		Flowback	n-nonane	NA	NA	0.59	0.48	0.41	0.23	0.17	0.076	0.065	0.056	0.05	0.035	0.029	0.016	0.022	0.016
			m+p-xylene	NA	NA	0.55	0.45	0.38	0.21	0.16	0.07	0.06	0.052	0.046	0.032	0.027	0.015	0.02	0.014
			1,3,5-trimethylbenzene	NA	NA	0.48	0.4	0.33	0.19	0.14	0.061	0.052	0.045	0.04	0.028	0.025	0.013	0.018	0.013
			1,2,4-trimethylbenzene	NA	NA	0.47	0.39	0.32	0.18	0.14	0.06	0.051	0.045	0.039	0.028	0.024	0.012	0.018	0.013
			1,2,3-trimethylbenzene	NA	NA	0.34	0.28	0.19	0.13	0.1	0.043	0.037	0.032	0.028	0.02	0.018	<0.01	0.013	0.01
			benzene	NA	NA	0.32	0.26	0.22	0.12	0.095	0.04	0.034	0.03	0.027	0.019	0.016	<0.01	0.012	<0.01
			2-ethyltoluene	NA	NA	0.23	0.19	0.13	0.091	0.069	0.029	0.025	0.022	0.019	0.013	0.012	0.01	<0.01	<0.01

Garfield County: Valley (Rifle)	Drilling	o-xylene	NA	NA	0.11	0.087	0.073	0.041	0.031	0.013	0.012	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
		benzene	NA	NA	0.42	0.31	0.26	0.28	0.22	0.19	0.16	0.14	0.13	0.1	0.094	0.072	0.05	0.03
	Fracking	toluene	NA	NA	0.14	0.1	0.084	0.09	0.073	0.061	0.053	0.046	0.041	0.034	0.03	0.023	0.016	<0.01
		m+p-xylene	NA	NA	1.6	1.3	1.1	0.85	0.69	0.59	0.51	0.45	0.4	0.33	0.32	0.26	0.21	0.12
		n-nonane	NA	NA	0.91	0.74	0.63	0.49	0.41	0.35	0.3	0.27	0.24	0.19	0.19	0.15	0.12	0.07
		benzene	NA	NA	0.8	0.65	0.56	0.44	0.36	0.3	0.27	0.23	0.21	0.17	0.16	0.13	0.11	0.063
		1,2,4-trimethylbenzene	NA	NA	0.36	0.29	0.25	0.19	0.16	0.13	0.11	0.1	0.09	0.073	0.071	0.057	0.046	0.028
		1,3,5-trimethylbenzene	NA	NA	0.27	0.22	0.18	0.15	0.12	0.1	0.089	0.079	0.07	0.056	0.056	0.045	0.037	0.022
		o-xylene	NA	NA	0.13	0.11	0.094	0.073	0.06	0.051	0.045	0.04	0.035	0.029	0.027	0.022	0.018	0.01
	Flowback	n-nonane	NA	NA	0.25	0.24	0.2	0.15	0.17	0.14	0.13	0.11	0.11	0.082	0.077	0.054	0.034	0.027
		m+p-xylene	NA	NA	0.23	0.23	0.18	0.14	0.15	0.13	0.12	0.11	0.097	0.076	0.071	0.05	0.032	0.025
		1,3,5-trimethylbenzene	NA	NA	0.2	0.19	0.16	0.11	0.13	0.11	0.1	0.089	0.078	0.064	0.06	0.042	0.027	0.021
		1,2,4-trimethylbenzene	NA	NA	0.19	0.19	0.15	0.11	0.13	0.11	0.098	0.086	0.076	0.062	0.058	0.041	0.026	0.02
		1,2,3-trimethylbenzene	NA	NA	0.14	0.13	0.11	0.081	0.089	0.075	0.07	0.062	0.055	0.045	0.041	0.029	0.018	0.015
		benzene	NA	NA	0.14	0.13	0.11	0.08	0.093	0.078	0.072	0.063	0.058	0.045	0.042	0.03	0.019	0.015
Northern Front Range	Drilling	benzene	NA	NA	0.49	0.39	0.32	0.23	0.17	0.14	0.11	0.092	0.078	0.057	0.044	0.036	0.03	0.025
		toluene	NA	NA	0.16	0.13	0.1	0.074	0.057	0.045	0.036	0.03	0.026	0.018	0.014	0.012	<0.01	<0.01
	Flowback	benzene	NA	NA	1.1	0.91	0.75	0.53	0.4	0.31	0.25	0.21	0.18	0.13	0.11	0.085	0.07	0.059
		n-nonane	NA	NA	0.58	0.47	0.39	0.28	0.21	0.16	0.13	0.11	0.092	0.07	0.055	0.044	0.037	0.031
		m+p-xylene	NA	NA	0.35	0.29	0.24	0.17	0.13	0.099	0.079	0.066	0.056	0.042	0.033	0.027	0.022	0.019
		1,3,5-trimethylbenzene	NA	NA	0.25	0.2	0.17	0.12	0.089	0.07	0.056	0.047	0.04	0.03	0.024	0.019	0.016	0.013
		1,2,4-trimethylbenzene	NA	NA	0.22	0.18	0.15	0.1	0.079	0.063	0.049	0.041	0.035	0.027	0.021	0.017	0.014	0.012
		n-hexane	NA	NA	0.12	0.097	0.08	0.057	0.044	0.033	0.027	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-14. Percentage of Subchronic Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Fracking	m+p-xylene	NA	NA	25%	10%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			n-nonane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Garfield County: Valley (Rifle)		m+p-xylene	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Flowback	benzene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)	Fracking	m+p-xylene	NA	NA	25%	10%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			n-nonane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		m+p-xylene	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Flowback	benzene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)	Fracking	m+p-xylene	NA	NA	24%	10%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			n-nonane	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		m+p-xylene	NA	NA	7%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Flowback	benzene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity.

Table E-15. Largest Subchronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.71	0.58	0.49	0.36	0.28	0.22	0.17	0.075	0.065	0.048	0.038	0.031	0.026	0.026
			neurotoxicity	NA	NA	0.31	0.25	0.21	0.16	0.12	0.095	0.076	0.033	0.028	0.022	0.017	0.014	0.011	0.012
		Fracking	neurotoxicity	NA	NA	4.3	3.5	3	2.2	1.7	1.3	1.1	0.87	0.74	0.57	0.45	0.38	0.31	0.27
			hematological	NA	NA	4	3.3	2.8	2	1.6	1.2	0.99	0.82	0.69	0.53	0.42	0.35	0.29	0.25
			respiratory	NA	NA	0.87	0.72	0.61	0.46	0.35	0.28	0.22	0.18	0.16	0.12	0.1	0.082	0.068	0.059
			systemic	NA	NA	0.21	0.17	0.15	0.11	0.084	0.066	0.053	0.044	0.037	0.029	0.023	0.019	0.016	0.014
		Flowback	neurotoxicity	NA	NA	2.6	2.1	1.8	1	0.77	0.33	0.29	0.25	0.22	0.15	0.13	0.07	0.099	0.072
			hematological	NA	NA	2.3	1.8	1.5	0.87	0.66	0.29	0.24	0.21	0.19	0.13	0.11	0.06	0.085	0.062
			respiratory	NA	NA	1.3	1.1	0.84	0.5	0.38	0.16	0.14	0.12	0.11	0.076	0.066	0.034	0.05	0.037
			systemic	NA	NA	0.43	0.35	0.25	0.17	0.13	0.054	0.046	0.04	0.035	0.025	0.022	0.016	0.017	0.012
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	0.47	0.35	0.29	0.31	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.082	0.057	0.034
			neurotoxicity	NA	NA	0.2	0.15	0.12	0.14	0.11	0.093	0.081	0.071	0.063	0.052	0.046	0.035	0.024	0.015
		Fracking	neurotoxicity	NA	NA	3.4	2.8	2.4	1.8	1.5	1.3	1.1	1	0.89	0.72	0.7	0.56	0.47	0.26
			hematological	NA	NA	3.2	2.6	2.2	1.7	1.4	1.2	1	0.93	0.83	0.67	0.64	0.52	0.43	0.24
			respiratory	NA	NA	0.72	0.58	0.5	0.39	0.31	0.27	0.23	0.2	0.18	0.15	0.15	0.12	0.095	0.057
			systemic	NA	NA	0.16	0.13	0.11	0.087	0.072	0.061	0.053	0.047	0.042	0.034	0.032	0.025	0.021	0.013
		Flowback	neurotoxicity	NA	NA	1.1	1	0.86	0.63	0.71	0.6	0.56	0.49	0.44	0.35	0.33	0.23	0.15	0.12
			hematological	NA	NA	0.94	0.9	0.74	0.54	0.61	0.51	0.48	0.42	0.38	0.3	0.28	0.2	0.13	0.099
			respiratory	NA	NA	0.53	0.51	0.42	0.31	0.34	0.29	0.27	0.24	0.21	0.17	0.16	0.11	0.071	0.056
			systemic	NA	NA	0.17	0.16	0.13	0.098	0.11	0.098	0.087	0.076	0.068	0.055	0.051	0.036	0.023	0.018
	Northern Front Range	Drilling	hematological	NA	NA	0.55	0.45	0.37	0.26	0.2	0.16	0.13	0.1	0.089	0.065	0.05	0.041	0.034	0.028
			neurotoxicity	NA	NA	0.24	0.19	0.16	0.11	0.087	0.068	0.055	0.045	0.039	0.028	0.022	0.018	0.015	0.012
		Fracking	hematological	NA	NA	0.11	0.092	0.076	0.054	0.042	0.033	0.027	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
			neurotoxicity	NA	NA	1.8	1.4	1.2	0.84	0.63	0.49	0.39	0.33	0.28	0.21	0.17	0.13	0.11	0.094
		Flowback	hematological	NA	NA	2.1	1.7	1.4	0.99	0.74	0.58	0.46	0.39	0.33	0.25	0.2	0.16	0.13	0.11
			neurotoxicity	NA	NA	1.8	1.4	1.2	0.84	0.63	0.49	0.39	0.33	0.28	0.21	0.17	0.13	0.11	0.094
			respiratory	NA	NA	0.51	0.41	0.34	0.24	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
			systemic	NA	NA	0.16	0.13	0.1	0.074	0.056	0.044	0.035	0.029	0.025	0.019	0.015	0.012	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.71	0.58	0.49	0.36	0.28	0.22	0.17	0.075	0.065	0.048	0.038	0.031	0.026	0.026
			neurotoxicity	NA	NA	0.31	0.25	0.21	0.16	0.12	0.095	0.076	0.033	0.028	0.022	0.017	0.014	0.011	0.012
		Fracking	neurotoxicity	NA	NA	4.3	3.5	3	2.2	1.7	1.3	1.1	0.87	0.74	0.57	0.45	0.38	0.31	0.27
			hematological	NA	NA	4	3.3	2.8	2	1.6	1.2	0.99	0.82	0.69	0.53	0.42	0.35	0.29	0.25
			respiratory	NA	NA	0.87	0.72	0.61	0.46	0.35	0.28	0.22	0.18	0.16	0.12	0.099	0.082	0.069	0.059

60+ Years		Flowback	systemic	NA	NA	0.21	0.17	0.15	0.11	0.084	0.066	0.053	0.044	0.037	0.029	0.023	0.019	0.016	0.014
			neurotoxicity	NA	NA	2.6	2.1	1.8	1	0.78	0.33	0.29	0.25	0.22	0.15	0.13	0.07	0.099	0.072
			hematological	NA	NA	2.3	1.8	1.5	0.87	0.67	0.29	0.24	0.21	0.19	0.13	0.11	0.06	0.085	0.062
			respiratory	NA	NA	1.3	1.1	0.84	0.5	0.38	0.16	0.14	0.12	0.11	0.076	0.066	0.034	0.05	0.036
			systemic	NA	NA	0.43	0.35	0.25	0.17	0.13	0.054	0.046	0.04	0.035	0.025	0.022	0.016	0.017	0.012
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	0.47	0.35	0.29	0.31	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.082	0.057	0.034
			neurotoxicity	NA	NA	0.2	0.15	0.12	0.14	0.11	0.093	0.081	0.071	0.063	0.052	0.046	0.035	0.024	0.015
		Fracking	neurotoxicity	NA	NA	3.4	2.8	2.4	1.8	1.5	1.3	1.1	0.99	0.89	0.72	0.69	0.56	0.46	0.26
			hematological	NA	NA	3.2	2.6	2.2	1.7	1.4	1.2	1	0.93	0.82	0.67	0.64	0.52	0.43	0.24
			respiratory	NA	NA	0.72	0.58	0.5	0.39	0.31	0.27	0.23	0.2	0.18	0.15	0.14	0.12	0.095	0.057
			systemic	NA	NA	0.16	0.13	0.11	0.087	0.072	0.061	0.053	0.047	0.042	0.034	0.032	0.025	0.021	0.013
		Flowback	neurotoxicity	NA	NA	1.1	1	0.86	0.63	0.71	0.6	0.56	0.49	0.44	0.35	0.33	0.23	0.15	0.12
			hematological	NA	NA	0.93	0.9	0.74	0.54	0.61	0.51	0.48	0.42	0.38	0.3	0.28	0.2	0.13	0.099
			respiratory	NA	NA	0.53	0.51	0.42	0.31	0.34	0.29	0.27	0.24	0.21	0.17	0.16	0.11	0.071	0.056
			systemic	NA	NA	0.17	0.16	0.13	0.098	0.11	0.098	0.087	0.076	0.068	0.055	0.051	0.036	0.023	0.018
	Northern Front Range	Drilling	hematological	NA	NA	0.55	0.45	0.37	0.26	0.2	0.16	0.12	0.1	0.088	0.064	0.05	0.041	0.033	0.028
			neurotoxicity	NA	NA	0.24	0.19	0.16	0.11	0.087	0.068	0.055	0.045	0.039	0.028	0.022	0.018	0.015	0.012
		Fracking	hematological	NA	NA	0.11	0.092	0.076	0.054	0.042	0.033	0.027	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
		Flowback	hematological	NA	NA	2.1	1.7	1.4	0.99	0.74	0.58	0.46	0.39	0.33	0.25	0.2	0.16	0.13	0.11
			neurotoxicity	NA	NA	1.8	1.4	1.2	0.84	0.63	0.49	0.39	0.33	0.28	0.21	0.17	0.13	0.11	0.094
			respiratory	NA	NA	0.51	0.41	0.34	0.24	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
			systemic	NA	NA	0.16	0.13	0.1	0.074	0.056	0.044	0.035	0.029	0.025	0.019	0.015	0.012	<0.01	<0.01
	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.71	0.58	0.49	0.36	0.28	0.22	0.17	0.075	0.065	0.048	0.038	0.031	0.026	0.026
			neurotoxicity	NA	NA	0.31	0.25	0.21	0.16	0.12	0.095	0.076	0.033	0.028	0.022	0.017	0.014	0.011	0.012
		Fracking	neurotoxicity	NA	NA	4.3	3.5	3	2.2	1.7	1.3	1.1	0.87	0.74	0.57	0.45	0.38	0.31	0.27
			hematological	NA	NA	4	3.3	2.8	2	1.6	1.2	0.99	0.81	0.69	0.53	0.42	0.35	0.29	0.25
			respiratory	NA	NA	0.87	0.72	0.61	0.46	0.35	0.28	0.22	0.18	0.16	0.12	0.1	0.082	0.068	0.059
			systemic	NA	NA	0.21	0.17	0.15	0.11	0.084	0.066	0.053	0.044	0.037	0.029	0.023	0.019	0.016	0.014
		Flowback	neurotoxicity	NA	NA	2.6	2.1	1.8	1	0.78	0.33	0.29	0.25	0.22	0.15	0.13	0.07	0.1	0.072
			hematological	NA	NA	2.3	1.8	1.5	0.88	0.67	0.29	0.24	0.21	0.19	0.13	0.11	0.06	0.085	0.062
			respiratory	NA	NA	1.3	1.1	0.84	0.51	0.38	0.16	0.14	0.12	0.11	0.076	0.066	0.034	0.05	0.037
			systemic	NA	NA	0.43	0.35	0.25	0.17	0.13	0.054	0.046	0.04	0.035	0.025	0.022	0.016	0.017	0.012
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	0.47	0.35	0.29	0.31	0.25	0.21	0.18	0.16	0.14	0.12	0.11	0.082	0.057	0.034
			neurotoxicity	NA	NA	0.2	0.15	0.13	0.14	0.11	0.093	0.081	0.071	0.063	0.052	0.046	0.035	0.024	0.015
		Fracking	neurotoxicity	NA	NA	3.4	2.8	2.4	1.8	1.5	1.3	1.1	0.99	0.89	0.72	0.7	0.56	0.47	0.26
			hematological	NA	NA	3.2	2.6	2.2	1.7	1.4	1.2	1	0.93	0.83	0.67	0.64	0.52	0.43	0.24
			respiratory	NA	NA	0.72	0.58	0.5	0.39	0.31	0.27	0.23	0.2	0.18	0.15	0.14	0.12	0.095	0.057

	Flowback	systemic	NA	NA	0.16	0.13	0.11	0.087	0.072	0.061	0.053	0.047	0.042	0.034	0.032	0.025	0.021	0.013
		neurotoxicity	NA	NA	1.1	1.1	0.86	0.63	0.71	0.6	0.56	0.49	0.44	0.35	0.33	0.23	0.15	0.12
		hematological	NA	NA	0.94	0.9	0.74	0.54	0.61	0.51	0.48	0.42	0.38	0.3	0.28	0.2	0.13	0.099
		respiratory	NA	NA	0.53	0.51	0.42	0.31	0.34	0.29	0.27	0.24	0.21	0.17	0.16	0.11	0.071	0.056
		systemic	NA	NA	0.17	0.16	0.13	0.098	0.11	0.098	0.087	0.076	0.068	0.055	0.051	0.036	0.023	0.018
	Drilling	hematological	NA	NA	0.55	0.45	0.37	0.26	0.2	0.16	0.13	0.1	0.088	0.065	0.05	0.041	0.034	0.028
		neurotoxicity	NA	NA	0.24	0.19	0.16	0.11	0.087	0.068	0.055	0.045	0.039	0.028	0.022	0.018	0.015	0.012
	Fracking	hematological	NA	NA	0.11	0.092	0.076	0.054	0.042	0.033	0.027	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
		hematological	NA	NA	2.1	1.7	1.4	0.99	0.74	0.58	0.46	0.39	0.33	0.25	0.2	0.16	0.13	0.11
		neurotoxicity	NA	NA	1.8	1.4	1.2	0.84	0.63	0.49	0.39	0.33	0.28	0.21	0.17	0.13	0.11	0.094
		respiratory	NA	NA	0.51	0.41	0.34	0.24	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
		systemic	NA	NA	0.16	0.13	0.1	0.074	0.056	0.044	0.035	0.029	0.025	0.019	0.015	0.012	<0.01	<0.01
Northern Front Range	Flowback	hematological	NA	NA	0.11	0.092	0.076	0.054	0.042	0.033	0.027	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
		hematological	NA	NA	2.1	1.7	1.4	0.99	0.74	0.58	0.46	0.39	0.33	0.25	0.2	0.16	0.13	0.11
		neurotoxicity	NA	NA	1.8	1.4	1.2	0.84	0.63	0.49	0.39	0.33	0.28	0.21	0.17	0.13	0.11	0.094
		respiratory	NA	NA	0.51	0.41	0.34	0.24	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
		systemic	NA	NA	0.16	0.13	0.1	0.074	0.056	0.044	0.035	0.029	0.025	0.019	0.015	0.012	<0.01	<0.01

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D).

Table E-16. Percentage of Subchronic Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 1-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Fracking	neurotoxicity	NA	NA	81%	71%	61%	37%	15%	2%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	78%	68%	56%	31%	10%	1%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	neurotoxicity	NA	NA	69%	56%	40%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	59%	43%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		respiratory	neurotoxicity	NA	NA	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Fracking	neurotoxicity	NA	NA	69%	55%	41%	17%	5%	1%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	65%	50%	35%	12%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	neurotoxicity	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	54%	36%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top	Fracking	neurotoxicity	NA	NA	80%	71%	61%	37%	15%	2%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	77%	67%	56%	31%	10%	1%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	neurotoxicity	NA	NA	69%	56%	40%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	59%	43%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Top (BarD)	Fracking	hematological	NA	NA	59%	43%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	respiratory		NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	neurotoxicity		NA	NA	69%	55%	40%	17%	5%	1%	1%	0%	0%	0%	0%	0%	0%	0%	
	hematological		NA	NA	65%	49%	34%	12%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
	Northern Front Range	Flowback	neurotoxicity	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	53%	35%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		neurotoxicity	NA	NA	40%	19%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)	Fracking	neurotoxicity	NA	NA	79%	69%	59%	36%	14%	2%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	76%	66%	55%	30%	10%	1%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	neurotoxicity	NA	NA	67%	54%	39%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	57%	42%	24%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			respiratory	NA	NA	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Fracking	neurotoxicity	NA	NA	67%	53%	39%	17%	5%	1%	1%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	63%	48%	34%	12%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	neurotoxicity	NA	NA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	52%	35%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			neurotoxicity	NA	NA	39%	18%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D).

E.1.2.2 3-acre Well Pad

Table E-17. Largest Subchronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.43	0.35	0.29	0.21	0.19	0.14	0.12	0.053	0.047	0.069	0.055	0.045	0.037	0.014
			toluene	NA	NA	0.14	0.11	0.094	0.068	0.059	0.046	0.037	0.017	0.015	0.022	0.017	0.014	0.012	<0.01
		Fracking	m+p-xylene	NA	NA	1.1	0.91	0.76	0.56	0.48	0.37	0.3	0.25	0.21	0.18	0.14	0.11	0.095	0.081
			n-nonane	NA	NA	0.67	0.55	0.46	0.34	0.29	0.23	0.18	0.15	0.13	0.11	0.084	0.068	0.057	0.049

		Flowback	benzene	NA	NA	0.58	0.48	0.4	0.29	0.25	0.2	0.16	0.13	0.11	0.092	0.073	0.06	0.05	0.043
			1,2,4-trimethylbenzene	NA	NA	0.26	0.21	0.18	0.13	0.11	0.087	0.071	0.058	0.049	0.041	0.033	0.027	0.022	0.019
			1,3,5-trimethylbenzene	NA	NA	0.2	0.16	0.13	0.098	0.085	0.066	0.054	0.044	0.037	0.031	0.025	0.02	0.017	0.015
			n-nonane	NA	NA	0.22	0.17	0.14	0.11	0.083	0.067	0.057	0.05	0.044	0.032	0.025	0.014	0.019	0.014
			m+p-xylene	NA	NA	0.2	0.16	0.13	0.099	0.076	0.062	0.053	0.046	0.041	0.029	0.023	0.013	0.018	0.013
			1,2,4-trimethylbenzene	NA	NA	0.16	0.13	0.1	0.077	0.06	0.049	0.042	0.036	0.032	0.023	0.018	0.01	0.014	<0.01
			1,3,5-trimethylbenzene	NA	NA	0.16	0.13	0.11	0.079	0.061	0.05	0.042	0.037	0.033	0.023	0.019	0.01	0.014	0.01
			benzene	NA	NA	0.12	0.096	0.08	0.059	0.046	0.037	0.032	0.028	0.024	0.017	0.014	<0.01	0.011	<0.01
			1,2,3-trimethylbenzene	NA	NA	0.11	0.085	0.071	0.052	0.04	0.033	0.028	0.024	0.022	0.015	0.012	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	0.3	0.26	0.21	0.15	0.12	0.1	0.086	0.13	0.11	0.068	0.075	0.054	0.042	0.03
		Fracking	m+p-xylene	NA	NA	0.95	0.65	0.53	0.64	0.52	0.44	0.38	0.33	0.29	0.23	0.2	0.15	0.12	0.076
			n-nonane	NA	NA	0.58	0.4	0.32	0.39	0.32	0.27	0.23	0.2	0.18	0.14	0.12	0.089	0.072	0.046
			benzene	NA	NA	0.52	0.36	0.29	0.34	0.28	0.23	0.2	0.18	0.15	0.12	0.1	0.079	0.064	0.041
			1,2,4-trimethylbenzene	NA	NA	0.23	0.16	0.13	0.15	0.12	0.1	0.089	0.078	0.068	0.054	0.046	0.036	0.029	0.019
			1,3,5-trimethylbenzene	NA	NA	0.17	0.12	0.095	0.11	0.094	0.079	0.068	0.059	0.052	0.041	0.035	0.027	0.022	0.014
		Flowback	n-nonane	NA	NA	0.26	0.2	0.16	0.14	0.11	0.09	0.081	0.12	0.11	0.066	0.071	0.05	0.036	0.025
			m+p-xylene	NA	NA	0.24	0.18	0.15	0.13	0.1	0.083	0.075	0.11	0.097	0.061	0.066	0.046	0.033	0.023
			1,3,5-trimethylbenzene	NA	NA	0.19	0.15	0.12	0.077	0.081	0.066	0.059	0.089	0.078	0.048	0.052	0.037	0.026	0.019
			1,2,4-trimethylbenzene	NA	NA	0.18	0.14	0.12	0.076	0.079	0.065	0.058	0.087	0.076	0.047	0.051	0.036	0.026	0.018
			benzene	NA	NA	0.14	0.11	0.089	0.079	0.061	0.05	0.045	0.067	0.058	0.037	0.039	0.028	0.02	0.014
			1,2,3-trimethylbenzene	NA	NA	0.12	0.096	0.078	0.051	0.053	0.043	0.039	0.059	0.051	0.031	0.034	0.024	0.017	0.012
	Northern Front Range	Drilling	benzene	NA	NA	0.41	0.33	0.27	0.19	0.15	0.12	0.097	0.081	0.068	0.05	0.039	0.032	0.026	0.022
			toluene	NA	NA	0.13	0.11	0.088	0.062	0.049	0.039	0.031	0.026	0.022	0.016	0.013	0.01	<0.01	<0.01
		Flowback	benzene	NA	NA	0.9	0.75	0.62	0.44	0.34	0.27	0.22	0.18	0.16	0.12	0.092	0.074	0.062	0.052
			n-nonane	NA	NA	0.47	0.39	0.32	0.23	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
			m+p-xylene	NA	NA	0.28	0.23	0.19	0.14	0.11	0.085	0.069	0.058	0.049	0.037	0.029	0.023	0.019	0.016
			1,3,5-trimethylbenzene	NA	NA	0.2	0.16	0.14	0.096	0.076	0.06	0.048	0.04	0.034	0.026	0.02	0.016	0.014	0.012
			1,2,4-trimethylbenzene	NA	NA	0.18	0.15	0.12	0.086	0.067	0.053	0.043	0.036	0.031	0.023	0.018	0.015	0.012	0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.43	0.35	0.29	0.21	0.19	0.14	0.12	0.053	0.047	0.069	0.055	0.045	0.037	0.014
			toluene	NA	NA	0.14	0.11	0.094	0.068	0.059	0.046	0.037	0.017	0.015	0.022	0.017	0.014	0.012	<0.01
		Fracking	m+p-xylene	NA	NA	1.1	0.91	0.76	0.56	0.48	0.37	0.3	0.25	0.21	0.17	0.14	0.11	0.095	0.081
			n-nonane	NA	NA	0.67	0.55	0.46	0.33	0.29	0.23	0.18	0.15	0.12	0.11	0.084	0.068	0.057	0.049
			benzene	NA	NA	0.58	0.47	0.4	0.29	0.25	0.2	0.16	0.13	0.11	0.092	0.073	0.06	0.05	0.043
			1,2,4-trimethylbenzene	NA	NA	0.26	0.21	0.18	0.13	0.11	0.087	0.071	0.058	0.048	0.041	0.033	0.027	0.022	0.019
			1,3,5-trimethylbenzene	NA	NA	0.2	0.16	0.13	0.098	0.085	0.066	0.054	0.044	0.037	0.031	0.025	0.02	0.017	0.014
		Flowback	n-nonane	NA	NA	0.21	0.17	0.14	0.11	0.082	0.067	0.057	0.05	0.044	0.031	0.025	0.014	0.019	0.014
			m+p-xylene	NA	NA	0.2	0.16	0.13	0.098	0.076	0.062	0.053	0.046	0.041	0.029	0.023	0.013	0.018	0.013

60+ Years	Garfield County: Valley (Rifle)		1,2,4-trimethylbenzene	NA	NA	0.16	0.13	0.1	0.077	0.059	0.049	0.041	0.036	0.032	0.023	0.018	0.01	0.014	<0.01
			1,3,5-trimethylbenzene	NA	NA	0.16	0.13	0.11	0.079	0.061	0.05	0.042	0.037	0.033	0.023	0.018	0.01	0.014	0.01
			benzene	NA	NA	0.12	0.096	0.08	0.059	0.046	0.037	0.032	0.028	0.024	0.017	0.014	<0.01	0.011	<0.01
		Drilling	benzene	NA	NA	0.3	0.25	0.21	0.15	0.12	0.1	0.086	0.13	0.11	0.068	0.074	0.053	0.042	0.029
		Fracking	m+p-xylene	NA	NA	0.95	0.65	0.53	0.64	0.52	0.44	0.38	0.33	0.29	0.23	0.2	0.15	0.12	0.076
			n-nonane	NA	NA	0.58	0.4	0.32	0.39	0.32	0.27	0.23	0.2	0.18	0.14	0.12	0.089	0.072	0.046
			benzene	NA	NA	0.52	0.36	0.29	0.34	0.28	0.23	0.2	0.18	0.15	0.12	0.1	0.079	0.064	0.041
			1,2,4-trimethylbenzene	NA	NA	0.23	0.16	0.13	0.15	0.12	0.1	0.089	0.078	0.068	0.054	0.046	0.036	0.029	0.019
			1,3,5-trimethylbenzene	NA	NA	0.17	0.12	0.094	0.11	0.093	0.079	0.068	0.059	0.052	0.041	0.035	0.027	0.022	0.014
		Flowback	n-nonane	NA	NA	0.25	0.2	0.16	0.14	0.11	0.089	0.081	0.12	0.1	0.066	0.071	0.05	0.036	0.025
			m+p-xylene	NA	NA	0.24	0.18	0.15	0.13	0.1	0.083	0.075	0.11	0.097	0.061	0.065	0.046	0.033	0.023
			1,3,5-trimethylbenzene	NA	NA	0.19	0.15	0.12	0.077	0.081	0.066	0.059	0.089	0.078	0.048	0.052	0.037	0.026	0.019
			1,2,4-trimethylbenzene	NA	NA	0.18	0.14	0.12	0.075	0.079	0.064	0.058	0.087	0.076	0.047	0.051	0.036	0.026	0.018
			benzene	NA	NA	0.14	0.11	0.089	0.079	0.061	0.049	0.045	0.067	0.058	0.036	0.039	0.028	0.02	0.014
			1,2,3-trimethylbenzene	NA	NA	0.12	0.096	0.078	0.051	0.053	0.043	0.039	0.058	0.051	0.031	0.034	0.024	0.017	0.012
	Northern Front Range	Drilling	benzene	NA	NA	0.41	0.33	0.27	0.19	0.15	0.12	0.097	0.081	0.068	0.05	0.039	0.031	0.026	0.022
			toluene	NA	NA	0.13	0.11	0.088	0.062	0.049	0.039	0.031	0.026	0.022	0.016	0.012	0.01	<0.01	<0.01
		Flowback	benzene	NA	NA	0.91	0.75	0.62	0.44	0.34	0.27	0.22	0.18	0.16	0.12	0.092	0.074	0.062	0.052
			n-nonane	NA	NA	0.47	0.39	0.32	0.23	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
			m+p-xylene	NA	NA	0.28	0.24	0.19	0.14	0.11	0.085	0.069	0.058	0.049	0.037	0.029	0.023	0.019	0.016
			1,3,5-trimethylbenzene	NA	NA	0.2	0.16	0.14	0.096	0.076	0.06	0.048	0.041	0.034	0.026	0.02	0.016	0.014	0.012
			1,2,4-trimethylbenzene	NA	NA	0.18	0.15	0.12	0.086	0.067	0.053	0.043	0.036	0.031	0.023	0.018	0.015	0.012	0.01
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.43	0.35	0.29	0.21	0.19	0.14	0.12	0.053	0.047	0.069	0.055	0.045	0.037	0.014
			toluene	NA	NA	0.14	0.11	0.094	0.069	0.059	0.046	0.037	0.017	0.015	0.022	0.017	0.014	0.012	<0.01
		Fracking	m+p-xylene	NA	NA	1.1	0.91	0.76	0.56	0.48	0.37	0.3	0.25	0.21	0.18	0.14	0.11	0.095	0.081
			n-nonane	NA	NA	0.67	0.55	0.46	0.33	0.29	0.23	0.18	0.15	0.13	0.11	0.084	0.068	0.057	0.049
			benzene	NA	NA	0.58	0.48	0.4	0.29	0.25	0.2	0.16	0.13	0.11	0.092	0.073	0.06	0.05	0.043
			1,2,4-trimethylbenzene	NA	NA	0.26	0.21	0.18	0.13	0.11	0.087	0.071	0.058	0.049	0.041	0.033	0.027	0.022	0.019
			1,3,5-trimethylbenzene	NA	NA	0.2	0.16	0.13	0.098	0.085	0.066	0.054	0.044	0.037	0.031	0.025	0.02	0.017	0.014
		Flowback	n-nonane	NA	NA	0.22	0.17	0.14	0.11	0.083	0.067	0.057	0.05	0.044	0.032	0.025	0.014	0.019	0.014
			m+p-xylene	NA	NA	0.2	0.16	0.13	0.099	0.076	0.062	0.053	0.046	0.041	0.029	0.023	0.013	0.018	0.013
			1,2,4-trimethylbenzene	NA	NA	0.16	0.13	0.1	0.077	0.06	0.049	0.042	0.036	0.032	0.023	0.018	0.01	0.014	<0.01
			1,3,5-trimethylbenzene	NA	NA	0.16	0.13	0.11	0.079	0.061	0.05	0.042	0.037	0.033	0.023	0.019	0.01	0.014	0.01
			benzene	NA	NA	0.12	0.096	0.08	0.059	0.046	0.037	0.032	0.028	0.024	0.017	0.014	<0.01	0.011	<0.01
			1,2,3-trimethylbenzene	NA	NA	0.11	0.085	0.071	0.052	0.04	0.033	0.028	0.024	0.022	0.015	0.012	<0.01	<0.01	<0.01
	Garfield County: ...	Drilling	benzene	NA	NA	0.3	0.26	0.21	0.15	0.12	0.1	0.086	0.13	0.11	0.068	0.075	0.054	0.042	0.03
		Fracking	m+p-xylene	NA	NA	0.95	0.65	0.53	0.64	0.52	0.44	0.38	0.33	0.29	0.23	0.2	0.15	0.12	0.076

	Valley (Rifle)		n-nonane	NA	NA	0.58	0.4	0.32	0.39	0.32	0.27	0.23	0.2	0.18	0.14	0.12	0.089	0.072	0.046
			benzene	NA	NA	0.52	0.36	0.29	0.34	0.28	0.23	0.2	0.18	0.15	0.12	0.11	0.079	0.064	0.041
			1,2,4-trimethylbenzene	NA	NA	0.23	0.16	0.13	0.15	0.12	0.1	0.09	0.078	0.068	0.054	0.046	0.036	0.029	0.019
			1,3,5-trimethylbenzene	NA	NA	0.17	0.12	0.095	0.12	0.094	0.079	0.068	0.059	0.052	0.041	0.035	0.027	0.022	0.014
		Flowback	n-nonane	NA	NA	0.26	0.2	0.16	0.14	0.11	0.09	0.081	0.12	0.11	0.066	0.071	0.05	0.036	0.025
			m+p-xylene	NA	NA	0.24	0.18	0.15	0.13	0.1	0.083	0.075	0.11	0.097	0.061	0.066	0.046	0.033	0.023
			1,3,5-trimethylbenzene	NA	NA	0.19	0.15	0.12	0.077	0.081	0.066	0.059	0.089	0.078	0.048	0.052	0.037	0.026	0.019
			1,2,4-trimethylbenzene	NA	NA	0.18	0.14	0.12	0.076	0.079	0.065	0.058	0.087	0.076	0.047	0.051	0.036	0.026	0.018
			benzene	NA	NA	0.14	0.11	0.089	0.079	0.061	0.05	0.045	0.067	0.058	0.037	0.039	0.028	0.02	0.014
			1,2,3-trimethylbenzene	NA	NA	0.12	0.096	0.078	0.051	0.053	0.043	0.039	0.059	0.051	0.031	0.034	0.024	0.017	0.012
	Northern Front Range	Drilling	benzene	NA	NA	0.41	0.33	0.27	0.19	0.15	0.12	0.097	0.081	0.068	0.05	0.039	0.032	0.026	0.022
			toluene	NA	NA	0.13	0.11	0.088	0.062	0.049	0.039	0.031	0.026	0.022	0.016	0.013	0.01	<0.01	<0.01
		Flowback	benzene	NA	NA	0.9	0.75	0.62	0.44	0.34	0.27	0.22	0.18	0.16	0.12	0.092	0.074	0.062	0.052
			n-nonane	NA	NA	0.47	0.39	0.32	0.23	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
			m+p-xylene	NA	NA	0.28	0.23	0.19	0.14	0.11	0.085	0.069	0.058	0.049	0.037	0.029	0.023	0.019	0.016
			1,3,5-trimethylbenzene	NA	NA	0.2	0.16	0.14	0.096	0.076	0.06	0.048	0.041	0.034	0.026	0.02	0.016	0.014	0.012
			1,2,4-trimethylbenzene	NA	NA	0.18	0.15	0.12	0.086	0.067	0.053	0.043	0.036	0.031	0.023	0.018	0.015	0.012	0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-18. Percentage of Subchronic Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Fracking	m+p-xylene	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years				NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years				NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity.

Table E-19. Largest Subchronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.49	0.4	0.34	0.24	0.21	0.16	0.13	0.06	0.053	0.079	0.062	0.051	0.043	0.017
			neurotoxicity	NA	NA	0.22	0.18	0.15	0.11	0.093	0.072	0.059	0.026	0.023	0.034	0.027	0.022	0.019	<0.01
		Fracking	neurotoxicity	NA	NA	2.5	2	1.7	1.2	1.1	0.84	0.68	0.56	0.47	0.39	0.31	0.25	0.21	0.18
			hematological	NA	NA	2.3	1.9	1.6	1.2	1	0.78	0.63	0.52	0.43	0.37	0.29	0.24	0.2	0.17
			respiratory	NA	NA	0.52	0.43	0.36	0.26	0.23	0.18	0.14	0.12	0.098	0.083	0.066	0.054	0.045	0.039
			systemic	NA	NA	0.12	0.097	0.081	0.059	0.051	0.04	0.033	0.027	0.022	0.019	0.015	0.012	0.01	<0.01
		Flowback	neurotoxicity	NA	NA	0.91	0.73	0.61	0.45	0.35	0.28	0.24	0.21	0.19	0.13	0.11	0.059	0.081	0.057
			hematological	NA	NA	0.78	0.63	0.52	0.38	0.3	0.24	0.21	0.18	0.16	0.11	0.09	0.05	0.07	0.049
			respiratory	NA	NA	0.42	0.34	0.28	0.21	0.16	0.13	0.11	0.097	0.086	0.062	0.049	0.027	0.038	0.026
			systemic	NA	NA	0.13	0.1	0.087	0.064	0.049	0.04	0.034	0.03	0.027	0.019	0.015	<0.01	0.011	<0.01
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	0.34	0.29	0.23	0.17	0.14	0.12	0.098	0.15	0.13	0.078	0.085	0.061	0.048	0.034
			neurotoxicity	NA	NA	0.15	0.13	0.1	0.075	0.062	0.051	0.043	0.064	0.056	0.034	0.038	0.027	0.021	0.015
		Fracking	neurotoxicity	NA	NA	2.1	1.5	1.2	1.4	1.2	0.99	0.86	0.75	0.65	0.52	0.44	0.33	0.27	0.17
			hematological	NA	NA	2	1.4	1.1	1.3	1.1	0.92	0.8	0.7	0.61	0.48	0.41	0.31	0.25	0.16
			respiratory	NA	NA	0.46	0.31	0.25	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.093	0.072	0.058	0.038
		Flowback	neurotoxicity	NA	NA	1.1	0.83	0.67	0.53	0.46	0.38	0.34	0.51	0.44	0.27	0.3	0.21	0.15	0.11
			hematological	NA	NA	0.91	0.71	0.58	0.44	0.4	0.32	0.29	0.43	0.38	0.24	0.25	0.18	0.13	0.091
			respiratory	NA	NA	0.5	0.39	0.31	0.2	0.21	0.17	0.16	0.23	0.2	0.13	0.14	0.097	0.069	0.049
			systemic	NA	NA	0.15	0.12	0.095	0.065	0.065	0.053	0.047	0.072	0.063	0.038	0.042	0.03	0.021	0.015
	Northern Front Range	Drilling	hematological	NA	NA	0.46	0.38	0.31	0.22	0.17	0.14	0.11	0.092	0.078	0.057	0.044	0.036	0.03	0.025
			neurotoxicity	NA	NA	0.2	0.16	0.14	0.097	0.076	0.06	0.048	0.04	0.034	0.025	0.019	0.016	0.013	0.011
		Flowback	hematological	NA	NA	1.7	1.4	1.2	0.81	0.64	0.5	0.41	0.34	0.29	0.22	0.17	0.14	0.11	0.097
			neurotoxicity	NA	NA	1.4	1.2	0.98	0.69	0.54	0.43	0.35	0.29	0.25	0.18	0.14	0.12	0.097	0.083
			respiratory	NA	NA	0.41	0.34	0.28	0.2	0.15	0.12	0.099	0.083	0.07	0.053	0.041	0.033	0.028	0.024
			systemic	NA	NA	0.13	0.11	0.088	0.062	0.049	0.038	0.031	0.026	0.022	0.017	0.013	0.01	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.49	0.4	0.34	0.24	0.21	0.16	0.13	0.06	0.053	0.079	0.062	0.051	0.043	0.017
			neurotoxicity	NA	NA	0.22	0.18	0.15	0.11	0.093	0.072	0.059	0.026	0.023	0.034	0.027	0.022	0.019	<0.01
		Fracking	neurotoxicity	NA	NA	2.5	2	1.7	1.2	1.1	0.84	0.68	0.55	0.46	0.39	0.31	0.25	0.21	0.18
			hematological	NA	NA	2.3	1.9	1.6	1.2	1	0.78	0.63	0.51	0.43	0.36	0.29	0.24	0.2	0.17
			respiratory	NA	NA	0.52	0.43	0.36	0.26	0.23	0.18	0.14	0.12	0.098	0.083	0.066	0.054	0.045	0.039
			systemic	NA	NA	0.12	0.097	0.081	0.059	0.051	0.04	0.032	0.027	0.022	0.019	0.015	0.012	0.01	<0.01
		Flowback	neurotoxicity	NA	NA	0.9	0.73	0.61	0.45	0.35	0.28	0.24	0.21	0.19	0.13	0.11	0.059	0.081	0.057

60+ Years	Garfield County: Valley (Rifle)		hematological	NA	NA	0.77	0.62	0.52	0.38	0.3	0.24	0.21	0.18	0.16	0.11	0.09	0.05	0.07	0.049
			respiratory	NA	NA	0.42	0.34	0.28	0.21	0.16	0.13	0.11	0.097	0.086	0.062	0.049	0.027	0.038	0.026
			systemic	NA	NA	0.13	0.1	0.087	0.064	0.049	0.04	0.034	0.03	0.026	0.019	0.015	<0.01	0.011	<0.01
		Drilling	hematological	NA	NA	0.34	0.29	0.23	0.17	0.14	0.12	0.098	0.14	0.13	0.078	0.085	0.061	0.047	0.034
			neurotoxicity	NA	NA	0.15	0.13	0.1	0.075	0.062	0.051	0.043	0.064	0.056	0.034	0.038	0.027	0.021	0.015
			respiratory	NA	NA	0.45	0.31	0.25	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.093	0.072	0.058	0.038
		Fracking	neurotoxicity	NA	NA	2.1	1.5	1.2	1.4	1.2	0.99	0.86	0.75	0.65	0.51	0.44	0.33	0.27	0.17
			hematological	NA	NA	2	1.4	1.1	1.3	1.1	0.92	0.8	0.69	0.61	0.48	0.41	0.31	0.25	0.16
			respiratory	NA	NA	0.45	0.31	0.25	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.093	0.072	0.058	0.038
		Flowback	neurotoxicity	NA	NA	1.1	0.83	0.67	0.52	0.46	0.37	0.34	0.5	0.44	0.27	0.3	0.21	0.15	0.11
			hematological	NA	NA	0.91	0.71	0.58	0.44	0.39	0.32	0.29	0.43	0.38	0.23	0.25	0.18	0.13	0.09
			respiratory	NA	NA	0.49	0.39	0.31	0.2	0.21	0.17	0.16	0.23	0.2	0.13	0.14	0.097	0.069	0.049
			systemic	NA	NA	0.15	0.12	0.095	0.065	0.065	0.052	0.047	0.072	0.063	0.038	0.042	0.03	0.021	0.015
	Northern Front Range	Drilling	hematological	NA	NA	0.46	0.38	0.31	0.22	0.17	0.14	0.11	0.092	0.077	0.057	0.044	0.036	0.03	0.025
			neurotoxicity	NA	NA	0.2	0.16	0.14	0.097	0.076	0.06	0.048	0.04	0.034	0.025	0.019	0.016	0.013	0.011
		Flowback	hematological	NA	NA	1.7	1.4	1.2	0.81	0.64	0.5	0.41	0.34	0.29	0.22	0.17	0.14	0.11	0.097
			neurotoxicity	NA	NA	1.4	1.2	0.98	0.69	0.54	0.43	0.35	0.29	0.25	0.18	0.14	0.12	0.098	0.083
			respiratory	NA	NA	0.41	0.34	0.28	0.2	0.15	0.12	0.099	0.083	0.07	0.053	0.041	0.034	0.028	0.024
			systemic	NA	NA	0.13	0.11	0.088	0.062	0.049	0.038	0.031	0.026	0.022	0.017	0.013	0.01	<0.01	<0.01
			hematological	NA	NA	0.49	0.4	0.34	0.24	0.21	0.16	0.13	0.06	0.053	0.079	0.062	0.051	0.043	0.017
			neurotoxicity	NA	NA	0.22	0.18	0.15	0.11	0.093	0.072	0.059	0.026	0.023	0.035	0.027	0.022	0.019	<0.01
	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.49	0.4	0.34	0.24	0.21	0.16	0.13	0.06	0.053	0.079	0.062	0.051	0.043	0.017
			neurotoxicity	NA	NA	0.22	0.18	0.15	0.11	0.093	0.072	0.059	0.026	0.023	0.035	0.027	0.022	0.019	<0.01
			respiratory	NA	NA	0.52	0.43	0.36	0.26	0.23	0.18	0.14	0.12	0.098	0.083	0.066	0.054	0.045	0.039
			systemic	NA	NA	0.12	0.097	0.081	0.059	0.051	0.04	0.033	0.027	0.022	0.019	0.015	0.012	0.01	<0.01
		Fracking	neurotoxicity	NA	NA	2.5	2	1.7	1.2	1.1	0.84	0.68	0.55	0.47	0.39	0.31	0.25	0.21	0.18
			hematological	NA	NA	2.3	1.9	1.6	1.2	1	0.78	0.63	0.52	0.43	0.36	0.29	0.24	0.2	0.17
			respiratory	NA	NA	0.52	0.43	0.36	0.26	0.23	0.18	0.14	0.12	0.098	0.083	0.066	0.054	0.045	0.039
			systemic	NA	NA	0.12	0.097	0.081	0.059	0.051	0.04	0.033	0.027	0.022	0.019	0.015	0.012	0.01	<0.01
		Flowback	neurotoxicity	NA	NA	0.91	0.73	0.61	0.45	0.35	0.28	0.24	0.21	0.19	0.13	0.11	0.059	0.081	0.057
			hematological	NA	NA	0.78	0.63	0.52	0.38	0.3	0.24	0.21	0.18	0.16	0.11	0.09	0.05	0.07	0.049
			respiratory	NA	NA	0.42	0.34	0.28	0.21	0.16	0.13	0.11	0.097	0.086	0.062	0.049	0.027	0.038	0.026
			systemic	NA	NA	0.13	0.1	0.087	0.064	0.049	0.04	0.034	0.03	0.027	0.019	0.015	<0.01	0.011	<0.01
		Drilling	hematological	NA	NA	0.34	0.29	0.23	0.17	0.14	0.12	0.098	0.15	0.13	0.078	0.085	0.061	0.048	0.034
			neurotoxicity	NA	NA	0.15	0.13	0.1	0.075	0.062	0.051	0.043	0.064	0.056	0.034	0.038	0.027	0.021	0.015
			respiratory	NA	NA	0.45	0.31	0.25	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.094	0.072	0.058	0.038
			systemic	NA	NA	0.13	0.1	0.087	0.064	0.049	0.04	0.034	0.03	0.027	0.019	0.015	<0.01	0.011	<0.01
			hematological	NA	NA	0.34	0.29	0.23	0.17	0.14	0.12	0.098	0.15	0.13	0.078	0.085	0.061	0.048	0.034
			neurotoxicity	NA	NA	0.15	0.13	0.1	0.075	0.062	0.051	0.043	0.064	0.056	0.034	0.038	0.027	0.021	0.015
			respiratory	NA	NA	0.45	0.31	0.25	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.094	0.072	0.058	0.038
			systemic	NA	NA	0.13	0.1	0.087	0.064	0.049	0.04	0.034	0.03	0.027	0.019	0.015	<0.01	0.011	<0.01
		Fracking	neurotoxicity	NA	NA	2.1	1.5	1.2	1.4	1.2	0.99	0.86	0.75	0.66	0.52	0.45	0.33	0.27	0.17
			hematological	NA	NA	2	1.4	1.1	1.3	1.1	0.92	0.8	0.7	0.61	0.48	0.41	0.31	0.25	0.16
			respiratory	NA	NA	0.45	0.31	0.25	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.094	0.072	0.058	0.038
			systemic	NA	NA	0.13	0.1	0.087	0.064	0.049	0.04	0.034	0.03	0.027	0.019	0.015	<0.01	0.011	<0.01
		Flowback	neurotoxicity	NA	NA	1.1	0.83	0.67	0.53	0.46	0.38	0.34	0.51	0.44	0.27	0.3	0.21	0.15	0.11
			hematological	NA	NA	0.92	0.71	0.58	0.44	0.4	0.32	0.29	0.43	0.38	0.24	0.25	0.18	0.13	0.091
			respiratory	NA	NA	0.5	0.39	0.31	0.2	0.21	0.17	0.16	0.23	0.2	0.13	0.14	0.097	0.069	0.049
			systemic	NA	NA	0.15	0.12	0.095	0.065	0.065	0.053	0.047	0.072	0.063	0.038	0.042	0.03	0.021	0.015

	Northern Front Range	Drilling	hematological	NA	NA	0.46	0.38	0.31	0.22	0.17	0.14	0.11	0.092	0.078	0.057	0.045	0.036	0.03	0.025
			neurotoxicity	NA	NA	0.2	0.16	0.14	0.097	0.076	0.06	0.048	0.04	0.034	0.025	0.019	0.016	0.013	0.011
	Flowback		hematological	NA	NA	1.7	1.4	1.2	0.81	0.64	0.5	0.41	0.34	0.29	0.22	0.17	0.14	0.11	0.097
			neurotoxicity	NA	NA	1.4	1.2	0.98	0.69	0.54	0.43	0.35	0.29	0.25	0.18	0.14	0.12	0.097	0.083
			respiratory	NA	NA	0.41	0.34	0.28	0.2	0.15	0.12	0.099	0.083	0.07	0.053	0.041	0.033	0.028	0.024
			systemic	NA	NA	0.13	0.11	0.088	0.062	0.049	0.038	0.031	0.026	0.022	0.017	0.013	0.01	<0.01	<0.01

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D).

Table E-20. Percentage of Subchronic Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Fracking	neurotoxicity	NA	NA	68%	55%	40%	8%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	64%	49%	34%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			neurotoxicity	NA	NA	61%	29%	5%	24%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	56%	22%	1%	17%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Flowback	neurotoxicity	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	45%	29%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			neurotoxicity	NA	NA	32%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)	Fracking	neurotoxicity	NA	NA	68%	55%	40%	8%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	64%	49%	34%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			neurotoxicity	NA	NA	61%	29%	5%	24%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	56%	22%	1%	17%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	Flowback	neurotoxicity	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

60+ Years	Northern Front Range		hematological	NA	NA	45%	29%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			neurotoxicity	NA	NA	32%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Garfield County: Ridge Top (BarD)	Fracking	neurotoxicity	NA	NA	66%	53%	39%	7%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
			hematological	NA	NA	62%	47%	33%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			Garfield County: Valley (Rifle)	neurotoxicity	NA	NA	59%	28%	5%	24%	2%	0%	0%	0%	0%	0%	0%	0%	0%
				hematological	NA	NA	54%	21%	1%	16%	1%	0%	0%	0%	0%	0%	0%	0%	0%
		Flowback	neurotoxicity	NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			hematological	NA	NA	44%	28%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Northern Front Range		neurotoxicity	NA	NA	31%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D).

E.1.2.3 5-acre Well Pad

Table E-21. Largest Subchronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.44	0.36	0.31	0.24	0.19	0.15	0.12	0.052	0.046	0.067	0.054	0.044	0.037	0.032
			toluene	NA	NA	0.14	0.12	0.1	0.076	0.06	0.048	0.039	0.017	0.015	0.022	0.017	0.014	0.012	0.01
		Fracking	m+p-xylene	NA	NA	1.1	0.95	0.81	0.62	0.49	0.39	0.32	0.27	0.23	0.18	0.14	0.12	0.097	0.083
			n-nonane	NA	NA	0.69	0.58	0.49	0.38	0.3	0.24	0.19	0.16	0.14	0.11	0.086	0.07	0.059	0.051
			benzene	NA	NA	0.61	0.51	0.44	0.33	0.26	0.21	0.17	0.14	0.12	0.095	0.076	0.062	0.052	0.045
			1,2,4-trimethylbenzene	NA	NA	0.27	0.22	0.19	0.15	0.12	0.093	0.076	0.064	0.054	0.042	0.033	0.027	0.023	0.02
			1,3,5-trimethylbenzene	NA	NA	0.2	0.17	0.15	0.11	0.088	0.07	0.057	0.048	0.041	0.032	0.025	0.021	0.017	0.015
		Drilling	benzene	NA	NA	0.33	0.27	0.21	0.15	0.12	0.1	0.085	0.13	0.11	0.069	0.075	0.058	0.042	0.03
			toluene	NA	NA	0.11	0.086	0.068	0.048	0.04	0.032	0.027	0.041	0.036	0.022	0.024	0.019	0.013	<0.01
	Garfield County: Valley (Rifle)	Fracking	m+p-xylene	NA	NA	1	0.69	0.56	0.4	0.51	0.43	0.37	0.33	0.28	0.22	0.19	0.15	0.12	0.073

	(Rifle)		n-nonane	NA	NA	0.61	0.42	0.33	0.24	0.31	0.26	0.23	0.2	0.17	0.14	0.12	0.091	0.073	0.045
			benzene	NA	NA	0.54	0.37	0.29	0.21	0.28	0.23	0.2	0.18	0.15	0.12	0.1	0.081	0.065	0.04
			1,2,4-trimethylbenzene	NA	NA	0.24	0.16	0.13	0.092	0.12	0.1	0.088	0.077	0.067	0.053	0.045	0.035	0.028	0.018
			1,3,5-trimethylbenzene	NA	NA	0.18	0.12	0.098	0.07	0.092	0.078	0.067	0.059	0.051	0.04	0.035	0.027	0.021	0.013
	Northern Front Range	Drilling	benzene	NA	NA	0.39	0.32	0.26	0.19	0.15	0.11	0.093	0.078	0.066	0.048	0.038	0.031	0.025	0.021
			toluene	NA	NA	0.12	0.1	0.084	0.06	0.046	0.037	0.03	0.025	0.021	0.015	0.012	<0.01	<0.01	<0.01
		Flowback	benzene	NA	NA	0.88	0.72	0.6	0.42	0.33	0.26	0.21	0.18	0.15	0.11	0.087	0.071	0.058	0.049
			n-nonane	NA	NA	0.45	0.37	0.31	0.22	0.17	0.14	0.11	0.091	0.075	0.057	0.045	0.036	0.03	0.025
			m+p-xylene	NA	NA	0.27	0.23	0.19	0.13	0.1	0.082	0.066	0.055	0.045	0.035	0.027	0.022	0.018	0.015
			1,3,5-trimethylbenzene	NA	NA	0.19	0.16	0.13	0.093	0.072	0.057	0.046	0.039	0.032	0.024	0.019	0.015	0.013	0.011
			1,2,4-trimethylbenzene	NA	NA	0.17	0.14	0.12	0.084	0.064	0.051	0.041	0.034	0.028	0.022	0.017	0.014	0.011	<0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.43	0.36	0.31	0.24	0.19	0.15	0.12	0.052	0.046	0.067	0.053	0.044	0.037	0.031
			toluene	NA	NA	0.14	0.12	0.1	0.076	0.06	0.048	0.039	0.017	0.015	0.022	0.017	0.014	0.012	0.01
		Fracking	m+p-xylene	NA	NA	1.1	0.95	0.81	0.62	0.49	0.39	0.32	0.27	0.23	0.18	0.14	0.12	0.097	0.083
			n-nonane	NA	NA	0.69	0.58	0.49	0.38	0.3	0.24	0.19	0.16	0.14	0.11	0.086	0.07	0.059	0.05
			benzene	NA	NA	0.61	0.51	0.44	0.33	0.26	0.21	0.17	0.14	0.12	0.095	0.076	0.062	0.052	0.044
			1,2,4-trimethylbenzene	NA	NA	0.27	0.22	0.19	0.15	0.12	0.093	0.076	0.064	0.054	0.042	0.033	0.027	0.023	0.02
			1,3,5-trimethylbenzene	NA	NA	0.2	0.17	0.15	0.11	0.088	0.07	0.057	0.048	0.041	0.032	0.025	0.021	0.017	0.015
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	0.33	0.27	0.21	0.15	0.12	0.1	0.085	0.13	0.11	0.069	0.075	0.058	0.042	0.03
			toluene	NA	NA	0.11	0.086	0.068	0.048	0.04	0.032	0.027	0.041	0.036	0.022	0.024	0.019	0.013	<0.01
		Fracking	m+p-xylene	NA	NA	1	0.69	0.55	0.4	0.51	0.43	0.37	0.32	0.28	0.22	0.19	0.15	0.12	0.073
			n-nonane	NA	NA	0.61	0.42	0.33	0.24	0.31	0.26	0.23	0.2	0.17	0.14	0.12	0.091	0.073	0.045
			benzene	NA	NA	0.54	0.37	0.29	0.21	0.28	0.23	0.2	0.18	0.15	0.12	0.1	0.081	0.065	0.04
			1,2,4-trimethylbenzene	NA	NA	0.24	0.16	0.13	0.092	0.12	0.1	0.088	0.077	0.067	0.052	0.045	0.035	0.028	0.018
			1,3,5-trimethylbenzene	NA	NA	0.18	0.12	0.098	0.07	0.092	0.078	0.067	0.059	0.051	0.04	0.035	0.027	0.021	0.013
	Northern Front Range	Drilling	benzene	NA	NA	0.39	0.31	0.26	0.19	0.14	0.11	0.092	0.077	0.065	0.048	0.038	0.03	0.025	0.021
			toluene	NA	NA	0.12	0.1	0.084	0.059	0.046	0.037	0.03	0.025	0.021	0.015	0.012	<0.01	<0.01	<0.01
		Flowback	benzene	NA	NA	0.88	0.72	0.6	0.42	0.33	0.26	0.21	0.18	0.15	0.11	0.087	0.071	0.058	0.049
n-nonane			NA	NA	0.45	0.37	0.31	0.22	0.17	0.13	0.11	0.091	0.075	0.057	0.045	0.036	0.03	0.025	
m+p-xylene			NA	NA	0.27	0.23	0.19	0.13	0.1	0.081	0.066	0.055	0.045	0.035	0.027	0.022	0.018	0.015	
1,3,5-trimethylbenzene			NA	NA	0.19	0.16	0.13	0.092	0.072	0.057	0.046	0.038	0.032	0.024	0.019	0.015	0.013	0.011	
1,2,4-trimethylbenzene			NA	NA	0.17	0.14	0.12	0.084	0.064	0.051	0.041	0.034	0.028	0.022	0.017	0.014	0.011	<0.01	
60+ Years	Garfield County: Ridge Top (BarD)	Drilling	benzene	NA	NA	0.44	0.36	0.31	0.24	0.19	0.15	0.12	0.052	0.046	0.067	0.054	0.044	0.037	0.032
			toluene	NA	NA	0.14	0.12	0.1	0.076	0.06	0.048	0.039	0.017	0.015	0.022	0.017	0.014	0.012	0.01
		Fracking	m+p-xylene	NA	NA	1.1	0.95	0.81	0.62	0.49	0.39	0.32	0.27	0.23	0.18	0.14	0.12	0.097	0.083
			n-nonane	NA	NA	0.69	0.58	0.49	0.38	0.3	0.24	0.19	0.16	0.14	0.11	0.086	0.07	0.059	0.051
			benzene	NA	NA	0.61	0.51	0.44	0.33	0.26	0.21	0.17	0.14	0.12	0.095	0.076	0.062	0.052	0.045

			1,2,4-trimethylbenzene	NA	NA	0.27	0.22	0.19	0.15	0.12	0.093	0.076	0.064	0.054	0.042	0.033	0.027	0.023	0.02
			1,3,5-trimethylbenzene	NA	NA	0.2	0.17	0.15	0.11	0.088	0.07	0.057	0.048	0.041	0.032	0.025	0.021	0.017	0.015
	Garfield County: Valley (Rifle)	Drilling	benzene	NA	NA	0.33	0.27	0.21	0.15	0.12	0.1	0.085	0.13	0.11	0.069	0.075	0.058	0.042	0.03
			toluene	NA	NA	0.11	0.086	0.068	0.048	0.04	0.032	0.027	0.041	0.036	0.022	0.024	0.019	0.013	<0.01
		Fracking	m+p-xylene	NA	NA	1	0.69	0.56	0.4	0.51	0.43	0.37	0.33	0.28	0.22	0.19	0.15	0.12	0.073
			n-nonane	NA	NA	0.61	0.42	0.33	0.24	0.31	0.26	0.23	0.2	0.17	0.14	0.12	0.091	0.073	0.045
			benzene	NA	NA	0.54	0.37	0.29	0.21	0.28	0.23	0.2	0.18	0.15	0.12	0.1	0.081	0.065	0.04
			1,2,4-trimethylbenzene	NA	NA	0.24	0.16	0.13	0.092	0.12	0.1	0.088	0.077	0.067	0.053	0.045	0.035	0.028	0.018
			1,3,5-trimethylbenzene	NA	NA	0.18	0.12	0.098	0.07	0.092	0.078	0.067	0.059	0.051	0.04	0.035	0.027	0.021	0.013
	Northern Front Range	Drilling	benzene	NA	NA	0.39	0.32	0.26	0.19	0.15	0.11	0.093	0.078	0.066	0.048	0.038	0.031	0.025	0.021
			toluene	NA	NA	0.12	0.1	0.084	0.06	0.046	0.037	0.03	0.025	0.021	0.015	0.012	<0.01	<0.01	<0.01
		Flowback	benzene	NA	NA	0.88	0.72	0.6	0.42	0.33	0.26	0.21	0.18	0.15	0.11	0.087	0.071	0.058	0.049
			n-nonane	NA	NA	0.45	0.37	0.31	0.22	0.17	0.14	0.11	0.091	0.075	0.057	0.045	0.036	0.03	0.025
			m+p-xylene	NA	NA	0.27	0.23	0.19	0.13	0.1	0.082	0.066	0.055	0.045	0.035	0.027	0.022	0.018	0.015
			1,3,5-trimethylbenzene	NA	NA	0.19	0.16	0.13	0.093	0.072	0.057	0.046	0.039	0.032	0.024	0.019	0.015	0.013	0.011
			1,2,4-trimethylbenzene	NA	NA	0.17	0.14	0.12	0.084	0.064	0.051	0.041	0.034	0.028	0.022	0.017	0.014	0.011	<0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity. Flowback is not shown for the Garfield County sites because it lasts more than 1 year in the 5-acre scenario with many wells being developed (so we defer to a chronic assessment).

Table E-22. Percentage of Subchronic Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County:	Fracking	m+p-xylene	NA	NA	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Ridge Top (BarD)			NA	NA	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years				NA	NA	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Flowback is not shown for the Garfield County sites because it lasts more than 1 year in the 5-acre scenario with many wells being developed (so we defer to a chronic assessment).

Table E-23. Largest Subchronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.5	0.41	0.35	0.27	0.21	0.17	0.14	0.06	0.053	0.075	0.061	0.05	0.041	0.036
			neurotoxicity	NA	NA	0.22	0.18	0.16	0.12	0.094	0.075	0.055	0.026	0.023	0.031	0.026	0.022	0.016	0.016
		Fracking	neurotoxicity	NA	NA	2.6	2.1	1.8	1.4	1.1	0.89	0.72	0.61	0.52	0.4	0.32	0.26	0.22	0.19
			hematological	NA	NA	2.4	2	1.7	1.3	1	0.83	0.67	0.57	0.48	0.37	0.3	0.24	0.2	0.17
			respiratory	NA	NA	0.54	0.45	0.39	0.3	0.23	0.19	0.15	0.13	0.11	0.084	0.067	0.055	0.046	0.04
			systemic	NA	NA	0.12	0.1	0.089	0.068	0.054	0.043	0.035	0.029	0.025	0.019	0.015	0.013	0.011	<0.01
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	0.38	0.3	0.24	0.17	0.14	0.11	0.096	0.15	0.13	0.079	0.086	0.066	0.048	0.034
			neurotoxicity	NA	NA	0.17	0.13	0.11	0.076	0.062	0.05	0.042	0.064	0.056	0.035	0.038	0.029	0.021	0.015
		Fracking	neurotoxicity	NA	NA	2.3	1.6	1.2	0.89	1.2	0.98	0.84	0.73	0.64	0.5	0.43	0.34	0.27	0.17
			hematological	NA	NA	2.1	1.4	1.2	0.83	1.1	0.91	0.79	0.69	0.6	0.47	0.4	0.31	0.25	0.16
			respiratory	NA	NA	0.48	0.32	0.26	0.19	0.24	0.21	0.18	0.15	0.14	0.11	0.092	0.071	0.057	0.036
			systemic	NA	NA	0.11	0.075	0.06	0.043	0.057	0.048	0.041	0.036	0.031	0.025	0.021	0.016	0.013	<0.01
	Northern Front Range	Drilling	hematological	NA	NA	0.44	0.36	0.3	0.21	0.17	0.13	0.11	0.088	0.075	0.055	0.043	0.035	0.029	0.024
			neurotoxicity	NA	NA	0.2	0.16	0.13	0.093	0.073	0.058	0.046	0.039	0.033	0.024	0.019	0.015	0.013	0.011
		Flowback	hematological	NA	NA	1.6	1.3	1.1	0.79	0.61	0.48	0.39	0.33	0.27	0.21	0.16	0.13	0.11	0.091
			neurotoxicity	NA	NA	1.4	1.1	0.94	0.67	0.52	0.41	0.33	0.28	0.23	0.17	0.14	0.11	0.091	0.077
			respiratory	NA	NA	0.39	0.32	0.27	0.19	0.15	0.12	0.094	0.079	0.065	0.05	0.039	0.032	0.026	0.022
			systemic	NA	NA	0.12	0.1	0.085	0.06	0.047	0.037	0.03	0.025	0.021	0.016	0.012	<0.01	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.5	0.41	0.35	0.27	0.21	0.17	0.14	0.059	0.053	0.074	0.061	0.05	0.04	0.036
			neurotoxicity	NA	NA	0.22	0.18	0.16	0.12	0.094	0.075	0.055	0.026	0.023	0.031	0.026	0.022	0.016	0.016
		Fracking	neurotoxicity	NA	NA	2.6	2.1	1.8	1.4	1.1	0.89	0.72	0.61	0.52	0.4	0.32	0.26	0.22	0.19
			hematological	NA	NA	2.4	2	1.7	1.3	1	0.83	0.67	0.57	0.48	0.37	0.3	0.24	0.2	0.17
			respiratory	NA	NA	0.54	0.45	0.39	0.3	0.23	0.19	0.15	0.13	0.11	0.084	0.067	0.055	0.046	0.04
			systemic	NA	NA	0.12	0.1	0.089	0.068	0.054	0.043	0.035	0.029	0.025	0.019	0.015	0.013	0.011	<0.01
	Garfield County: Valley (Rifle)	Drilling	hematological	NA	NA	0.38	0.3	0.24	0.17	0.14	0.11	0.096	0.15	0.13	0.079	0.086	0.066	0.048	0.034
			neurotoxicity	NA	NA	0.16	0.13	0.11	0.075	0.062	0.05	0.042	0.064	0.056	0.035	0.038	0.029	0.021	0.015
		Fracking	neurotoxicity	NA	NA	2.3	1.5	1.2	0.89	1.2	0.97	0.84	0.73	0.64	0.5	0.43	0.34	0.27	0.17
			hematological	NA	NA	2.1	1.4	1.2	0.83	1.1	0.91	0.79	0.68	0.6	0.47	0.4	0.31	0.25	0.16
			respiratory	NA	NA	0.47	0.32	0.26	0.19	0.24	0.21	0.18	0.15	0.14	0.11	0.092	0.071	0.057	0.036
			systemic	NA	NA	0.11	0.075	0.06	0.043	0.056	0.048	0.041	0.036	0.031	0.025	0.021	0.016	0.013	<0.01
	Northern	Drilling	hematological	NA	NA	0.44	0.36	0.3	0.21	0.16	0.13	0.11	0.088	0.075	0.055	0.043	0.035	0.029	0.024

60+ Years	Front Range	Flowback	neurotoxicity	NA	NA	0.19	0.16	0.13	0.093	0.073	0.058	0.046	0.039	0.033	0.024	0.019	0.015	0.013	0.011
			hematological	NA	NA	1.6	1.3	1.1	0.78	0.61	0.48	0.39	0.33	0.27	0.21	0.16	0.13	0.11	0.091
			neurotoxicity	NA	NA	1.4	1.1	0.94	0.67	0.52	0.41	0.33	0.28	0.23	0.17	0.14	0.11	0.091	0.077
			respiratory	NA	NA	0.39	0.32	0.27	0.19	0.15	0.12	0.094	0.078	0.065	0.05	0.039	0.031	0.026	0.022
			systemic	NA	NA	0.12	0.1	0.085	0.06	0.047	0.037	0.03	0.025	0.021	0.016	0.012	<0.01	<0.01	<0.01
	Garfield County: Ridge Top (BarD)	Drilling	hematological	NA	NA	0.5	0.41	0.35	0.27	0.21	0.17	0.14	0.06	0.053	0.075	0.061	0.05	0.041	0.036
			neurotoxicity	NA	NA	0.22	0.18	0.16	0.12	0.094	0.075	0.055	0.026	0.023	0.031	0.026	0.022	0.016	0.016
		Fracking	neurotoxicity	NA	NA	2.6	2.1	1.8	1.4	1.1	0.89	0.72	0.61	0.52	0.4	0.32	0.26	0.22	0.19
			hematological	NA	NA	2.4	2	1.7	1.3	1	0.83	0.67	0.57	0.48	0.37	0.3	0.24	0.2	0.17
			respiratory	NA	NA	0.54	0.45	0.39	0.3	0.23	0.19	0.15	0.13	0.11	0.084	0.067	0.055	0.046	0.04
			systemic	NA	NA	0.12	0.1	0.089	0.068	0.054	0.043	0.035	0.029	0.025	0.019	0.015	0.013	0.011	<0.01
		Garfield County: Valley (Rifle)	hematological	NA	NA	0.38	0.3	0.24	0.17	0.14	0.11	0.096	0.15	0.13	0.079	0.086	0.067	0.048	0.034
			neurotoxicity	NA	NA	0.17	0.13	0.11	0.076	0.062	0.05	0.042	0.064	0.056	0.035	0.038	0.029	0.021	0.015
		Fracking	neurotoxicity	NA	NA	2.3	1.6	1.2	0.89	1.2	0.98	0.84	0.73	0.64	0.5	0.43	0.34	0.27	0.17
			hematological	NA	NA	2.1	1.4	1.2	0.83	1.1	0.91	0.79	0.69	0.6	0.47	0.41	0.32	0.25	0.16
			respiratory	NA	NA	0.48	0.32	0.26	0.19	0.24	0.21	0.18	0.15	0.14	0.11	0.092	0.071	0.057	0.036
			systemic	NA	NA	0.11	0.075	0.06	0.043	0.057	0.048	0.041	0.036	0.031	0.025	0.021	0.016	0.013	<0.01
	Northern Front Range	Drilling	hematological	NA	NA	0.44	0.36	0.3	0.21	0.17	0.13	0.11	0.088	0.075	0.055	0.043	0.035	0.029	0.024
			neurotoxicity	NA	NA	0.2	0.16	0.13	0.093	0.073	0.058	0.046	0.039	0.033	0.024	0.019	0.015	0.013	0.011
		Flowback	hematological	NA	NA	1.6	1.3	1.1	0.79	0.61	0.48	0.39	0.33	0.27	0.21	0.16	0.13	0.11	0.091
			neurotoxicity	NA	NA	1.4	1.1	0.94	0.67	0.52	0.41	0.33	0.28	0.23	0.17	0.14	0.11	0.091	0.077
			respiratory	NA	NA	0.39	0.32	0.27	0.19	0.15	0.12	0.094	0.079	0.065	0.05	0.039	0.032	0.026	0.022
			systemic	NA	NA	0.12	0.1	0.085	0.06	0.047	0.037	0.03	0.025	0.021	0.016	0.012	<0.01	<0.01	<0.01

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Flowback is not shown for the Garfield County sites because it lasts more than 1 year in the 5-acre scenario with many wells being developed (so we defer to a chronic assessment).

Table E-24. Percentage of Subchronic Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge	Fracking	neurotoxicity	NA	NA	72%	61%	49%	25%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Top (BarD)		hematological	NA	NA	68%	57%	43%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	68%	39%	16%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	64%	32%	7%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Flowback	hematological	NA	NA	44%	28%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			neurotoxicity	NA	NA	32%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)	Fracking	neurotoxicity	NA	NA	72%	61%	49%	25%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	68%	56%	43%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	67%	39%	15%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	63%	32%	6%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Flowback	hematological	NA	NA	44%	28%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			neurotoxicity	NA	NA	32%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)	Fracking	neurotoxicity	NA	NA	70%	59%	47%	24%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	66%	55%	42%	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	66%	38%	15%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	62%	31%	6%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	Flowback	hematological	NA	NA	44%	27%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			neurotoxicity	NA	NA	31%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Flowback is not shown for the Garfield County sites because it lasts more than 1 year in the 5-acre scenario with many wells being developed (so we defer to a chronic assessment).

E.1.3 Chronic Non-cancer Hazards

E.1.3.1 5-acre Well Pad

Table E-25. Largest Chronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 5-acre Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Flowback	n-nonane	NA	NA	2.1	1.7	1.4	1	0.81	0.65	0.56	0.49	0.43	0.31	0.25	0.14	0.19	0.13
			benzene	NA	NA	1	0.8	0.66	0.48	0.37	0.3	0.26	0.23	0.2	0.14	0.11	0.064	0.088	0.062
			m+p-xylene	NA	NA	0.79	0.63	0.52	0.38	0.3	0.24	0.2	0.18	0.16	0.11	0.091	0.051	0.07	0.04
			1,3,5-trimethylbenzene	NA	NA	0.54	0.43	0.36	0.26	0.2	0.16	0.14	0.12	0.11	0.076	0.062	0.035	0.048	0.034
			1,2,4-trimethylbenzene	NA	NA	0.53	0.42	0.35	0.26	0.2	0.16	0.14	0.12	0.11	0.075	0.061	0.034	0.047	0.033
			2-ethyltoluene	NA	NA	0.53	0.42	0.35	0.25	0.2	0.16	0.14	0.12	0.1	0.074	0.06	0.048	0.041	0.032
			1,2,3-trimethylbenzene	NA	NA	0.35	0.28	0.23	0.17	0.13	0.11	0.09	0.079	0.07	0.049	0.04	0.023	0.031	0.022
			o-xylene	NA	NA	0.15	0.12	0.096	0.07	0.054	0.044	0.038	0.033	0.029	0.02	0.017	<0.01	0.013	<0.01
			3-ethyltoluene	NA	NA	0.12	0.098	0.081	0.06	0.046	0.037	0.032	0.028	0.025	0.017	0.014	<0.01	0.011	<0.01
	Garfield County: Valley (Rifle)		n-nonane	NA	NA	2.7	2	1.6	1	1.1	0.89	0.81	1.2	1	0.65	0.69	0.49	0.35	0.25
			benzene	NA	NA	1.3	0.95	0.76	0.48	0.52	0.42	0.38	0.54	0.48	0.3	0.32	0.23	0.16	0.11
			m+p-xylene	NA	NA	0.98	0.75	0.59	0.38	0.41	0.33	0.3	0.43	0.37	0.24	0.25	0.18	0.13	0.09
			1,3,5-trimethylbenzene	NA	NA	0.67	0.51	0.41	0.26	0.28	0.22	0.2	0.29	0.25	0.16	0.17	0.12	0.086	0.061
			1,2,4-trimethylbenzene	NA	NA	0.65	0.5	0.39	0.25	0.27	0.22	0.2	0.28	0.25	0.16	0.17	0.12	0.084	0.06
			2-ethyltoluene	NA	NA	0.65	0.49	0.39	0.25	0.27	0.22	0.2	0.28	0.24	0.16	0.16	0.11	0.081	0.058
			1,2,3-trimethylbenzene	NA	NA	0.43	0.33	0.26	0.16	0.18	0.14	0.13	0.19	0.16	0.11	0.11	0.076	0.055	0.039
			o-xylene	NA	NA	0.18	0.14	0.11	0.069	0.074	0.06	0.054	0.078	0.068	0.044	0.046	0.032	0.023	0.016
			3-ethyltoluene	NA	NA	0.15	0.12	0.092	0.059	0.063	0.051	0.046	0.066	0.058	0.037	0.039	0.027	0.02	0.014
18 to 59 Years	Garfield County: Ridge Top (BarD)	n-nonane	NA	NA	2.1	1.7	1.4	1	0.81	0.65	0.56	0.49	0.43	0.31	0.25	0.14	0.19	0.13	
		benzene	NA	NA	1	0.8	0.66	0.48	0.37	0.3	0.26	0.23	0.2	0.14	0.11	0.064	0.088	0.062	
		m+p-xylene	NA	NA	0.79	0.63	0.52	0.38	0.3	0.24	0.2	0.18	0.16	0.11	0.09	0.05	0.069	0.049	
		1,3,5-trimethylbenzene	NA	NA	0.54	0.43	0.36	0.26	0.2	0.16	0.14	0.12	0.11	0.076	0.062	0.035	0.048	0.034	
		1,2,4-trimethylbenzene	NA	NA	0.53	0.42	0.35	0.26	0.2	0.16	0.14	0.12	0.11	0.074	0.06	0.034	0.046	0.033	
		2-ethyltoluene	NA	NA	0.52	0.42	0.35	0.25	0.2	0.16	0.14	0.12	0.1	0.074	0.06	0.048	0.041	0.032	
		1,2,3-trimethylbenzene	NA	NA	0.35	0.28	0.23	0.17	0.13	0.11	0.09	0.079	0.07	0.049	0.04	0.023	0.031	0.022	
		o-xylene	NA	NA	0.14	0.12	0.096	0.07	0.054	0.044	0.037	0.033	0.029	0.02	0.017	<0.01	0.013	<0.01	
		3-ethyltoluene	NA	NA	0.12	0.098	0.081	0.059	0.046	0.037	0.032	0.028	0.025	0.017	0.014	<0.01	0.011	<0.01	

60+ Years	Garfield County: Valley (Rifle)	n-nonane	NA	NA	2.7	2	1.6	1	1.1	0.89	0.81	1.2	1	0.65	0.69	0.48	0.35	0.24
		benzene	NA	NA	1.2	0.95	0.75	0.48	0.51	0.41	0.37	0.54	0.47	0.3	0.32	0.23	0.16	0.11
		m+p-xylene	NA	NA	0.98	0.75	0.59	0.38	0.4	0.33	0.29	0.43	0.37	0.24	0.25	0.18	0.13	0.089
		1,3,5-trimethylbenzene	NA	NA	0.67	0.51	0.4	0.26	0.28	0.22	0.2	0.29	0.25	0.16	0.17	0.12	0.086	0.061
		1,2,4-trimethylbenzene	NA	NA	0.65	0.5	0.39	0.25	0.27	0.22	0.2	0.28	0.25	0.16	0.17	0.12	0.084	0.059
		2-ethyltoluene	NA	NA	0.64	0.49	0.39	0.25	0.27	0.21	0.19	0.28	0.24	0.16	0.16	0.11	0.081	0.058
		1,2,3-trimethylbenzene	NA	NA	0.43	0.33	0.26	0.16	0.18	0.14	0.13	0.19	0.16	0.11	0.11	0.076	0.055	0.039
		o-xylene	NA	NA	0.18	0.14	0.11	0.068	0.074	0.059	0.054	0.077	0.068	0.044	0.046	0.032	0.023	0.016
		3-ethyltoluene	NA	NA	0.15	0.12	0.092	0.058	0.063	0.051	0.046	0.066	0.058	0.037	0.039	0.027	0.02	0.014
	Garfield County: Ridge Top (BarD)	n-nonane	NA	NA	2.1	1.7	1.4	1	0.81	0.65	0.56	0.49	0.43	0.31	0.25	0.14	0.19	0.13
		benzene	NA	NA	1	0.8	0.66	0.48	0.37	0.3	0.26	0.23	0.2	0.14	0.11	0.064	0.088	0.062
		m+p-xylene	NA	NA	0.79	0.63	0.52	0.38	0.3	0.24	0.2	0.18	0.16	0.11	0.091	0.051	0.07	0.049
		1,3,5-trimethylbenzene	NA	NA	0.54	0.43	0.36	0.26	0.2	0.16	0.14	0.12	0.11	0.076	0.062	0.035	0.048	0.034
		1,2,4-trimethylbenzene	NA	NA	0.53	0.42	0.35	0.26	0.2	0.16	0.14	0.12	0.11	0.075	0.061	0.034	0.047	0.033
		2-ethyltoluene	NA	NA	0.53	0.42	0.35	0.25	0.2	0.16	0.14	0.12	0.1	0.074	0.06	0.048	0.041	0.032
		1,2,3-trimethylbenzene	NA	NA	0.35	0.28	0.23	0.17	0.13	0.11	0.091	0.079	0.07	0.049	0.04	0.023	0.031	0.022
		o-xylene	NA	NA	0.15	0.12	0.096	0.07	0.054	0.044	0.038	0.033	0.029	0.02	0.017	<0.01	0.013	<0.01
		3-ethyltoluene	NA	NA	0.12	0.098	0.081	0.06	0.046	0.038	0.032	0.028	0.025	0.017	0.014	<0.01	0.011	<0.01
	Garfield County: Valley (Rifle)	n-nonane	NA	NA	2.7	2	1.6	1	1.1	0.89	0.81	1.2	1	0.65	0.69	0.49	0.35	0.25
		benzene	NA	NA	1.3	0.95	0.76	0.48	0.52	0.42	0.38	0.54	0.48	0.3	0.32	0.23	0.16	0.11
		m+p-xylene	NA	NA	0.98	0.75	0.59	0.38	0.41	0.33	0.3	0.43	0.37	0.24	0.25	0.18	0.13	0.09
		1,3,5-trimethylbenzene	NA	NA	0.67	0.51	0.41	0.26	0.28	0.22	0.2	0.29	0.25	0.16	0.17	0.12	0.086	0.061
		1,2,4-trimethylbenzene	NA	NA	0.65	0.5	0.39	0.25	0.27	0.22	0.2	0.28	0.25	0.16	0.17	0.12	0.084	0.06
		2-ethyltoluene	NA	NA	0.65	0.49	0.39	0.25	0.27	0.22	0.2	0.28	0.24	0.16	0.16	0.11	0.081	0.058
		1,2,3-trimethylbenzene	NA	NA	0.43	0.33	0.26	0.16	0.18	0.14	0.13	0.19	0.16	0.11	0.11	0.076	0.055	0.039
		o-xylene	NA	NA	0.18	0.14	0.11	0.069	0.074	0.06	0.054	0.078	0.068	0.044	0.046	0.032	0.023	0.016
		3-ethyltoluene	NA	NA	0.15	0.12	0.092	0.059	0.063	0.051	0.046	0.066	0.058	0.037	0.039	0.027	0.02	0.014

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity. Drilling and fracking for the Garfield County sites, and all development activities for the Northern Front Range, are not shown because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment).

Table E-26. Percentage of Chronic Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 5-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Flowback	n-nonane	NA	NA	67%	51%	36%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		n-nonane	NA	NA	78%	64%	45%	0%	8%	0%	0%	15%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)		n-nonane	NA	NA	66%	51%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		n-nonane	NA	NA	78%	63%	45%	0%	8%	0%	0%	14%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)		n-nonane	NA	NA	65%	49%	34%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		n-nonane	NA	NA	76%	62%	44%	0%	8%	0%	0%	14%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Drilling and fracking for the Garfield County sites, and all development activities for the Northern Front Range, are not shown because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment).

Table E-27. Largest Chronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities, by Distance from the 5-acre Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Flowback	neurotoxicity	NA	NA	4.6	3.7	3	2.2	1.7	1.4	1.2	1	0.92	0.65	0.53	0.3	0.4	0.28
			hematological	NA	NA	2.4	1.9	1.6	1.2	0.91	0.74	0.63	0.55	0.48	0.34	0.28	0.16	0.21	0.15
			respiratory	NA	NA	1.5	1.2	0.99	0.72	0.56	0.45	0.39	0.34	0.3	0.21	0.17	0.096	0.13	0.093
			systemic	NA	NA	0.83	0.67	0.55	0.4	0.31	0.25	0.22	0.19	0.17	0.12	0.096	0.068	0.068	0.052
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	5.7	4.3	3.4	2.2	2.4	1.9	1.7	2.5	2.2	1.4	1.5	1	0.74	0.52
			hematological	NA	NA	3	2.3	1.8	1.2	1.2	1	0.91	1.3	1.1	0.74	0.77	0.54	0.39	0.27
			respiratory	NA	NA	1.8	1.4	1.1	0.71	0.76	0.62	0.56	0.8	0.7	0.45	0.47	0.33	0.24	0.17
			systemic	NA	NA	1	0.78	0.62	0.39	0.43	0.34	0.31	0.44	0.39	0.25	0.26	0.18	0.13	0.093
18 to 59 Years	Garfield County: Ridge Top (BarD)	neurotoxicity	NA	NA	4.6	3.7	3	2.2	1.7	1.4	1.2	1	0.92	0.65	0.53	0.29	0.4	0.28	
		hematological	NA	NA	2.4	1.9	1.6	1.2	0.91	0.74	0.63	0.55	0.48	0.34	0.28	0.16	0.21	0.15	
		respiratory	NA	NA	1.5	1.2	0.98	0.72	0.56	0.45	0.39	0.34	0.3	0.21	0.17	0.096	0.13	0.092	
		systemic	NA	NA	0.83	0.66	0.55	0.4	0.31	0.25	0.21	0.19	0.17	0.12	0.095	0.068	0.068	0.051	
	Garfield County: Valley (Rifle)	neurotoxicity	NA	NA	5.7	4.3	3.4	2.2	2.4	1.9	1.7	2.5	2.2	1.4	1.5	1	0.73	0.52	
		hematological	NA	NA	3	2.3	1.8	1.1	1.2	1	0.91	1.3	1.1	0.73	0.77	0.54	0.39	0.27	
		respiratory	NA	NA	1.8	1.4	1.1	0.71	0.76	0.61	0.56	0.8	0.7	0.45	0.47	0.33	0.24	0.17	
		systemic	NA	NA	1	0.78	0.62	0.39	0.42	0.34	0.31	0.44	0.38	0.25	0.26	0.18	0.13	0.093	
60+ Years	Garfield County: Ridge Top (BarD)	neurotoxicity	NA	NA	4.6	3.7	3	2.2	1.7	1.4	1.2	1	0.92	0.65	0.53	0.3	0.4	0.29	
		hematological	NA	NA	2.4	1.9	1.6	1.2	0.91	0.74	0.63	0.55	0.48	0.34	0.28	0.16	0.21	0.15	
		respiratory	NA	NA	1.5	1.2	0.99	0.72	0.56	0.45	0.39	0.34	0.3	0.21	0.17	0.096	0.13	0.093	
		systemic	NA	NA	0.83	0.67	0.55	0.4	0.31	0.25	0.22	0.19	0.17	0.12	0.096	0.068	0.068	0.052	
	Garfield County: Valley (Rifle)	neurotoxicity	NA	NA	5.7	4.3	3.4	2.2	2.4	1.9	1.7	2.5	2.2	1.4	1.5	1	0.74	0.52	
		hematological	NA	NA	3	2.3	1.8	1.2	1.2	1	0.91	1.3	1.1	0.74	0.77	0.54	0.39	0.27	
		respiratory	NA	NA	1.8	1.4	1.1	0.71	0.76	0.62	0.56	0.8	0.7	0.45	0.47	0.33	0.24	0.17	
		systemic	NA	NA	1	0.78	0.62	0.39	0.43	0.34	0.31	0.44	0.39	0.25	0.26	0.18	0.13	0.093	

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Drilling and fracking for the Garfield County sites, and all development activities for the Northern Front Range, are not shown because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment).

Table E-28. Percentage of Chronic Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities, by Distance from the 5-acre Well Pad

				Distance from Well Pad (feet)																
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	
Up to 17 Years	Garfield County: Ridge Top (BarD)	Flowback	neurotoxicity	NA	NA	95%	90%	83%	69%	51%	33%	18%	0%	0%	0%	0%	0%	0%	0%	
			hematological	NA	NA	73%	60%	44%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	40%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	99%	94%	88%	68%	73%	60%	52%	75%	67%	34%	38%	0%	0%	0%	
			hematological	NA	NA	83%	71%	56%	13%	22%	0%	0%	27%	12%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	57%	35%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
18 to 59 Years	Garfield County: Ridge Top (BarD)		neurotoxicity	NA	NA	95%	90%	83%	69%	51%	33%	18%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	73%	60%	44%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	40%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	99%	94%	88%	68%	72%	59%	51%	75%	67%	34%	38%	0%	0%	0%	
			hematological	NA	NA	83%	71%	56%	13%	22%	0%	0%	27%	11%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	57%	34%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
60+ Years	Garfield County: Ridge Top (BarD)		neurotoxicity	NA	NA	93%	88%	80%	67%	49%	33%	17%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	71%	58%	44%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	39%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	97%	92%	86%	66%	71%	57%	49%	72%	65%	33%	38%	0%	0%	0%	
			hematological	NA	NA	81%	69%	54%	12%	21%	0%	0%	26%	12%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	56%	33%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Drilling and fracking for the Garfield County sites, and all development activities for the Northern Front Range, are not shown because they last less than 1 year in the 5-acre scenario with many wells being developed (so we defer to a subchronic assessment).

E.2 Oil and Gas Production

E.2.1 Acute Non-cancer Hazards

Table E-29. Largest Acute Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Production Activities, by Distance from the Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Production	benzene	2.6	2.1	1.8	1.6	1.4	1.4	0.94	0.77	0.68	0.63	0.58	0.51	0.45	0.4	0.35	0.32
			2-ethyltoluene	0.38	0.28	0.24	0.21	0.2	0.21	0.13	0.11	0.096	0.088	0.082	0.072	0.063	0.056	0.05	0.045
			toluene	0.32	0.25	0.22	0.2	0.18	0.18	0.11	0.092	0.078	0.068	0.06	0.046	0.037	0.031	0.026	0.022
			cyclohexane	0.13	0.1	0.09	0.079	0.07	0.068	0.046	0.042	0.038	0.035	0.032	0.029	0.025	0.022	0.02	0.018
			isobutane	0.13	0.094	0.082	0.072	0.064	0.085	0.058	0.052	0.048	0.044	0.041	0.036	0.031	0.028	0.025	0.022
			n-butane	0.12	0.087	0.075	0.066	0.059	0.078	0.053	0.048	0.044	0.04	0.037	0.033	0.029	0.025	0.023	0.02
	Garfield County: Valley (Rifle)		benzene	2.7	1.8	1.6	1.4	1.2	1.1	0.99	0.9	0.83	0.77	0.71	0.61	0.5	0.3	0.36	0.18
			2-ethyltoluene	0.36	0.27	0.22	0.2	0.19	0.16	0.14	0.13	0.12	0.11	0.1	0.083	0.072	0.063	0.051	0.031
			toluene	0.31	0.23	0.18	0.17	0.15	0.14	0.12	0.11	0.098	0.091	0.083	0.066	0.06	0.053	0.042	0.024
			isobutane	0.16	0.1	0.08	0.071	0.064	0.053	0.052	0.046	0.042	0.039	0.036	0.027	0.021	0.018	0.016	<0.01
			n-butane	0.15	0.095	0.074	0.065	0.059	0.049	0.048	0.042	0.039	0.036	0.033	0.025	0.019	0.017	0.015	<0.01
			cyclohexane	0.13	0.089	0.076	0.067	0.061	0.053	0.049	0.044	0.041	0.038	0.035	0.03	0.025	0.015	0.018	<0.01
	Northern Front Range		benzene	2.9	2.3	2.1	2	1.9	1.6	1.7	1.5	1.3	1.2	1.1	0.85	0.72	0.61	0.46	0.41
			2-ethyltoluene	0.42	0.33	0.29	0.26	0.24	0.21	0.21	0.19	0.17	0.16	0.15	0.12	0.1	0.088	0.072	0.064
			toluene	0.4	0.31	0.28	0.25	0.22	0.18	0.16	0.14	0.13	0.12	0.11	0.1	0.086	0.073	0.06	0.053
			isobutane	0.19	0.16	0.14	0.13	0.12	0.099	0.091	0.081	0.075	0.069	0.064	0.046	0.039	0.033	0.025	0.022
			n-butane	0.18	0.14	0.13	0.12	0.11	0.091	0.083	0.075	0.068	0.063	0.058	0.042	0.036	0.03	0.023	0.02
			cyclohexane	0.15	0.12	0.11	0.1	0.095	0.08	0.082	0.073	0.066	0.061	0.056	0.042	0.035	0.03	0.022	0.02
18 to 59 Years	Garfield County: Ridge Top (BarD)	benzene	2.6	2.1	1.8	1.6	1.4	1.4	0.94	0.77	0.68	0.63	0.58	0.51	0.45	0.4	0.35	0.32	
		2-ethyltoluene	0.38	0.28	0.24	0.21	0.2	0.21	0.13	0.11	0.096	0.088	0.082	0.072	0.063	0.056	0.05	0.045	
		toluene	0.32	0.25	0.22	0.2	0.18	0.18	0.11	0.092	0.078	0.068	0.06	0.046	0.037	0.031	0.026	0.022	
		cyclohexane	0.13	0.1	0.09	0.079	0.07	0.068	0.046	0.042	0.038	0.035	0.032	0.029	0.025	0.022	0.02	0.018	
		isobutane	0.13	0.094	0.082	0.072	0.064	0.085	0.058	0.052	0.048	0.044	0.041	0.036	0.031	0.028	0.025	0.022	
		n-butane	0.12	0.087	0.075	0.066	0.059	0.078	0.053	0.048	0.044	0.04	0.037	0.033	0.029	0.025	0.023	0.02	
	Garfield County: Valley (Rifle)	benzene	2.7	1.8	1.6	1.4	1.2	1.1	0.99	0.9	0.83	0.77	0.71	0.61	0.5	0.3	0.36	0.18	
		2-ethyltoluene	0.36	0.27	0.22	0.2	0.19	0.16	0.14	0.13	0.12	0.11	0.1	0.083	0.072	0.063	0.051	0.031	
		toluene	0.31	0.23	0.18	0.17	0.15	0.14	0.12	0.11	0.098	0.091	0.083	0.066	0.06	0.053	0.042	0.024	

60+ Years	(Rifle)	isobutane	0.16	0.1	0.08	0.071	0.064	0.053	0.052	0.046	0.042	0.039	0.036	0.027	0.021	0.018	0.016	<0.01
		n-butane	0.15	0.095	0.074	0.065	0.059	0.049	0.048	0.042	0.039	0.036	0.033	0.025	0.019	0.017	0.015	<0.01
		cyclohexane	0.13	0.089	0.076	0.067	0.061	0.053	0.049	0.044	0.041	0.038	0.035	0.03	0.025	0.015	0.018	<0.01
	Northern Front Range	benzene	2.9	2.3	2.1	2	1.9	1.6	1.7	1.5	1.3	1.2	1.1	0.85	0.72	0.61	0.46	0.41
		2-ethyltoluene	0.42	0.33	0.29	0.26	0.24	0.21	0.21	0.19	0.17	0.16	0.15	0.12	0.1	0.088	0.072	0.064
		toluene	0.4	0.31	0.28	0.25	0.22	0.18	0.16	0.14	0.13	0.12	0.11	0.1	0.086	0.073	0.06	0.053
		isobutane	0.19	0.16	0.14	0.13	0.12	0.099	0.091	0.081	0.075	0.069	0.064	0.046	0.039	0.033	0.025	0.022
		n-butane	0.18	0.14	0.13	0.12	0.11	0.091	0.083	0.075	0.068	0.063	0.058	0.042	0.036	0.03	0.023	0.02
		cyclohexane	0.15	0.12	0.11	0.1	0.095	0.08	0.082	0.073	0.066	0.061	0.056	0.042	0.035	0.03	0.022	0.02
		benzene	2.6	2.1	1.8	1.6	1.4	1.4	0.94	0.77	0.68	0.63	0.58	0.51	0.45	0.4	0.35	0.32
		2-ethyltoluene	0.38	0.28	0.24	0.21	0.2	0.21	0.13	0.11	0.096	0.088	0.082	0.072	0.063	0.056	0.05	0.045
		toluene	0.32	0.25	0.22	0.2	0.18	0.18	0.11	0.092	0.078	0.068	0.06	0.046	0.037	0.031	0.026	0.022
	Garfield County: Ridge Top (BarD)	cyclohexane	0.13	0.1	0.09	0.079	0.07	0.068	0.046	0.042	0.038	0.035	0.032	0.029	0.025	0.022	0.02	0.018
		isobutane	0.13	0.094	0.082	0.072	0.064	0.085	0.058	0.052	0.048	0.044	0.041	0.036	0.031	0.028	0.025	0.022
		n-butane	0.12	0.087	0.075	0.066	0.059	0.078	0.053	0.048	0.044	0.04	0.037	0.033	0.029	0.025	0.023	0.02
		benzene	2.7	1.8	1.6	1.4	1.2	1.1	0.99	0.9	0.83	0.77	0.71	0.61	0.5	0.3	0.36	0.18
		2-ethyltoluene	0.36	0.27	0.22	0.2	0.19	0.16	0.14	0.13	0.12	0.11	0.1	0.083	0.072	0.063	0.051	0.031
		toluene	0.31	0.23	0.18	0.17	0.15	0.14	0.12	0.11	0.098	0.091	0.083	0.066	0.06	0.053	0.042	0.024
		isobutane	0.16	0.1	0.08	0.071	0.064	0.053	0.052	0.046	0.042	0.039	0.036	0.027	0.021	0.018	0.016	<0.01
		n-butane	0.15	0.095	0.074	0.065	0.059	0.049	0.048	0.042	0.039	0.036	0.033	0.025	0.019	0.017	0.015	<0.01
		cyclohexane	0.13	0.089	0.076	0.067	0.061	0.053	0.049	0.044	0.041	0.038	0.035	0.03	0.025	0.015	0.018	<0.01
	Northern Front Range	benzene	2.9	2.3	2.1	2	1.9	1.6	1.7	1.5	1.3	1.2	1.1	0.85	0.72	0.61	0.46	0.41
		2-ethyltoluene	0.42	0.33	0.29	0.26	0.24	0.21	0.21	0.19	0.17	0.16	0.15	0.12	0.1	0.088	0.072	0.064
		toluene	0.4	0.31	0.28	0.25	0.22	0.18	0.16	0.14	0.13	0.12	0.11	0.1	0.086	0.073	0.06	0.053
		isobutane	0.19	0.16	0.14	0.13	0.12	0.099	0.091	0.081	0.075	0.069	0.064	0.046	0.039	0.033	0.025	0.022
		n-butane	0.18	0.14	0.13	0.12	0.11	0.091	0.083	0.075	0.068	0.063	0.058	0.042	0.036	0.03	0.023	0.02
		cyclohexane	0.15	0.12	0.11	0.1	0.095	0.08	0.082	0.073	0.066	0.061	0.056	0.042	0.035	0.03	0.022	0.02
		isobutane	0.19	0.16	0.14	0.13	0.12	0.099	0.091	0.081	0.075	0.069	0.064	0.046	0.039	0.033	0.025	0.022

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-30. Percentage of Acute Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Production Activities, by Distance from the Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Production	benzene	6%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)			11%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range			8%	3%	2%	2%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)			6%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)			11%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range			8%	3%	2%	2%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)			6%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Garfield County: Valley (Rifle)	10%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Northern Front Range	7%	3%	2%	2%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity.

Table E-31. Largest Acute Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Production Activities, by Distance from the Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Production	hematological	2.7	2.1	1.8	1.6	1.4	1.4	0.95	0.78	0.68	0.63	0.58	0.51	0.45	0.4	0.35	0.32
			neurotoxicity	0.58	0.47	0.4	0.35	0.31	0.31	0.21	0.17	0.14	0.12	0.11	0.095	0.083	0.074	0.066	0.059
			respiratory	0.15	0.11	0.096	0.084	0.075	0.099	0.067	0.061	0.056	0.051	0.047	0.042	0.036	0.032	0.029	0.026
			systemic	0.14	0.1	0.091	0.08	0.071	0.093	0.064	0.058	0.053	0.048	0.045	0.04	0.035	0.031	0.027	0.024
	Garfield County: Valley (Rifle)		hematological	2.7	1.8	1.6	1.4	1.3	1.1	1	0.91	0.84	0.77	0.71	0.62	0.51	0.3	0.36	0.18
			neurotoxicity	0.6	0.4	0.34	0.3	0.28	0.24	0.22	0.2	0.18	0.17	0.16	0.14	0.11	0.088	0.08	0.04
			respiratory	0.19	0.12	0.094	0.083	0.074	0.062	0.06	0.053	0.049	0.045	0.041	0.032	0.025	0.021	0.018	<0.01
			systemic	0.18	0.11	0.089	0.078	0.07	0.059	0.057	0.051	0.046	0.043	0.039	0.03	0.023	0.02	0.017	<0.01
	Northern Front Range		hematological	2.9	2.3	2.1	2	1.9	1.6	1.7	1.5	1.4	1.2	1.1	0.86	0.72	0.61	0.46	0.41
			neurotoxicity	0.63	0.51	0.47	0.44	0.42	0.36	0.37	0.33	0.3	0.27	0.25	0.19	0.16	0.13	0.1	0.09
			respiratory	0.22	0.18	0.17	0.15	0.14	0.12	0.11	0.095	0.087	0.08	0.074	0.054	0.045	0.038	0.029	0.025
			systemic	0.21	0.17	0.16	0.14	0.13	0.11	0.1	0.09	0.082	0.076	0.07	0.051	0.043	0.036	0.027	0.024
18 to 59 Years	Garfield County: Ridge Top (BarD)		hematological	2.7	2.1	1.8	1.6	1.4	1.4	0.95	0.78	0.68	0.63	0.58	0.51	0.45	0.4	0.35	0.32
			neurotoxicity	0.58	0.47	0.4	0.35	0.31	0.31	0.21	0.17	0.14	0.12	0.11	0.095	0.083	0.074	0.066	0.059
			respiratory	0.15	0.11	0.096	0.084	0.075	0.099	0.067	0.061	0.056	0.051	0.047	0.042	0.036	0.032	0.029	0.026
			systemic	0.14	0.1	0.091	0.08	0.071	0.093	0.064	0.058	0.053	0.048	0.045	0.04	0.035	0.031	0.027	0.024
	Garfield County: Valley (Rifle)		hematological	2.7	1.8	1.6	1.4	1.3	1.1	1	0.91	0.84	0.77	0.71	0.62	0.51	0.3	0.36	0.18
			neurotoxicity	0.6	0.4	0.34	0.3	0.28	0.24	0.22	0.2	0.18	0.17	0.16	0.14	0.11	0.088	0.08	0.04
			respiratory	0.19	0.12	0.094	0.083	0.074	0.062	0.06	0.053	0.049	0.045	0.041	0.032	0.025	0.021	0.018	<0.01
			systemic	0.18	0.11	0.089	0.078	0.07	0.059	0.057	0.051	0.046	0.043	0.039	0.03	0.023	0.02	0.017	<0.01

60+ Years	Northern Front Range	hematological	2.9	2.3	2.1	2	1.9	1.6	1.7	1.5	1.4	1.2	1.1	0.86	0.72	0.61	0.46	0.41
	Garfield County: Ridge Top (BarD)	neurotoxicity	0.63	0.51	0.47	0.44	0.42	0.36	0.37	0.33	0.3	0.27	0.25	0.19	0.16	0.13	0.1	0.09
		respiratory	0.22	0.18	0.17	0.15	0.14	0.12	0.11	0.095	0.087	0.08	0.074	0.054	0.045	0.038	0.029	0.025
		systemic	0.21	0.17	0.16	0.14	0.13	0.11	0.1	0.09	0.082	0.076	0.07	0.051	0.043	0.036	0.027	0.024
		hematological	2.7	2.1	1.8	1.6	1.4	1.4	0.95	0.78	0.68	0.63	0.58	0.51	0.45	0.4	0.35	0.32
	Garfield County: Valley (Rifle)	neurotoxicity	0.58	0.47	0.4	0.35	0.31	0.31	0.21	0.17	0.14	0.12	0.11	0.095	0.083	0.074	0.066	0.059
		respiratory	0.15	0.11	0.096	0.084	0.075	0.099	0.067	0.061	0.056	0.051	0.047	0.042	0.036	0.032	0.029	0.026
		systemic	0.14	0.1	0.091	0.08	0.071	0.093	0.064	0.058	0.053	0.048	0.045	0.04	0.035	0.031	0.027	0.024
		hematological	2.7	1.8	1.6	1.4	1.3	1.1	1	0.91	0.84	0.77	0.71	0.62	0.51	0.3	0.36	0.18
	Northern Front Range	neurotoxicity	0.6	0.4	0.34	0.3	0.28	0.24	0.22	0.2	0.18	0.17	0.16	0.14	0.11	0.088	0.08	0.04
		respiratory	0.19	0.12	0.094	0.083	0.074	0.062	0.06	0.053	0.049	0.045	0.041	0.032	0.025	0.021	0.018	<0.01
		systemic	0.18	0.11	0.089	0.078	0.07	0.059	0.057	0.051	0.046	0.043	0.039	0.03	0.023	0.02	0.017	<0.01
		hematological	2.9	2.3	2.1	2	1.9	1.6	1.7	1.5	1.4	1.2	1.1	0.86	0.72	0.61	0.46	0.41
		neurotoxicity	0.63	0.51	0.47	0.44	0.42	0.36	0.37	0.33	0.3	0.27	0.25	0.19	0.16	0.13	0.1	0.09
		respiratory	0.22	0.18	0.17	0.15	0.14	0.12	0.11	0.095	0.087	0.08	0.074	0.054	0.045	0.038	0.029	0.025
		systemic	0.21	0.17	0.16	0.14	0.13	0.11	0.1	0.09	0.082	0.076	0.07	0.051	0.043	0.036	0.027	0.024

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

Table E-32. Percentage of Acute Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Production Activities, by Distance from the Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Production	hematological	6%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)			11%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Northern Front Range		8%	3%	2%	2%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)		6%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		11%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range		8%	3%	2%	2%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)		6%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		11%	2%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range		7%	3%	2%	2%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals, including ethyltoluenes, could not be assigned to any acute critical-effect group (see Appendix D).

E.2.2 Chronic Non-cancer Hazards

Table E-33. Largest Chronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Production Activities, by Distance from the Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Production	benzene	1.1	0.63	0.49	0.4	0.33	0.25	0.2	0.15	0.12	0.1	0.086	0.065	0.052	0.042	0.035	0.03
			1,2,4-trimethylbenzene	0.33	0.19	0.15	0.12	0.1	0.076	0.061	0.048	0.038	0.032	0.027	0.02	0.016	0.013	0.011	<0.01
			n-nonane	0.3	0.18	0.14	0.11	0.094	0.069	0.055	0.043	0.035	0.029	0.024	0.018	0.014	0.012	<0.01	<0.01
			2-ethyltoluene	0.25	0.14	0.11	0.092	0.077	0.057	0.045	0.036	0.028	0.024	0.02	0.015	0.012	<0.01	<0.01	<0.01
			1,2,3-trimethylbenzene	0.14	0.082	0.064	0.052	0.044	0.032	0.026	0.02	0.016	0.013	0.011	<0.01	<0.01	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)		benzene	1.2	0.5	0.39	0.32	0.27	0.21	0.17	0.14	0.12	0.1	0.092	0.071	0.063	0.054	0.04	0.029
			1,2,4-trimethylbenzene	0.38	0.15	0.12	0.098	0.083	0.063	0.051	0.043	0.037	0.032	0.028	0.022	0.019	0.016	0.012	<0.01
			n-nonane	0.34	0.14	0.11	0.088	0.075	0.057	0.047	0.039	0.033	0.029	0.026	0.02	0.017	0.015	0.011	<0.01
			2-ethyltoluene	0.28	0.11	0.089	0.073	0.062	0.047	0.038	0.032	0.028	0.024	0.021	0.016	0.014	0.012	<0.01	<0.01
			1,2,3-trimethylbenzene	0.16	0.065	0.051	0.042	0.035	0.027	0.022	0.018	0.016	0.014	0.012	<0.01	<0.01	<0.01	<0.01	<0.01
	Northern Front Range		benzene	0.93	0.52	0.41	0.34	0.28	0.2	0.16	0.13	0.1	0.087	0.074	0.056	0.044	0.036	0.03	0.025
			1,2,4-trimethylbenzene	0.29	0.16	0.13	0.1	0.086	0.062	0.048	0.038	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
			n-nonane	0.26	0.14	0.11	0.093	0.077	0.056	0.044	0.035	0.029	0.024	0.02	0.016	0.012	<0.01	<0.01	<0.01
			2-ethyltoluene	0.21	0.12	0.094	0.077	0.064	0.046	0.036	0.029	0.023	0.02	0.017	0.013	<0.01	<0.01	<0.01	<0.01
			1,2,3-trimethylbenzene	0.12	0.067	0.053	0.043	0.036	0.026	0.021	0.016	0.013	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)		benzene	1.1	0.63	0.49	0.4	0.33	0.25	0.2	0.15	0.12	0.1	0.086	0.065	0.052	0.042	0.035	0.03
			1,2,4-trimethylbenzene	0.33	0.19	0.15	0.12	0.1	0.076	0.061	0.048	0.038	0.032	0.027	0.02	0.016	0.013	0.011	<0.01
			n-nonane	0.3	0.18	0.14	0.11	0.094	0.069	0.055	0.043	0.035	0.029	0.024	0.018	0.014	0.012	<0.01	<0.01
			2-ethyltoluene	0.25	0.14	0.11	0.092	0.077	0.057	0.045	0.036	0.028	0.024	0.02	0.015	0.012	<0.01	<0.01	<0.01
			1,2,3-trimethylbenzene	0.14	0.082	0.064	0.052	0.044	0.032	0.026	0.02	0.016	0.013	0.011	<0.01	<0.01	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)		benzene	1.2	0.5	0.39	0.32	0.27	0.21	0.17	0.14	0.12	0.1	0.091	0.071	0.062	0.054	0.04	0.028
			1,2,4-trimethylbenzene	0.37	0.15	0.12	0.098	0.083	0.063	0.051	0.043	0.037	0.032	0.028	0.022	0.019	0.016	0.012	<0.01
			n-nonane	0.34	0.14	0.11	0.088	0.075	0.057	0.047	0.039	0.033	0.029	0.026	0.02	0.017	0.015	0.011	<0.01
			2-ethyltoluene	0.28	0.11	0.089	0.073	0.062	0.047	0.038	0.032	0.028	0.024	0.021	0.016	0.014	0.012	<0.01	<0.01
			1,2,3-trimethylbenzene	0.16	0.065	0.051	0.041	0.035	0.027	0.022	0.018	0.016	0.014	0.012	<0.01	<0.01	<0.01	<0.01	<0.01
	Northern Front Range		benzene	0.93	0.52	0.41	0.34	0.28	0.2	0.16	0.13	0.1	0.087	0.074	0.056	0.044	0.036	0.03	0.025
			1,2,4-trimethylbenzene	0.29	0.16	0.13	0.1	0.085	0.062	0.048	0.038	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
			n-nonane	0.26	0.14	0.11	0.093	0.077	0.056	0.044	0.035	0.029	0.024	0.02	0.016	0.012	<0.01	<0.01	<0.01
			2-ethyltoluene	0.21	0.12	0.094	0.077	0.064	0.046	0.036	0.029	0.023	0.02	0.017	0.013	<0.01	<0.01	<0.01	<0.01
			1,2,3-trimethylbenzene	0.12	0.067	0.053	0.043	0.036	0.026	0.021	0.016	0.013	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
60+ Years	Garfield County:		benzene	1.1	0.63	0.49	0.4	0.33	0.25	0.2	0.15	0.12	0.1	0.086	0.065	0.052	0.042	0.035	0.03
			1,2,4-trimethylbenzene	0.33	0.19	0.15	0.12	0.1	0.076	0.061	0.048	0.038	0.032	0.027	0.02	0.016	0.013	0.011	<0.01

	Ridge Top (BarD)	n-nonane	0.3	0.18	0.14	0.11	0.094	0.069	0.055	0.043	0.035	0.029	0.024	0.018	0.014	0.012	<0.01	<0.01
		2-ethyltoluene	0.25	0.14	0.11	0.092	0.077	0.057	0.045	0.036	0.028	0.024	0.02	0.015	0.012	<0.01	<0.01	<0.01
		1,2,3-trimethylbenzene	0.14	0.082	0.064	0.052	0.044	0.032	0.026	0.02	0.016	0.013	0.011	<0.01	<0.01	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)	benzene	1.2	0.5	0.39	0.32	0.27	0.21	0.17	0.14	0.12	0.1	0.092	0.071	0.063	0.054	0.04	0.029
		1,2,4-trimethylbenzene	0.38	0.15	0.12	0.098	0.083	0.063	0.051	0.043	0.037	0.032	0.028	0.022	0.019	0.016	0.012	<0.01
		n-nonane	0.34	0.14	0.11	0.088	0.075	0.057	0.047	0.039	0.033	0.029	0.026	0.02	0.017	0.015	0.011	<0.01
		2-ethyltoluene	0.28	0.11	0.089	0.073	0.062	0.047	0.038	0.032	0.028	0.024	0.021	0.016	0.014	0.012	<0.01	<0.01
		1,2,3-trimethylbenzene	0.16	0.065	0.051	0.042	0.035	0.027	0.022	0.018	0.016	0.014	0.012	<0.01	<0.01	<0.01	<0.01	<0.01
		benzene	0.93	0.52	0.41	0.34	0.28	0.2	0.16	0.13	0.1	0.087	0.074	0.056	0.044	0.036	0.03	0.025
	Northern Front Range	1,2,4-trimethylbenzene	0.29	0.16	0.13	0.1	0.086	0.062	0.048	0.038	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
		n-nonane	0.26	0.14	0.11	0.093	0.077	0.056	0.044	0.035	0.029	0.024	0.02	0.016	0.012	<0.01	<0.01	<0.01
		2-ethyltoluene	0.21	0.12	0.094	0.077	0.064	0.046	0.036	0.029	0.023	0.02	0.017	0.013	<0.01	<0.01	<0.01	<0.01
		1,2,3-trimethylbenzene	0.12	0.067	0.053	0.043	0.036	0.026	0.021	0.016	0.013	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients within a given combination of age group, site, and activity.

Table E-34. Percentage of Chronic Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Production Activities, by Distance from the Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Production	benzene	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)			19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)			4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Garfield County: Valley (Rifle)		20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)		4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity.

Table E-35. Largest Chronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Production Activities, by Distance from the Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Production	hematological	1.6	0.94	0.74	0.6	0.5	0.37	0.29	0.23	0.18	0.15	0.13	0.098	0.077	0.063	0.052	0.045
			neurotoxicity	1.1	0.66	0.52	0.42	0.35	0.26	0.21	0.16	0.13	0.11	0.09	0.068	0.054	0.044	0.037	0.031
			respiratory	0.58	0.34	0.27	0.22	0.18	0.13	0.11	0.084	0.067	0.055	0.047	0.035	0.028	0.023	0.019	0.016
			systemic	0.34	0.2	0.16	0.13	0.11	0.078	0.063	0.049	0.039	0.032	0.027	0.021	0.016	0.013	0.011	<0.01
	Garfield County: Valley (Rifle)	Production	hematological	1.8	0.74	0.58	0.48	0.41	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.093	0.08	0.06	0.042
			neurotoxicity	1.3	0.52	0.41	0.33	0.28	0.21	0.17	0.15	0.13	0.11	0.096	0.074	0.064	0.055	0.041	0.029
			respiratory	0.66	0.27	0.21	0.17	0.15	0.11	0.09	0.076	0.065	0.057	0.05	0.038	0.033	0.029	0.021	0.015
			systemic	0.38	0.16	0.12	0.1	0.085	0.065	0.053	0.044	0.038	0.033	0.029	0.023	0.02	0.017	0.012	<0.01
	Northern Front Range	Production	hematological	1.4	0.77	0.61	0.5	0.42	0.3	0.24	0.19	0.15	0.13	0.11	0.083	0.066	0.053	0.044	0.037
			neurotoxicity	0.97	0.54	0.43	0.35	0.29	0.21	0.17	0.13	0.11	0.089	0.076	0.058	0.045	0.037	0.03	0.026
			respiratory	0.5	0.28	0.22	0.18	0.15	0.11	0.085	0.068	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013
			systemic	0.3	0.16	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge	Production	hematological	1.6	0.94	0.73	0.6	0.5	0.37	0.29	0.23	0.18	0.15	0.13	0.098	0.077	0.063	0.052	0.045
			neurotoxicity	1.1	0.66	0.52	0.42	0.35	0.26	0.21	0.16	0.13	0.11	0.09	0.068	0.054	0.044	0.037	0.031

60+ Years	Top (BarD)	respiratory	0.58	0.34	0.27	0.22	0.18	0.13	0.11	0.084	0.067	0.055	0.047	0.035	0.028	0.023	0.019	0.016
	Top (BarD)	systemic	0.34	0.2	0.16	0.13	0.11	0.078	0.063	0.049	0.039	0.032	0.027	0.021	0.016	0.013	0.011	<0.01
	Garfield County: Valley (Rifle)	hematological	1.8	0.74	0.58	0.48	0.4	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.093	0.08	0.06	0.042
		neurotoxicity	1.3	0.52	0.4	0.33	0.28	0.21	0.17	0.15	0.13	0.11	0.096	0.074	0.064	0.055	0.041	0.029
		respiratory	0.66	0.27	0.21	0.17	0.15	0.11	0.09	0.076	0.065	0.057	0.05	0.038	0.033	0.028	0.021	0.015
		systemic	0.38	0.16	0.12	0.1	0.085	0.065	0.053	0.044	0.038	0.033	0.029	0.023	0.02	0.017	0.012	<0.01
	Northern Front Range	hematological	1.4	0.77	0.61	0.5	0.42	0.3	0.24	0.19	0.15	0.13	0.11	0.083	0.066	0.053	0.044	0.037
		neurotoxicity	0.97	0.53	0.43	0.35	0.29	0.21	0.17	0.13	0.11	0.089	0.076	0.058	0.045	0.037	0.03	0.026
		respiratory	0.5	0.28	0.22	0.18	0.15	0.11	0.085	0.068	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013
		systemic	0.3	0.16	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
	Garfield County: Ridge Top (BarD)	hematological	1.6	0.94	0.74	0.6	0.5	0.37	0.29	0.23	0.18	0.15	0.13	0.098	0.077	0.063	0.052	0.045
		neurotoxicity	1.1	0.66	0.52	0.42	0.35	0.26	0.21	0.16	0.13	0.11	0.09	0.068	0.054	0.044	0.037	0.031
		respiratory	0.58	0.34	0.27	0.22	0.18	0.13	0.11	0.084	0.067	0.055	0.047	0.035	0.028	0.023	0.019	0.016
		systemic	0.34	0.2	0.16	0.13	0.11	0.078	0.063	0.049	0.039	0.032	0.027	0.021	0.016	0.013	0.011	<0.01
	Garfield County: Valley (Rifle)	hematological	1.8	0.75	0.58	0.48	0.41	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.093	0.08	0.06	0.042
		neurotoxicity	1.3	0.52	0.41	0.33	0.28	0.21	0.17	0.15	0.13	0.11	0.096	0.074	0.064	0.055	0.041	0.029
		respiratory	0.66	0.27	0.21	0.17	0.15	0.11	0.09	0.076	0.065	0.057	0.05	0.038	0.033	0.029	0.021	0.015
		systemic	0.38	0.16	0.12	0.1	0.086	0.065	0.053	0.044	0.038	0.033	0.029	0.023	0.02	0.017	0.012	<0.01
	Northern Front Range	hematological	1.4	0.77	0.61	0.5	0.42	0.3	0.24	0.19	0.15	0.13	0.11	0.083	0.066	0.053	0.044	0.037
		neurotoxicity	0.97	0.54	0.43	0.35	0.29	0.21	0.17	0.13	0.11	0.089	0.076	0.058	0.045	0.037	0.03	0.026
		respiratory	0.5	0.28	0.22	0.18	0.15	0.11	0.085	0.068	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013
		systemic	0.3	0.16	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D).

Table E-36. Percentage of Chronic Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Production Activities, by Distance from the Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge	Production	hematological	42%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Top (BarD)	neurotoxicity	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	hematological	53%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		neurotoxicity	24%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	hematological	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18 to 59 Years	Garfield County: Ridge Top (BarD)	hematological	43%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		neurotoxicity	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	hematological	54%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		neurotoxicity	24%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	hematological	32%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)	hematological	42%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		neurotoxicity	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	hematological	52%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		neurotoxicity	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range	hematological	32%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D).

E.3 Sequential Oil and Gas Development and Production

E.3.1 Development

E.3.1.1 1-acre Well Pad

We do not show a table in this section about percentage of subchronic non-cancer hazard quotients (across the hypothetical population) that are above 1 during development activities in sequence (by distance from the 1-acre well pad) because this scenario had no hazard quotients above 1. All sequences of activities shown here last less than 365 days in total, so we calculated only subchronic results here (no chronic results).

Table E-37. Largest Subchronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities in Sequence, by Distance from the 1-acre Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	m+p-xylene	NA	NA	0.49	0.4	0.34	0.21	0.16	0.081	0.068	0.057	0.05	0.036	0.03	0.019	0.022	0.016
			n-nonane	NA	NA	0.49	0.4	0.34	0.2	0.15	0.072	0.061	0.052	0.046	0.033	0.027	0.016	0.02	0.015
			benzene	NA	NA	0.4	0.33	0.28	0.18	0.13	0.082	0.067	0.044	0.039	0.028	0.023	0.016	0.017	0.013
			1,3,5-trimethylbenzene	NA	NA	0.37	0.3	0.25	0.14	0.11	0.048	0.041	0.035	0.031	0.022	0.019	0.01	0.014	0.011
			1,2,4-trimethylbenzene	NA	NA	0.36	0.3	0.25	0.14	0.11	0.049	0.042	0.036	0.032	0.023	0.019	0.011	0.014	0.011
			1,2,3-trimethylbenzene	NA	NA	0.26	0.21	0.14	0.1	0.078	0.034	0.029	0.025	0.022	0.016	0.014	<0.01	0.01	<0.01
			2-ethyltoluene	NA	NA	0.18	0.14	0.097	0.069	0.053	0.023	0.019	0.016	0.014	0.01	<0.01	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)		m+p-xylene	NA	NA	0.25	0.23	0.19	0.14	0.15	0.12	0.11	0.099	0.09	0.071	0.068	0.047	0.033	0.024
			n-nonane	NA	NA	0.23	0.21	0.18	0.13	0.14	0.12	0.11	0.095	0.088	0.069	0.065	0.045	0.03	0.023
			benzene	NA	NA	0.22	0.19	0.16	0.13	0.13	0.11	0.095	0.083	0.075	0.06	0.056	0.041	0.029	0.019
			1,2,4-trimethylbenzene	NA	NA	0.16	0.15	0.12	0.092	0.1	0.085	0.079	0.069	0.061	0.05	0.046	0.032	0.021	0.016
			1,3,5-trimethylbenzene	NA	NA	0.16	0.15	0.12	0.09	0.1	0.085	0.079	0.069	0.061	0.05	0.046	0.033	0.021	0.016
			1,2,3-trimethylbenzene	NA	NA	0.11	0.1	0.084	0.063	0.069	0.058	0.054	0.047	0.042	0.034	0.032	0.022	0.014	0.011
	Northern Front Range		benzene	NA	NA	0.67	0.54	0.44	0.31	0.24	0.18	0.15	0.12	0.1	0.078	0.061	0.049	0.041	0.034
			n-nonane	NA	NA	0.27	0.22	0.18	0.13	0.097	0.076	0.061	0.051	0.043	0.033	0.026	0.021	0.017	0.014
			m+p-xylene	NA	NA	0.17	0.14	0.11	0.08	0.06	0.048	0.038	0.031	0.027	0.02	0.016	0.013	0.011	<0.01
			1,3,5-trimethylbenzene	NA	NA	0.12	0.095	0.078	0.056	0.042	0.033	0.026	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
			1,2,4-trimethylbenzene	NA	NA	0.11	0.087	0.072	0.051	0.038	0.03	0.024	0.02	0.017	0.013	0.01	<0.01	<0.01	<0.01
18 to 59	Garfield		m+p-xylene	NA	NA	0.5	0.41	0.34	0.2	0.16	0.082	0.068	0.057	0.049	0.036	0.03	0.019	0.022	0.017

Years	County: Ridge Top (BarD)	n-nonane	NA	NA	0.48	0.4	0.33	0.19	0.15	0.071	0.06	0.051	0.045	0.032	0.027	0.016	0.02	0.015
		benzene	NA	NA	0.4	0.33	0.28	0.18	0.14	0.083	0.068	0.044	0.039	0.028	0.022	0.015	0.016	0.013
		1,2,4-trimethylbenzene	NA	NA	0.37	0.3	0.25	0.15	0.11	0.05	0.042	0.036	0.032	0.023	0.02	0.011	0.015	0.011
		1,3,5-trimethylbenzene	NA	NA	0.37	0.3	0.25	0.15	0.11	0.049	0.041	0.036	0.032	0.022	0.02	0.011	0.015	0.011
		1,2,3-trimethylbenzene	NA	NA	0.26	0.21	0.14	0.1	0.079	0.034	0.029	0.025	0.022	0.016	0.014	<0.01	0.01	<0.01
		2-ethyltoluene	NA	NA	0.18	0.14	0.096	0.069	0.053	0.023	0.019	0.016	0.015	0.01	<0.01	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)	m+p-xylene	NA	NA	0.24	0.22	0.18	0.14	0.15	0.12	0.11	0.098	0.089	0.07	0.067	0.049	0.033	0.024
		n-nonane	NA	NA	0.23	0.21	0.17	0.13	0.14	0.12	0.11	0.095	0.087	0.069	0.064	0.047	0.031	0.023
		benzene	NA	NA	0.22	0.18	0.15	0.13	0.12	0.1	0.093	0.082	0.074	0.06	0.055	0.041	0.028	0.019
		1,2,4-trimethylbenzene	NA	NA	0.16	0.15	0.12	0.09	0.099	0.083	0.077	0.068	0.06	0.049	0.046	0.032	0.021	0.016
		1,3,5-trimethylbenzene	NA	NA	0.15	0.15	0.12	0.089	0.1	0.083	0.078	0.069	0.061	0.05	0.046	0.032	0.021	0.016
		1,2,3-trimethylbenzene	NA	NA	0.11	0.1	0.084	0.063	0.068	0.057	0.054	0.047	0.042	0.034	0.031	0.022	0.014	0.011
	Northern Front Range	benzene	NA	NA	0.66	0.53	0.44	0.31	0.24	0.18	0.15	0.12	0.1	0.078	0.061	0.049	0.041	0.034
		n-nonane	NA	NA	0.27	0.22	0.18	0.13	0.096	0.076	0.06	0.05	0.043	0.033	0.026	0.021	0.017	0.014
		m+p-xylene	NA	NA	0.17	0.14	0.11	0.08	0.06	0.048	0.038	0.031	0.027	0.02	0.016	0.013	0.011	<0.01
		1,3,5-trimethylbenzene	NA	NA	0.12	0.095	0.078	0.056	0.042	0.033	0.026	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
		1,2,4-trimethylbenzene	NA	NA	0.11	0.087	0.072	0.051	0.038	0.03	0.024	0.02	0.017	0.013	0.01	<0.01	<0.01	<0.01
		m+p-xylene	NA	NA	0.49	0.41	0.34	0.21	0.16	0.084	0.07	0.059	0.051	0.037	0.03	0.019	0.022	0.017
60+ Years	Garfield County: Ridge Top (BarD)	n-nonane	NA	NA	0.49	0.4	0.34	0.2	0.15	0.074	0.062	0.053	0.047	0.033	0.027	0.016	0.02	0.015
		benzene	NA	NA	0.4	0.33	0.28	0.18	0.14	0.082	0.067	0.043	0.038	0.027	0.022	0.015	0.016	0.013
		1,2,4-trimethylbenzene	NA	NA	0.37	0.3	0.25	0.15	0.11	0.05	0.042	0.036	0.032	0.023	0.02	0.011	0.015	0.011
		1,3,5-trimethylbenzene	NA	NA	0.37	0.3	0.26	0.15	0.11	0.049	0.041	0.036	0.032	0.022	0.02	0.011	0.015	0.011
		1,2,3-trimethylbenzene	NA	NA	0.26	0.21	0.14	0.1	0.078	0.034	0.029	0.025	0.022	0.016	0.014	<0.01	0.01	<0.01
		2-ethyltoluene	NA	NA	0.18	0.14	0.096	0.069	0.053	0.023	0.019	0.016	0.015	0.01	<0.01	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)	m+p-xylene	NA	NA	0.25	0.23	0.19	0.14	0.15	0.12	0.11	0.1	0.092	0.073	0.07	0.051	0.035	0.025
		n-nonane	NA	NA	0.23	0.21	0.17	0.13	0.14	0.12	0.11	0.096	0.088	0.069	0.067	0.048	0.032	0.024
		benzene	NA	NA	0.22	0.19	0.16	0.13	0.13	0.11	0.094	0.083	0.075	0.06	0.057	0.041	0.028	0.02
		1,2,4-trimethylbenzene	NA	NA	0.16	0.15	0.12	0.092	0.1	0.083	0.077	0.068	0.06	0.049	0.046	0.033	0.021	0.016
		1,3,5-trimethylbenzene	NA	NA	0.16	0.15	0.12	0.091	0.099	0.083	0.077	0.068	0.06	0.049	0.046	0.033	0.021	0.016
		1,2,3-trimethylbenzene	NA	NA	0.11	0.1	0.085	0.064	0.069	0.057	0.054	0.047	0.042	0.035	0.031	0.022	0.014	0.011
	Northern Front Range	benzene	NA	NA	0.67	0.54	0.44	0.32	0.24	0.18	0.15	0.12	0.1	0.078	0.061	0.049	0.041	0.034
		n-nonane	NA	NA	0.27	0.22	0.18	0.13	0.097	0.077	0.06	0.05	0.043	0.033	0.026	0.021	0.017	0.014
		m+p-xylene	NA	NA	0.17	0.14	0.11	0.08	0.061	0.048	0.038	0.031	0.027	0.02	0.016	0.013	0.011	<0.01
		1,3,5-trimethylbenzene	NA	NA	0.12	0.095	0.078	0.056	0.042	0.033	0.026	0.022	0.019	0.014	0.011	<0.01	<0.01	<0.01
		1,2,4-trimethylbenzene	NA	NA	0.11	0.087	0.072	0.051	0.038	0.03	0.024	0.02	0.017	0.013	0.01	<0.01	<0.01	<0.01
		m+p-xylene	NA	NA	0.49	0.41	0.34	0.21	0.16	0.084	0.07	0.059	0.051	0.037	0.03	0.019	0.022	0.017

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-38. Largest Subchronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities in Sequence, by Distance from the 1-acre Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	neurotoxicity	NA	NA	2.1	1.7	1.4	0.86	0.66	0.32	0.27	0.22	0.2	0.14	0.12	0.069	0.086	0.065
			hematological	NA	NA	1.9	1.6	1.3	0.79	0.6	0.3	0.25	0.2	0.18	0.13	0.11	0.064	0.077	0.059
			respiratory	NA	NA	0.99	0.81	0.64	0.39	0.3	0.13	0.11	0.096	0.085	0.06	0.052	0.028	0.039	0.029
			systemic	NA	NA	0.33	0.27	0.19	0.13	0.098	0.043	0.037	0.031	0.027	0.02	0.017	0.012	0.013	<0.01
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	1	0.92	0.76	0.57	0.62	0.52	0.48	0.42	0.38	0.3	0.28	0.2	0.13	0.1
			hematological	NA	NA	0.92	0.84	0.69	0.53	0.56	0.47	0.43	0.38	0.34	0.27	0.25	0.18	0.12	0.09
			respiratory	NA	NA	0.42	0.4	0.33	0.24	0.27	0.23	0.21	0.19	0.16	0.13	0.12	0.087	0.056	0.044
			systemic	NA	NA	0.13	0.13	0.1	0.078	0.088	0.077	0.068	0.06	0.053	0.043	0.04	0.028	0.018	0.014
	Northern Front Range		hematological	NA	NA	1.1	0.9	0.75	0.53	0.41	0.31	0.25	0.21	0.18	0.13	0.1	0.085	0.07	0.059
			neurotoxicity	NA	NA	0.89	0.72	0.59	0.42	0.32	0.25	0.2	0.16	0.14	0.11	0.083	0.067	0.056	0.047
			respiratory	NA	NA	0.25	0.2	0.17	0.12	0.089	0.07	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013
18 to 59 Years	Garfield County: Ridge Top (BarD)	neurotoxicity	NA	NA	2.1	1.8	1.4	0.86	0.65	0.31	0.26	0.22	0.19	0.14	0.12	0.07	0.087	0.066	
		hematological	NA	NA	1.9	1.6	1.3	0.78	0.6	0.3	0.25	0.2	0.18	0.13	0.11	0.064	0.079	0.06	
		respiratory	NA	NA	1	0.82	0.65	0.39	0.3	0.13	0.11	0.097	0.086	0.061	0.053	0.029	0.039	0.029	
		systemic	NA	NA	0.33	0.27	0.19	0.13	0.098	0.043	0.037	0.031	0.028	0.02	0.018	0.012	0.013	<0.01	
	Garfield County: Valley (Rifle)	neurotoxicity	NA	NA	0.97	0.89	0.73	0.55	0.6	0.51	0.47	0.41	0.37	0.3	0.28	0.2	0.13	0.098	
		hematological	NA	NA	0.89	0.81	0.66	0.51	0.55	0.46	0.42	0.37	0.34	0.27	0.25	0.18	0.12	0.089	
		respiratory	NA	NA	0.42	0.4	0.33	0.24	0.27	0.22	0.21	0.18	0.16	0.13	0.12	0.086	0.056	0.043	
		systemic	NA	NA	0.13	0.13	0.1	0.077	0.086	0.076	0.067	0.059	0.053	0.043	0.04	0.028	0.018	0.014	
	Northern Front Range	hematological	NA	NA	1.1	0.89	0.73	0.52	0.4	0.31	0.24	0.2	0.17	0.13	0.1	0.083	0.068	0.058	
		neurotoxicity	NA	NA	0.88	0.71	0.59	0.42	0.32	0.25	0.2	0.16	0.14	0.11	0.082	0.066	0.055	0.046	
		respiratory	NA	NA	0.25	0.2	0.17	0.12	0.088	0.07	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013	
60+ Years	Garfield County: Ridge Top (BarD)	neurotoxicity	NA	NA	2.2	1.8	1.5	0.87	0.66	0.32	0.27	0.23	0.2	0.14	0.12	0.07	0.088	0.066	
		hematological	NA	NA	2	1.6	1.3	0.79	0.6	0.3	0.25	0.2	0.18	0.13	0.11	0.064	0.079	0.06	
		respiratory	NA	NA	1	0.82	0.65	0.39	0.3	0.13	0.11	0.097	0.085	0.061	0.054	0.029	0.04	0.03	
		systemic	NA	NA	0.33	0.27	0.19	0.13	0.098	0.043	0.037	0.031	0.028	0.02	0.018	0.012	0.013	<0.01	
	Garfield County:	neurotoxicity	NA	NA	0.99	0.92	0.76	0.57	0.6	0.5	0.47	0.41	0.37	0.3	0.28	0.2	0.14	0.1	
		hematological	NA	NA	0.91	0.84	0.69	0.53	0.55	0.46	0.42	0.37	0.33	0.27	0.26	0.18	0.12	0.091	

	Valley (Rifle)	respiratory	NA	NA	0.43	0.41	0.33	0.25	0.27	0.22	0.21	0.18	0.16	0.13	0.12	0.087	0.056	0.044
		systemic	NA	NA	0.13	0.13	0.11	0.079	0.086	0.075	0.067	0.059	0.052	0.043	0.039	0.028	0.018	0.014
	Northern Front Range	hematological	NA	NA	1.1	0.9	0.74	0.53	0.41	0.31	0.25	0.21	0.18	0.13	0.1	0.084	0.069	0.059
		neurotoxicity	NA	NA	0.89	0.72	0.59	0.42	0.32	0.25	0.2	0.16	0.14	0.11	0.083	0.067	0.055	0.047
		respiratory	NA	NA	0.25	0.2	0.17	0.12	0.088	0.07	0.056	0.046	0.039	0.03	0.023	0.019	0.016	0.013

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D).

Table E-39. Percentage of Subchronic Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Development Activities in Sequence, by Distance from the 1-acre Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	neurotoxicity	NA	NA	57%	41%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	49%	32%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range		NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
18 to 59 Years	Garfield County: Ridge Top (BarD)		neurotoxicity	NA	NA	57%	41%	22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	49%	32%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Northern Front Range		NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)		neurotoxicity	NA	NA	56%	40%	22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	47%	31%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	Northern Front Range		NA	NA	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D).

E.3.1.2 3-acre Well Pad

We do not show tables in this section about percentage of subchronic non-cancer hazard quotients and hazard indices (across the hypothetical population) that are above 1 during development activities in sequence (by distance from the 3-acre well pad) because this scenario had no hazard quotients or hazard indices above 1. All sequences of activities shown here last less than 365 days in total, so we calculated only subchronic results here (no chronic results).

Table E-40. Largest Subchronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities in Sequence, by Distance from the 3-acre Well Pad

				Distance from Well Pad (feet)																
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	benzene	NA	NA	0.21	0.17	0.14	0.1	0.085	0.067	0.056	0.038	0.033	0.032	0.025	0.018	0.018	0.011	
			m+p-xylene	NA	NA	0.21	0.17	0.14	0.1	0.083	0.067	0.056	0.047	0.041	0.031	0.025	0.016	0.019	0.014	
			n-nonane	NA	NA	0.19	0.16	0.13	0.096	0.076	0.062	0.052	0.045	0.039	0.029	0.023	0.014	0.017	0.013	
			1,2,4-trimethylbenzene	NA	NA	0.13	0.11	0.088	0.064	0.05	0.041	0.035	0.03	0.026	0.019	0.015	<0.01	0.012	<0.01	
			1,3,5-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.063	0.049	0.04	0.034	0.029	0.026	0.019	0.015	<0.01	0.011	<0.01	
	Garfield County: Valley (Rifle)		m+p-xylene	NA	NA	0.23	0.17	0.14	0.13	0.1	0.085	0.076	0.1	0.088	0.057	0.059	0.042	0.031	0.021	
			n-nonane	NA	NA	0.22	0.17	0.14	0.13	0.098	0.08	0.072	0.1	0.087	0.056	0.059	0.042	0.03	0.021	
			benzene	NA	NA	0.19	0.15	0.12	0.11	0.085	0.069	0.061	0.084	0.074	0.047	0.05	0.035	0.026	0.019	
			1,2,4-trimethylbenzene	NA	NA	0.15	0.11	0.093	0.064	0.065	0.053	0.048	0.069	0.06	0.038	0.04	0.029	0.021	0.014	
			1,3,5-trimethylbenzene	NA	NA	0.15	0.11	0.092	0.063	0.064	0.052	0.047	0.069	0.06	0.038	0.04	0.029	0.02	0.014	
	Northern Front Range		benzene	NA	NA	0.56	0.46	0.38	0.27	0.21	0.17	0.14	0.11	0.096	0.071	0.056	0.045	0.038	0.032	
			n-nonane	NA	NA	0.22	0.18	0.15	0.11	0.083	0.066	0.053	0.045	0.038	0.028	0.022	0.018	0.015	0.013	
			m+p-xylene	NA	NA	0.14	0.11	0.095	0.067	0.052	0.042	0.033	0.028	0.024	0.018	0.014	0.011	<0.01	<0.01	
	18 to 59 Years		Garfield County: Ridge Top	benzene	NA	NA	0.21	0.17	0.14	0.1	0.085	0.067	0.056	0.038	0.033	0.032	0.025	0.018	0.018	0.011
				m+p-xylene	NA	NA	0.21	0.17	0.14	0.1	0.083	0.066	0.056	0.047	0.041	0.031	0.025	0.016	0.019	0.014
n-nonane				NA	NA	0.19	0.16	0.13	0.096	0.076	0.061	0.052	0.044	0.039	0.029	0.023	0.014	0.017	0.013	

60+ Years	Top (BarD)	1,2,4-trimethylbenzene	NA	NA	0.13	0.1	0.087	0.064	0.05	0.041	0.035	0.03	0.026	0.019	0.015	<0.01	0.012	<0.01
		1,3,5-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.063	0.049	0.04	0.034	0.029	0.026	0.019	0.015	<0.01	0.011	<0.01
	Garfield County: Valley (Rifle)	m+p-xylene	NA	NA	0.23	0.17	0.14	0.13	0.1	0.085	0.075	0.1	0.088	0.057	0.059	0.042	0.031	0.022
		n-nonane	NA	NA	0.22	0.17	0.14	0.13	0.097	0.08	0.071	0.099	0.087	0.056	0.058	0.041	0.03	0.021
		benzene	NA	NA	0.19	0.15	0.12	0.11	0.085	0.069	0.061	0.084	0.074	0.047	0.05	0.035	0.026	0.018
		1,2,4-trimethylbenzene	NA	NA	0.15	0.11	0.093	0.064	0.065	0.053	0.048	0.068	0.06	0.038	0.04	0.029	0.021	0.014
		1,3,5-trimethylbenzene	NA	NA	0.15	0.11	0.092	0.063	0.064	0.052	0.047	0.068	0.06	0.038	0.04	0.029	0.02	0.014
		benzene	NA	NA	0.56	0.46	0.38	0.27	0.21	0.17	0.14	0.11	0.096	0.072	0.056	0.045	0.038	0.032
	Northern Front Range	n-nonane	NA	NA	0.22	0.18	0.15	0.11	0.084	0.066	0.053	0.045	0.038	0.028	0.022	0.018	0.015	0.013
		m+p-xylene	NA	NA	0.14	0.11	0.095	0.067	0.053	0.042	0.034	0.028	0.024	0.018	0.014	0.011	<0.01	<0.01
		benzene	NA	NA	0.21	0.17	0.14	0.1	0.085	0.068	0.056	0.038	0.033	0.032	0.025	0.018	0.018	0.011
	Garfield County: Ridge Top (BarD)	m+p-xylene	NA	NA	0.21	0.17	0.14	0.1	0.083	0.066	0.056	0.047	0.041	0.031	0.025	0.016	0.019	0.014
		n-nonane	NA	NA	0.19	0.16	0.13	0.096	0.076	0.061	0.052	0.044	0.039	0.029	0.023	0.014	0.017	0.013
		1,2,4-trimethylbenzene	NA	NA	0.13	0.11	0.088	0.064	0.05	0.041	0.035	0.03	0.026	0.019	0.015	<0.01	0.012	<0.01
		1,3,5-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.063	0.049	0.04	0.034	0.029	0.026	0.019	0.015	<0.01	0.011	<0.01
		m+p-xylene	NA	NA	0.23	0.17	0.14	0.13	0.1	0.085	0.076	0.1	0.088	0.057	0.059	0.042	0.031	0.021
		n-nonane	NA	NA	0.22	0.17	0.14	0.13	0.098	0.08	0.071	0.099	0.087	0.056	0.059	0.042	0.03	0.021
	Garfield County: Valley (Rifle)	benzene	NA	NA	0.19	0.15	0.12	0.11	0.085	0.069	0.061	0.084	0.074	0.047	0.05	0.036	0.026	0.019
		1,2,4-trimethylbenzene	NA	NA	0.15	0.11	0.093	0.064	0.065	0.053	0.048	0.068	0.06	0.038	0.04	0.029	0.021	0.014
		1,3,5-trimethylbenzene	NA	NA	0.15	0.11	0.092	0.063	0.065	0.053	0.047	0.069	0.06	0.038	0.04	0.029	0.02	0.014
		benzene	NA	NA	0.56	0.46	0.38	0.27	0.21	0.17	0.14	0.11	0.096	0.071	0.056	0.045	0.038	0.032
	Northern Front Range	n-nonane	NA	NA	0.22	0.18	0.15	0.11	0.083	0.066	0.053	0.045	0.038	0.028	0.022	0.018	0.015	0.013
		m+p-xylene	NA	NA	0.14	0.11	0.095	0.067	0.052	0.042	0.033	0.028	0.024	0.018	0.014	0.011	<0.01	<0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-41. Largest Subchronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities in Sequence, by Distance from the 3-acre Well Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	neurotoxicity	NA	NA	0.83	0.67	0.56	0.41	0.33	0.26	0.22	0.19	0.16	0.12	0.099	0.061	0.075	0.053
			hematological	NA	NA	0.79	0.64	0.53	0.39	0.31	0.25	0.21	0.17	0.15	0.12	0.094	0.06	0.07	0.048
			respiratory	NA	NA	0.34	0.28	0.23	0.17	0.13	0.11	0.091	0.078	0.069	0.051	0.04	0.023	0.031	0.022
			systemic	NA	NA	0.11	0.085	0.071	0.052	0.041	0.033	0.028	0.024	0.021	0.016	0.012	<0.01	<0.01	<0.01
	Garfield		neurotoxicity	NA	NA	0.93	0.72	0.58	0.47	0.41	0.34	0.3	0.42	0.37	0.23	0.25	0.18	0.13	0.089

18 to 59 Years	County: Valley (Rifle)	hematological	NA	NA	0.85	0.66	0.53	0.43	0.37	0.31	0.27	0.38	0.33	0.21	0.23	0.16	0.12	0.081
		respiratory	NA	NA	0.39	0.3	0.25	0.17	0.17	0.14	0.13	0.18	0.16	0.1	0.11	0.076	0.054	0.038
		systemic	NA	NA	0.12	0.093	0.075	0.052	0.052	0.042	0.038	0.056	0.049	0.03	0.033	0.023	0.016	0.012
	Northern Front Range	hematological	NA	NA	0.94	0.77	0.64	0.45	0.36	0.28	0.23	0.19	0.16	0.12	0.094	0.076	0.063	0.054
		neurotoxicity	NA	NA	0.73	0.6	0.5	0.35	0.28	0.22	0.18	0.15	0.13	0.094	0.074	0.06	0.05	0.042
		respiratory	NA	NA	0.2	0.17	0.14	0.097	0.077	0.061	0.049	0.041	0.035	0.026	0.02	0.017	0.014	0.012
	Garfield County: Ridge Top (BarD)	neurotoxicity	NA	NA	0.83	0.67	0.56	0.41	0.33	0.26	0.22	0.19	0.16	0.12	0.099	0.061	0.075	0.053
		hematological	NA	NA	0.79	0.64	0.53	0.39	0.31	0.25	0.21	0.17	0.15	0.12	0.094	0.06	0.07	0.048
		respiratory	NA	NA	0.34	0.28	0.23	0.17	0.13	0.11	0.091	0.078	0.069	0.05	0.04	0.023	0.031	0.022
	Garfield County: Valley (Rifle)	systemic	NA	NA	0.11	0.085	0.071	0.052	0.041	0.033	0.028	0.024	0.021	0.016	0.012	<0.01	<0.01	<0.01
		neurotoxicity	NA	NA	0.93	0.71	0.58	0.47	0.41	0.33	0.3	0.42	0.37	0.23	0.25	0.18	0.13	0.09
		hematological	NA	NA	0.84	0.65	0.53	0.43	0.37	0.3	0.27	0.38	0.33	0.21	0.22	0.16	0.12	0.082
60+ Years	Northern Front Range	respiratory	NA	NA	0.39	0.3	0.25	0.17	0.17	0.14	0.12	0.18	0.16	0.099	0.11	0.076	0.054	0.038
		systemic	NA	NA	0.12	0.093	0.075	0.052	0.052	0.042	0.038	0.056	0.049	0.03	0.033	0.023	0.016	0.012
		hematological	NA	NA	0.94	0.78	0.64	0.45	0.36	0.28	0.23	0.19	0.16	0.12	0.095	0.076	0.063	0.054
	Garfield County: Ridge Top (BarD)	neurotoxicity	NA	NA	0.73	0.61	0.5	0.35	0.28	0.22	0.18	0.15	0.13	0.094	0.074	0.06	0.05	0.042
		respiratory	NA	NA	0.2	0.17	0.14	0.097	0.077	0.061	0.049	0.041	0.035	0.026	0.02	0.017	0.014	0.012
		neurotoxicity	NA	NA	0.84	0.68	0.56	0.41	0.33	0.26	0.22	0.19	0.16	0.12	0.099	0.061	0.075	0.053
	Garfield County: Valley (Rifle)	hematological	NA	NA	0.79	0.64	0.53	0.39	0.31	0.25	0.21	0.17	0.15	0.12	0.094	0.06	0.07	0.048
		respiratory	NA	NA	0.34	0.28	0.23	0.17	0.13	0.11	0.091	0.078	0.069	0.051	0.04	0.023	0.031	0.022
		systemic	NA	NA	0.11	0.085	0.071	0.052	0.041	0.033	0.028	0.024	0.021	0.016	0.012	<0.01	<0.01	<0.01
	Northern Front Range	neurotoxicity	NA	NA	0.93	0.72	0.58	0.47	0.41	0.33	0.3	0.42	0.37	0.23	0.25	0.18	0.13	0.089
		hematological	NA	NA	0.85	0.66	0.53	0.43	0.37	0.31	0.27	0.38	0.33	0.21	0.22	0.16	0.12	0.081
		respiratory	NA	NA	0.39	0.3	0.25	0.17	0.17	0.14	0.13	0.18	0.16	0.099	0.11	0.076	0.054	0.038

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D).

E.3.1.3 5-acre Well Pad

We do not show tables in this section about percentage of subchronic non-cancer hazard quotients and hazard indices (across the hypothetical population) that are above 1 during development activities in sequence (by distance from the 5-acre well pad) because this scenario had no hazard quotients or hazard indices above 1. Sequences of development activities at the Garfield County sites last more than 365 days in total, so we calculated only chronic results for those scenarios (no subchronic results). Sequences of development activities at the NFR site last less than 365 days in total, so we calculated only subchronic results for those scenarios (no chronic results).

Table E-42. Largest Subchronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Development Activities in Sequence, by Distance from the 5-acre Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
18 to 59 Years	Northern Front Range	Development	benzene	NA	NA	0.55	0.45	0.37	0.26	0.2	0.16	0.13	0.11	0.09	0.068	0.054	0.043	0.036	0.03
			m+p-xylene	NA	NA	0.13	0.11	0.091	0.064	0.05	0.04	0.032	0.027	0.022	0.017	0.013	0.011	0.0089	0.007
			n-nonane	NA	NA	0.21	0.17	0.14	0.1	0.08	0.063	0.051	0.042	0.035	0.027	0.021	0.017	0.014	0.012
benzene			NA	NA	0.55	0.45	0.37	0.26	0.21	0.16	0.13	0.11	0.091	0.069	0.054	0.044	0.036	0.03	
m+p-xylene			NA	NA	0.13	0.11	0.091	0.064	0.05	0.04	0.032	0.027	0.022	0.017	0.013	0.011	0.0089	0.007	
n-nonane			NA	NA	0.21	0.17	0.14	0.1	0.08	0.063	0.051	0.043	0.035	0.027	0.021	0.017	0.014	0.012	
benzene			NA	NA	0.55	0.45	0.37	0.26	0.2	0.16	0.13	0.11	0.09	0.069	0.054	0.043	0.036	0.03	
m+p-xylene			NA	NA	0.13	0.11	0.091	0.064	0.05	0.04	0.032	0.027	0.022	0.017	0.013	0.011	0.0089	0.007	
n-nonane			NA	NA	0.21	0.17	0.14	0.1	0.08	0.063	0.051	0.043	0.035	0.027	0.021	0.017	0.014	0.01	
Up to 17 Years																			

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity. Entries for Garfield County sites are not shown because development activities in sequence there last a total of more than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a chronic assessment).

Table E-43. Largest Subchronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Development Activities in Sequence, by Distance from the 5-acre Well Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
18 to 59 Years	Northern Front Range	Development	hematological	NA	NA	0.91	0.75	0.62	0.44	0.34	0.27	0.22	0.18	0.15	0.11	0.09	0.073	0.06	0.051
			neurotoxicity	NA	NA	0.71	0.58	0.48	0.34	0.27	0.21	0.17	0.14	0.12	0.089	0.07	0.057	0.047	0.04
			respiratory	NA	NA	0.19	0.16	0.13	0.094	0.073	0.058	0.047	0.039	0.032	0.025	0.019	0.016	0.013	0.011
60+ Years			hematological	NA	NA	0.91	0.75	0.62	0.44	0.34	0.27	0.22	0.18	0.15	0.11	0.09	0.073	0.06	0.051
neurotoxicity			NA	NA	0.71	0.58	0.48	0.34	0.27	0.21	0.17	0.14	0.12	0.089	0.07	0.057	0.047	0.04	
respiratory			NA	NA	0.19	0.16	0.13	0.095	0.073	0.058	0.047	0.039	0.032	0.025	0.019	0.016	0.013	0.011	
Up to 17			hematological	NA	NA	0.91	0.75	0.62	0.44	0.34	0.27	0.22	0.18	0.15	0.11	0.09	0.073	0.06	0.051

Years		neurotoxicity	NA	NA	0.71	0.58	0.48	0.34	0.27	0.21	0.17	0.14	0.12	0.089	0.07	0.057	0.047	0.04
		respiratory	NA	NA	0.19	0.16	0.13	0.094	0.073	0.058	0.047	0.039	0.032	0.025	0.019	0.016	0.013	0.011

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any subchronic critical-effect group (see Appendix D). Entries for Garfield County sites are not shown because development activities in sequence there last a total of more than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a chronic assessment).

E.3.2 Development and Production

E.3.2.1 1-acre Development Well Pad (1-acre Production Pad)

We do not show tables in this section about percentage of subchronic non-cancer hazard quotients and hazard indices (across the hypothetical population) that are above 1 during all activities in sequence (by distance from the 1-acre development well pad/1-acre production pad) because this scenario had no hazard quotients or hazard indices above 1. All sequences of activities shown here last more than 365 days in total, so we calculated only chronic results here (no subchronic results).

Table E-44. Largest Chronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during All Activities in Sequence, by Distance from the 1-acre Development Well Pad/1-acre Production Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	All	benzene	NA	NA	0.5	0.4	0.34	0.25	0.2	0.16	0.12	0.1	0.087	0.066	0.052	0.042	0.035	0.03
			1,2,4-trimethylbenzene	NA	NA	0.15	0.13	0.1	0.076	0.061	0.048	0.038	0.032	0.027	0.02	0.016	0.013	0.011	<0.01
			n-nonane	NA	NA	0.15	0.12	0.1	0.073	0.058	0.045	0.036	0.03	0.025	0.019	0.015	0.012	0.01	<0.01
			2-ethyltoluene	NA	NA	0.12	0.094	0.078	0.058	0.046	0.036	0.029	0.024	0.02	0.015	0.012	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)		benzene	NA	NA	0.39	0.32	0.27	0.21	0.17	0.14	0.12	0.11	0.092	0.072	0.063	0.054	0.041	0.029
			1,2,4-trimethylbenzene	NA	NA	0.12	0.099	0.084	0.064	0.052	0.044	0.037	0.033	0.029	0.022	0.019	0.016	0.012	<0.01
			n-nonane	NA	NA	0.11	0.092	0.078	0.059	0.049	0.041	0.035	0.031	0.027	0.021	0.018	0.015	0.011	<0.01
	Northern Front Range		benzene	NA	NA	0.42	0.34	0.28	0.2	0.16	0.13	0.1	0.088	0.075	0.057	0.045	0.036	0.03	0.025
			1,2,4-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.062	0.048	0.038	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
			n-nonane	NA	NA	0.12	0.095	0.079	0.057	0.045	0.036	0.029	0.024	0.021	0.016	0.013	0.01	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge		benzene	NA	NA	0.5	0.4	0.34	0.25	0.2	0.16	0.12	0.1	0.087	0.066	0.052	0.042	0.035	0.03
			1,2,4-trimethylbenzene	NA	NA	0.15	0.13	0.1	0.076	0.061	0.048	0.038	0.032	0.027	0.02	0.016	0.013	0.011	<0.01

60+ Years	Top (BarD)	n-nonane	NA	NA	0.15	0.12	0.1	0.073	0.058	0.045	0.036	0.03	0.025	0.019	0.015	0.012	0.01	<0.01
		2-ethyltoluene	NA	NA	0.12	0.094	0.078	0.058	0.046	0.036	0.029	0.024	0.02	0.015	0.012	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)	benzene	NA	NA	0.39	0.32	0.27	0.21	0.17	0.14	0.12	0.11	0.092	0.072	0.063	0.054	0.04	0.029
		1,2,4-trimethylbenzene	NA	NA	0.12	0.099	0.084	0.064	0.052	0.043	0.037	0.033	0.029	0.022	0.019	0.016	0.012	<0.01
		n-nonane	NA	NA	0.11	0.092	0.078	0.059	0.049	0.041	0.035	0.031	0.027	0.021	0.018	0.015	0.011	<0.01
	Northern Front Range	benzene	NA	NA	0.42	0.34	0.28	0.2	0.16	0.13	0.1	0.088	0.075	0.057	0.045	0.036	0.03	0.025
		1,2,4-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.062	0.048	0.038	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
		n-nonane	NA	NA	0.12	0.095	0.079	0.057	0.045	0.036	0.029	0.024	0.021	0.016	0.012	0.01	<0.01	<0.01
	Garfield County: Ridge Top (BarD)	benzene	NA	NA	0.5	0.4	0.34	0.25	0.2	0.16	0.12	0.1	0.087	0.066	0.052	0.042	0.035	0.03
		1,2,4-trimethylbenzene	NA	NA	0.15	0.13	0.1	0.076	0.061	0.048	0.038	0.032	0.027	0.02	0.016	0.013	0.011	<0.01
		n-nonane	NA	NA	0.15	0.12	0.1	0.073	0.058	0.045	0.036	0.03	0.025	0.019	0.015	0.012	0.01	<0.01
		2-ethyltoluene	NA	NA	0.12	0.094	0.078	0.058	0.046	0.036	0.029	0.024	0.02	0.015	0.012	<0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)	benzene	NA	NA	0.4	0.32	0.27	0.21	0.17	0.14	0.12	0.11	0.093	0.072	0.063	0.054	0.041	0.029
		1,2,4-trimethylbenzene	NA	NA	0.12	0.099	0.084	0.064	0.052	0.044	0.037	0.033	0.029	0.022	0.019	0.016	0.012	<0.01
		n-nonane	NA	NA	0.11	0.092	0.078	0.059	0.049	0.041	0.035	0.031	0.027	0.021	0.018	0.015	0.011	<0.01
	Northern Front Range	benzene	NA	NA	0.42	0.34	0.28	0.2	0.16	0.13	0.1	0.088	0.075	0.057	0.045	0.036	0.03	0.025
		1,2,4-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.062	0.048	0.038	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
		n-nonane	NA	NA	0.12	0.095	0.079	0.057	0.045	0.036	0.029	0.024	0.021	0.016	0.013	0.01	<0.01	<0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-45. Largest Chronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during All Activities in Sequence, by Distance from the 1-acre Development Well Pad/1-acre Production Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	All	hematological	NA	NA	0.75	0.61	0.51	0.37	0.3	0.23	0.19	0.15	0.13	0.098	0.078	0.063	0.053	0.045
			neurotoxicity	NA	NA	0.53	0.43	0.36	0.26	0.21	0.16	0.13	0.11	0.092	0.069	0.055	0.044	0.037	0.032
			respiratory	NA	NA	0.27	0.22	0.19	0.14	0.11	0.085	0.068	0.056	0.047	0.036	0.028	0.023	0.019	0.016
			systemic	NA	NA	0.16	0.13	0.11	0.08	0.064	0.05	0.04	0.033	0.028	0.021	0.017	0.014	0.011	<0.01
	Garfield County:		hematological	NA	NA	0.59	0.48	0.41	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.094	0.081	0.06	0.043
			neurotoxicity	NA	NA	0.41	0.34	0.29	0.22	0.18	0.15	0.13	0.11	0.099	0.077	0.067	0.057	0.042	0.03

18 to 59 Years	Valley (Rifle)	respiratory	NA	NA	0.21	0.17	0.15	0.11	0.092	0.077	0.066	0.058	0.051	0.039	0.034	0.029	0.022	0.016
		systemic	NA	NA	0.12	0.1	0.087	0.066	0.054	0.045	0.039	0.034	0.03	0.023	0.02	0.017	0.013	<0.01
	Northern Front Range	hematological	NA	NA	0.62	0.5	0.42	0.3	0.24	0.19	0.15	0.13	0.11	0.084	0.066	0.054	0.044	0.038
		neurotoxicity	NA	NA	0.43	0.35	0.29	0.21	0.17	0.13	0.11	0.09	0.077	0.058	0.046	0.037	0.031	0.026
		respiratory	NA	NA	0.22	0.18	0.15	0.11	0.086	0.068	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013
		systemic	NA	NA	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
	Garfield County: Ridge Top (BarD)	hematological	NA	NA	0.74	0.61	0.51	0.37	0.3	0.23	0.19	0.15	0.13	0.098	0.078	0.063	0.053	0.045
		neurotoxicity	NA	NA	0.53	0.43	0.36	0.26	0.21	0.16	0.13	0.11	0.092	0.069	0.055	0.044	0.037	0.032
		respiratory	NA	NA	0.27	0.22	0.19	0.14	0.11	0.085	0.068	0.056	0.047	0.036	0.028	0.023	0.019	0.016
		systemic	NA	NA	0.16	0.13	0.11	0.08	0.064	0.05	0.04	0.033	0.028	0.021	0.017	0.014	0.011	<0.01
	Garfield County: Valley (Rifle)	hematological	NA	NA	0.59	0.48	0.41	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.094	0.081	0.06	0.043
		neurotoxicity	NA	NA	0.41	0.34	0.29	0.22	0.18	0.15	0.13	0.11	0.099	0.076	0.066	0.057	0.042	0.03
		respiratory	NA	NA	0.21	0.17	0.15	0.11	0.092	0.077	0.066	0.058	0.051	0.039	0.034	0.029	0.022	0.015
		systemic	NA	NA	0.12	0.1	0.086	0.066	0.054	0.045	0.039	0.034	0.03	0.023	0.02	0.017	0.013	<0.01
	Northern Front Range	hematological	NA	NA	0.62	0.5	0.42	0.3	0.24	0.19	0.15	0.13	0.11	0.084	0.066	0.054	0.044	0.038
		neurotoxicity	NA	NA	0.43	0.35	0.29	0.21	0.17	0.13	0.11	0.09	0.077	0.058	0.046	0.037	0.031	0.026
		respiratory	NA	NA	0.22	0.18	0.15	0.11	0.086	0.068	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013
		systemic	NA	NA	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
60+ Years	Garfield County: Ridge Top (BarD)	hematological	NA	NA	0.75	0.61	0.51	0.37	0.3	0.23	0.19	0.15	0.13	0.098	0.078	0.063	0.053	0.045
		neurotoxicity	NA	NA	0.53	0.43	0.36	0.26	0.21	0.16	0.13	0.11	0.092	0.069	0.055	0.044	0.037	0.032
		respiratory	NA	NA	0.27	0.22	0.19	0.14	0.11	0.085	0.068	0.056	0.047	0.036	0.028	0.023	0.019	0.016
		systemic	NA	NA	0.16	0.13	0.11	0.08	0.064	0.05	0.04	0.033	0.028	0.021	0.017	0.014	0.011	<0.01
	Garfield County: Valley (Rifle)	hematological	NA	NA	0.59	0.48	0.41	0.31	0.25	0.21	0.18	0.16	0.14	0.11	0.094	0.081	0.06	0.043
		neurotoxicity	NA	NA	0.41	0.34	0.29	0.22	0.18	0.15	0.13	0.11	0.099	0.077	0.067	0.057	0.042	0.03
		respiratory	NA	NA	0.21	0.17	0.15	0.11	0.092	0.077	0.066	0.058	0.051	0.039	0.034	0.029	0.022	0.016
		systemic	NA	NA	0.12	0.1	0.087	0.066	0.054	0.045	0.039	0.034	0.03	0.023	0.02	0.017	0.013	<0.01
	Northern Front Range	hematological	NA	NA	0.62	0.5	0.42	0.3	0.24	0.19	0.15	0.13	0.11	0.084	0.066	0.054	0.044	0.038
		neurotoxicity	NA	NA	0.43	0.35	0.29	0.21	0.17	0.13	0.11	0.09	0.077	0.058	0.046	0.037	0.031	0.026
		respiratory	NA	NA	0.22	0.18	0.15	0.11	0.086	0.068	0.055	0.046	0.039	0.03	0.023	0.019	0.016	0.013
		systemic	NA	NA	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D).

E.3.2.2 3-acre Development Well Pad (1-acre Production Pad)

We do not show tables in this section about percentage of subchronic non-cancer hazard quotients and hazard indices (across the hypothetical population) that are above 1 during all activities in sequence (by distance from the 1-acre development well pad/1-acre production pad) because this scenario had no hazard quotients or hazard indices above 1. All sequences of activities shown here last more than 365 days in total, so we calculated only chronic results here (no subchronic results).

Table E-46. Largest Chronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during All Activities in Sequence, by Distance from the 3-acre Development Well Pad/1-acre Production Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	All	benzene	NA	NA	0.53	0.43	0.36	0.26	0.21	0.17	0.13	0.11	0.091	0.071	0.056	0.045	0.038	0.032
			n-nonane	NA	NA	0.19	0.15	0.13	0.093	0.075	0.059	0.048	0.04	0.034	0.026	0.02	0.015	0.014	0.012
			1,2,4-trimethylbenzene	NA	NA	0.16	0.13	0.11	0.08	0.064	0.05	0.04	0.033	0.028	0.021	0.017	0.013	0.012	<0.01
			2-ethyltoluene	NA	NA	0.12	0.099	0.082	0.061	0.048	0.038	0.031	0.025	0.022	0.016	0.013	0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)		benzene	NA	NA	0.43	0.35	0.29	0.23	0.18	0.15	0.13	0.12	0.11	0.08	0.072	0.06	0.045	0.032
			n-nonane	NA	NA	0.16	0.13	0.11	0.089	0.072	0.06	0.052	0.055	0.048	0.034	0.032	0.025	0.019	0.013
			1,2,4-trimethylbenzene	NA	NA	0.13	0.11	0.09	0.068	0.056	0.047	0.04	0.038	0.033	0.025	0.022	0.019	0.014	<0.01
	Northern Front Range		benzene	NA	NA	0.44	0.36	0.3	0.22	0.17	0.14	0.11	0.094	0.08	0.061	0.048	0.039	0.032	0.027
			1,2,4-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.062	0.049	0.039	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
			n-nonane	NA	NA	0.13	0.11	0.089	0.064	0.051	0.04	0.033	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge Top (BarD)	benzene	NA	NA	0.52	0.43	0.36	0.26	0.21	0.17	0.13	0.11	0.091	0.071	0.056	0.045	0.038	0.032	
		n-nonane	NA	NA	0.19	0.15	0.13	0.093	0.074	0.059	0.048	0.04	0.034	0.026	0.02	0.015	0.014	0.012	
		1,2,4-trimethylbenzene	NA	NA	0.16	0.13	0.11	0.08	0.064	0.05	0.04	0.033	0.028	0.021	0.017	0.013	0.012	<0.01	
		2-ethyltoluene	NA	NA	0.12	0.098	0.082	0.061	0.048	0.038	0.031	0.025	0.022	0.016	0.013	0.01	<0.01	<0.01	
	Garfield County: Valley (Rifle)	benzene	NA	NA	0.42	0.35	0.29	0.23	0.18	0.15	0.13	0.12	0.11	0.08	0.072	0.06	0.045	0.032	
		n-nonane	NA	NA	0.16	0.13	0.11	0.089	0.072	0.059	0.052	0.055	0.048	0.034	0.032	0.025	0.019	0.013	
		1,2,4-trimethylbenzene	NA	NA	0.13	0.11	0.089	0.067	0.056	0.047	0.04	0.038	0.033	0.025	0.022	0.018	0.014	<0.01	
	Northern Front	benzene	NA	NA	0.44	0.36	0.3	0.22	0.17	0.14	0.11	0.094	0.08	0.061	0.048	0.039	0.032	0.027	
		1,2,4-trimethylbenzene	NA	NA	0.13	0.1	0.086	0.062	0.049	0.039	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01	

	Range																	
60+ Years	Garfield County: Ridge Top (BarD)	n-nonane	NA	NA	0.13	0.11	0.089	0.064	0.051	0.04	0.033	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
		benzene	NA	NA	0.53	0.43	0.36	0.26	0.21	0.17	0.13	0.11	0.091	0.071	0.056	0.045	0.038	0.032
		n-nonane	NA	NA	0.19	0.15	0.13	0.093	0.075	0.059	0.048	0.04	0.034	0.026	0.02	0.015	0.014	0.012
		1,2,4-trimethylbenzene	NA	NA	0.16	0.13	0.11	0.08	0.064	0.05	0.04	0.033	0.028	0.021	0.017	0.013	0.012	<0.01
		2-ethyltoluene	NA	NA	0.12	0.099	0.082	0.061	0.048	0.038	0.031	0.025	0.022	0.016	0.013	0.01	<0.01	<0.01
	Garfield County: Valley (Rifle)	benzene	NA	NA	0.43	0.35	0.29	0.23	0.18	0.15	0.13	0.12	0.11	0.08	0.072	0.06	0.045	0.032
		n-nonane	NA	NA	0.16	0.13	0.11	0.089	0.072	0.059	0.052	0.055	0.048	0.034	0.032	0.025	0.019	0.013
		1,2,4-trimethylbenzene	NA	NA	0.13	0.11	0.09	0.068	0.056	0.047	0.04	0.038	0.033	0.025	0.022	0.019	0.014	<0.01
	Northern Front Range	benzene	NA	NA	0.45	0.36	0.3	0.22	0.17	0.14	0.11	0.094	0.08	0.061	0.048	0.039	0.032	0.027
		1,2,4-trimethylbenzene	NA	NA	0.13	0.1	0.087	0.062	0.049	0.039	0.031	0.026	0.022	0.017	0.013	0.011	<0.01	<0.01
		n-nonane	NA	NA	0.13	0.11	0.089	0.064	0.051	0.04	0.033	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity.

Table E-47. Largest Chronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during All Activities in Sequence, by Distance from the 3-acre Development Well Pad/1-acre Production Pad

				Distance from Well Pad (feet)															
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	All	hematological	NA	NA	0.79	0.64	0.54	0.4	0.32	0.25	0.2	0.16	0.14	0.11	0.084	0.067	0.058	0.048
			neurotoxicity	NA	NA	0.62	0.5	0.42	0.31	0.25	0.19	0.16	0.13	0.11	0.083	0.066	0.051	0.046	0.038
			respiratory	NA	NA	0.29	0.24	0.2	0.15	0.12	0.092	0.074	0.062	0.052	0.039	0.031	0.024	0.021	0.018
			systemic	NA	NA	0.17	0.14	0.12	0.085	0.068	0.054	0.043	0.036	0.03	0.023	0.018	0.014	0.012	0.01
	Garfield County: Valley (Rifle)		hematological	NA	NA	0.65	0.53	0.44	0.34	0.28	0.23	0.2	0.19	0.16	0.12	0.11	0.093	0.069	0.049
			neurotoxicity	NA	NA	0.52	0.42	0.35	0.28	0.23	0.19	0.16	0.16	0.14	0.1	0.096	0.078	0.057	0.041
			respiratory	NA	NA	0.24	0.2	0.17	0.12	0.1	0.087	0.076	0.073	0.064	0.047	0.043	0.035	0.026	0.019
			systemic	NA	NA	0.14	0.11	0.096	0.073	0.061	0.051	0.044	0.042	0.037	0.027	0.025	0.02	0.015	0.011
	Northern Front Range		hematological	NA	NA	0.65	0.53	0.44	0.32	0.25	0.2	0.16	0.14	0.12	0.088	0.069	0.056	0.046	0.039
			neurotoxicity	NA	NA	0.45	0.37	0.31	0.22	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
			respiratory	NA	NA	0.23	0.18	0.15	0.11	0.087	0.069	0.056	0.047	0.04	0.03	0.024	0.019	0.016	0.014
			systemic	NA	NA	0.13	0.11	0.09	0.065	0.051	0.04	0.033	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
18 to 59 Years	Garfield County: Ridge	hematological	NA	NA	0.79	0.64	0.54	0.4	0.32	0.25	0.2	0.16	0.14	0.11	0.084	0.067	0.058	0.048	
		neurotoxicity	NA	NA	0.61	0.5	0.42	0.31	0.25	0.19	0.16	0.13	0.11	0.083	0.066	0.051	0.046	0.038	

60+ Years	Top (BarD)	respiratory	NA	NA	0.29	0.24	0.2	0.15	0.12	0.092	0.074	0.062	0.052	0.039	0.031	0.024	0.021	0.018
		systemic	NA	NA	0.17	0.14	0.12	0.085	0.068	0.054	0.043	0.036	0.03	0.023	0.018	0.014	0.012	0.01
	Garfield County: Valley (Rifle)	hematological	NA	NA	0.65	0.53	0.44	0.34	0.28	0.23	0.2	0.19	0.16	0.12	0.11	0.092	0.069	0.049
		neurotoxicity	NA	NA	0.52	0.42	0.35	0.28	0.23	0.19	0.16	0.16	0.14	0.1	0.096	0.077	0.057	0.041
		respiratory	NA	NA	0.24	0.2	0.17	0.12	0.1	0.087	0.075	0.073	0.064	0.047	0.043	0.035	0.026	0.019
		systemic	NA	NA	0.14	0.11	0.096	0.073	0.061	0.05	0.044	0.042	0.037	0.027	0.025	0.02	0.015	0.011
	Northern Front Range	hematological	NA	NA	0.65	0.53	0.44	0.32	0.25	0.2	0.16	0.14	0.12	0.088	0.069	0.056	0.046	0.039
		neurotoxicity	NA	NA	0.45	0.37	0.31	0.22	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
		respiratory	NA	NA	0.23	0.18	0.15	0.11	0.087	0.069	0.056	0.047	0.04	0.03	0.024	0.019	0.016	0.014
		systemic	NA	NA	0.13	0.11	0.09	0.065	0.051	0.04	0.033	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01
	Garfield County: Ridge Top (BarD)	hematological	NA	NA	0.79	0.65	0.54	0.4	0.32	0.25	0.2	0.16	0.14	0.11	0.084	0.067	0.058	0.048
		neurotoxicity	NA	NA	0.62	0.5	0.42	0.31	0.25	0.19	0.16	0.13	0.11	0.083	0.066	0.051	0.046	0.038
		respiratory	NA	NA	0.29	0.24	0.2	0.15	0.12	0.092	0.074	0.062	0.052	0.039	0.031	0.024	0.021	0.018
		systemic	NA	NA	0.17	0.14	0.12	0.085	0.068	0.054	0.043	0.036	0.03	0.023	0.018	0.014	0.012	0.01
	Garfield County: Valley (Rifle)	hematological	NA	NA	0.65	0.53	0.44	0.34	0.28	0.23	0.2	0.19	0.16	0.12	0.11	0.093	0.069	0.049
		neurotoxicity	NA	NA	0.52	0.42	0.35	0.28	0.23	0.19	0.16	0.16	0.14	0.1	0.096	0.078	0.057	0.041
		respiratory	NA	NA	0.24	0.2	0.17	0.12	0.1	0.087	0.076	0.073	0.064	0.047	0.043	0.035	0.026	0.019
		systemic	NA	NA	0.14	0.11	0.096	0.073	0.061	0.051	0.044	0.042	0.037	0.027	0.025	0.02	0.015	0.011
	Northern Front Range	hematological	NA	NA	0.65	0.53	0.44	0.32	0.25	0.2	0.16	0.14	0.12	0.088	0.069	0.056	0.046	0.039
		neurotoxicity	NA	NA	0.45	0.37	0.31	0.22	0.18	0.14	0.11	0.095	0.081	0.061	0.048	0.039	0.032	0.027
		respiratory	NA	NA	0.23	0.18	0.15	0.11	0.087	0.069	0.056	0.047	0.04	0.03	0.024	0.019	0.016	0.014
		systemic	NA	NA	0.13	0.11	0.09	0.065	0.051	0.04	0.033	0.027	0.023	0.018	0.014	0.011	<0.01	<0.01

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D).

E.3.2.3 5-acre Development Well Pad (1-acre Production Pad)

Table E-48. Largest Chronic Non-cancer Hazard Quotients for the Highest Exposed Hypothetical Individuals during Activities in Sequence, by Distance from the 5-acre Development Well Pad/1-acre Production Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17	Garfield	Development	n-nonane	NA	NA	2	1.6	1.3	0.98	0.76	0.61	0.52	0.45	0.39	0.29	0.23	0.14	0.17	0.13

Years	County: Ridge Top (BarD)		benzene	NA	NA	1.8	1.4	1.2	0.92	0.72	0.58	0.48	0.32	0.28	0.26	0.21	0.15	0.15	0.12	
			m+p-xylene	NA	NA	0.84	0.68	0.57	0.42	0.33	0.27	0.22	0.19	0.17	0.12	0.099	0.063	0.072	0.055	
			1,2,4-trimethylbenzene	NA	NA	0.45	0.36	0.3	0.22	0.17	0.14	0.12	0.1	0.089	0.064	0.052	0.031	0.039	0.028	
			1,3,5-trimethylbenzene	NA	NA	0.44	0.35	0.29	0.21	0.17	0.13	0.11	0.099	0.087	0.062	0.051	0.03	0.038	0.028	
			2-ethyltoluene	NA	NA	0.41	0.33	0.27	0.2	0.16	0.13	0.11	0.092	0.082	0.059	0.048	0.038	0.033	0.026	
			1,2,3-trimethylbenzene	NA	NA	0.28	0.23	0.19	0.14	0.11	0.086	0.073	0.062	0.055	0.04	0.032	0.019	0.025	0.018	
			o-xylene	NA	NA	0.14	0.11	0.091	0.067	0.052	0.042	0.036	0.03	0.026	0.02	0.016	<0.01	0.012	<0.01	
			3-ethyltoluene	NA	NA	0.11	0.085	0.071	0.052	0.041	0.033	0.028	0.024	0.021	0.015	0.012	<0.01	<0.01	<0.01	
		All	benzene	NA	NA	0.56	0.45	0.38	0.28	0.22	0.18	0.14	0.11	0.096	0.076	0.06	0.048	0.041	0.035	
			n-nonane	NA	NA	0.23	0.19	0.16	0.12	0.092	0.073	0.06	0.051	0.044	0.032	0.026	0.019	0.018	0.015	
			1,2,4-trimethylbenzene	NA	NA	0.17	0.14	0.11	0.083	0.067	0.052	0.042	0.035	0.03	0.022	0.018	0.014	0.012	0.01	
			2-ethyltoluene	NA	NA	0.13	0.1	0.087	0.064	0.051	0.04	0.033	0.027	0.023	0.017	0.014	0.011	<0.01	<0.01	
		Garfield County: Valley (Rifle)	Development	n-nonane	NA	NA	2.3	1.7	1.4	0.89	0.99	0.8	0.72	0.97	0.85	0.56	0.57	0.41	0.3	0.21
				benzene	NA	NA	1.7	1.3	1.1	0.71	0.72	0.58	0.51	0.7	0.61	0.4	0.41	0.3	0.22	0.15
	m+p-xylene			NA	NA	0.95	0.71	0.56	0.37	0.41	0.34	0.3	0.39	0.34	0.23	0.23	0.16	0.12	0.083	
	1,2,4-trimethylbenzene			NA	NA	0.53	0.4	0.32	0.2	0.22	0.18	0.16	0.22	0.2	0.13	0.13	0.094	0.068	0.048	
	1,3,5-trimethylbenzene			NA	NA	0.53	0.4	0.32	0.2	0.22	0.18	0.16	0.23	0.2	0.13	0.13	0.094	0.068	0.048	
	2-ethyltoluene			NA	NA	0.5	0.38	0.3	0.19	0.21	0.17	0.15	0.21	0.18	0.12	0.12	0.087	0.063	0.045	
	1,2,3-trimethylbenzene			NA	NA	0.34	0.26	0.2	0.13	0.14	0.11	0.1	0.14	0.13	0.082	0.084	0.059	0.043	0.03	
	o-xylene			NA	NA	0.16	0.12	0.094	0.061	0.066	0.054	0.048	0.065	0.057	0.038	0.039	0.028	0.02	0.014	
	3-ethyltoluene			NA	NA	0.13	0.095	0.075	0.048	0.053	0.043	0.039	0.053	0.046	0.03	0.031	0.022	0.016	0.011	
	All		benzene	NA	NA	0.46	0.37	0.31	0.23	0.2	0.16	0.14	0.14	0.12	0.088	0.081	0.067	0.05	0.035	
			n-nonane	NA	NA	0.22	0.18	0.14	0.1	0.096	0.079	0.069	0.079	0.069	0.048	0.046	0.035	0.026	0.018	
			1,2,4-trimethylbenzene	NA	NA	0.14	0.11	0.096	0.071	0.061	0.05	0.044	0.043	0.037	0.028	0.025	0.02	0.015	0.011	
			2-ethyltoluene	NA	NA	0.11	0.089	0.074	0.055	0.047	0.039	0.034	0.034	0.03	0.022	0.02	0.016	0.012	<0.01	
			Northern Front Range	benzene	NA	NA	0.54	0.44	0.37	0.26	0.21	0.17	0.13	0.11	0.095	0.072	0.057	0.046	0.038	0.032
				n-nonane	NA	NA	0.18	0.14	0.12	0.086	0.068	0.054	0.043	0.036	0.031	0.023	0.018	0.015	0.012	0.011
1,2,4-trimethylbenzene				NA	NA	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.017	0.014	0.011	<0.01	<0.01	
18 to 59 Years	Garfield County: Ridge Top (BarD)	Development	n-nonane	NA	NA	2	1.6	1.3	0.98	0.76	0.61	0.52	0.45	0.39	0.29	0.23	0.14	0.17	0.13	
			benzene	NA	NA	1.8	1.4	1.2	0.91	0.71	0.57	0.48	0.32	0.28	0.26	0.21	0.15	0.15	0.12	
			m+p-xylene	NA	NA	0.84	0.68	0.57	0.42	0.33	0.27	0.22	0.19	0.17	0.12	0.098	0.063	0.072	0.055	
			1,2,4-trimethylbenzene	NA	NA	0.44	0.36	0.3	0.22	0.17	0.14	0.12	0.1	0.088	0.063	0.051	0.031	0.039	0.028	
			1,3,5-trimethylbenzene	NA	NA	0.44	0.35	0.29	0.21	0.17	0.13	0.11	0.099	0.087	0.062	0.05	0.03	0.038	0.028	
			2-ethyltoluene	NA	NA	0.41	0.33	0.27	0.2	0.16	0.13	0.11	0.092	0.081	0.059	0.048	0.038	0.033	0.026	
			1,2,3-trimethylbenzene	NA	NA	0.28	0.22	0.19	0.14	0.11	0.086	0.073	0.062	0.055	0.04	0.032	0.019	0.025	0.018	
			o-xylene	NA	NA	0.14	0.11	0.091	0.067	0.052	0.042	0.036	0.03	0.026	0.019	0.016	<0.01	0.011	<0.01	
			3-ethyltoluene	NA	NA	0.11	0.085	0.071	0.052	0.041	0.033	0.028	0.024	0.021	0.015	0.012	<0.01	<0.01	<0.01	

	Garfield County: Valley (Rifle)	All	benzene	NA	NA	0.56	0.45	0.38	0.28	0.22	0.18	0.14	0.11	0.096	0.076	0.06	0.048	0.041	0.035
			n-nonane	NA	NA	0.23	0.19	0.16	0.12	0.092	0.073	0.06	0.051	0.044	0.032	0.026	0.019	0.018	0.015
			1,2,4-trimethylbenzene	NA	NA	0.17	0.14	0.11	0.083	0.067	0.052	0.042	0.035	0.03	0.022	0.018	0.014	0.012	0.01
			2-ethyltoluene	NA	NA	0.13	0.1	0.087	0.064	0.051	0.04	0.033	0.027	0.023	0.017	0.014	0.011	<0.01	<0.01
		Development	n-nonane	NA	NA	2.3	1.7	1.4	0.89	0.98	0.8	0.72	0.97	0.84	0.56	0.57	0.41	0.3	0.2
			benzene	NA	NA	1.7	1.3	1.1	0.71	0.72	0.58	0.51	0.7	0.61	0.4	0.41	0.3	0.22	0.15
			m+p-xylene	NA	NA	0.95	0.71	0.56	0.37	0.41	0.33	0.3	0.39	0.34	0.23	0.23	0.16	0.12	0.082
			1,2,4-trimethylbenzene	NA	NA	0.53	0.4	0.32	0.2	0.22	0.18	0.16	0.22	0.2	0.13	0.13	0.093	0.068	0.048
			1,3,5-trimethylbenzene	NA	NA	0.53	0.4	0.32	0.2	0.22	0.18	0.16	0.22	0.2	0.13	0.13	0.094	0.067	0.048
			2-ethyltoluene	NA	NA	0.5	0.38	0.3	0.19	0.21	0.17	0.15	0.21	0.18	0.12	0.12	0.087	0.063	0.044
			1,2,3-trimethylbenzene	NA	NA	0.34	0.25	0.2	0.13	0.14	0.11	0.1	0.14	0.13	0.082	0.084	0.059	0.043	0.03
			o-xylene	NA	NA	0.16	0.12	0.093	0.06	0.066	0.054	0.048	0.065	0.057	0.038	0.039	0.027	0.02	0.014
			3-ethyltoluene	NA	NA	0.13	0.095	0.075	0.048	0.053	0.043	0.038	0.053	0.046	0.03	0.031	0.022	0.016	0.011
		All	benzene	NA	NA	0.46	0.37	0.31	0.23	0.2	0.16	0.14	0.14	0.12	0.088	0.081	0.067	0.05	0.035
			n-nonane	NA	NA	0.22	0.17	0.14	0.1	0.096	0.079	0.069	0.078	0.069	0.048	0.046	0.035	0.026	0.018
			1,2,4-trimethylbenzene	NA	NA	0.14	0.11	0.095	0.071	0.06	0.05	0.044	0.042	0.037	0.027	0.025	0.02	0.015	0.011
			2-ethyltoluene	NA	NA	0.11	0.089	0.074	0.055	0.047	0.039	0.034	0.034	0.03	0.022	0.02	0.016	0.012	<0.01
	Northern Front Range		benzene	NA	NA	0.54	0.44	0.37	0.26	0.21	0.17	0.13	0.11	0.095	0.072	0.057	0.046	0.038	0.032
			n-nonane	NA	NA	0.18	0.14	0.12	0.086	0.068	0.054	0.043	0.036	0.031	0.023	0.018	0.015	0.012	0.01
			1,2,4-trimethylbenzene	NA	NA	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.017	0.014	0.011	<0.01	<0.01
60+ Years	Garfield County: Ridge Top (BarD)	Development	n-nonane	NA	NA	2	1.6	1.3	0.98	0.76	0.61	0.52	0.45	0.39	0.29	0.23	0.14	0.17	0.13
			benzene	NA	NA	1.8	1.4	1.2	0.92	0.72	0.58	0.48	0.32	0.28	0.26	0.21	0.15	0.15	0.12
			m+p-xylene	NA	NA	0.84	0.68	0.57	0.42	0.33	0.27	0.22	0.19	0.17	0.12	0.099	0.063	0.072	0.055
			1,2,4-trimethylbenzene	NA	NA	0.45	0.36	0.3	0.22	0.17	0.14	0.12	0.1	0.089	0.064	0.052	0.031	0.039	0.028
			1,3,5-trimethylbenzene	NA	NA	0.44	0.35	0.29	0.21	0.17	0.13	0.11	0.099	0.087	0.062	0.051	0.03	0.038	0.028
			2-ethyltoluene	NA	NA	0.41	0.33	0.27	0.2	0.16	0.13	0.11	0.092	0.082	0.059	0.048	0.038	0.033	0.026
			1,2,3-trimethylbenzene	NA	NA	0.28	0.23	0.19	0.14	0.11	0.086	0.073	0.062	0.055	0.04	0.032	0.019	0.025	0.018
			o-xylene	NA	NA	0.14	0.11	0.091	0.067	0.052	0.042	0.036	0.03	0.026	0.02	0.016	<0.01	0.012	<0.01
			3-ethyltoluene	NA	NA	0.11	0.085	0.071	0.052	0.041	0.033	0.028	0.024	0.021	0.015	0.012	<0.01	<0.01	<0.01
		All	benzene	NA	NA	0.56	0.45	0.38	0.28	0.22	0.18	0.14	0.11	0.096	0.076	0.06	0.048	0.041	0.035
			n-nonane	NA	NA	0.23	0.19	0.16	0.12	0.092	0.073	0.06	0.051	0.044	0.032	0.026	0.019	0.018	0.015
			1,2,4-trimethylbenzene	NA	NA	0.17	0.14	0.11	0.083	0.067	0.052	0.042	0.035	0.03	0.022	0.018	0.014	0.012	0.01
			2-ethyltoluene	NA	NA	0.13	0.1	0.087	0.064	0.051	0.04	0.033	0.027	0.023	0.017	0.014	0.011	<0.01	<0.01
	Garfield County: Valley (Rifle)	Development	n-nonane	NA	NA	2.3	1.7	1.4	0.89	0.99	0.8	0.72	0.97	0.85	0.56	0.57	0.41	0.3	0.21
			benzene	NA	NA	1.7	1.3	1.1	0.71	0.72	0.58	0.51	0.7	0.61	0.4	0.41	0.3	0.22	0.15
			m+p-xylene	NA	NA	0.95	0.71	0.56	0.37	0.41	0.34	0.3	0.39	0.34	0.23	0.23	0.16	0.12	0.083
			1,2,4-trimethylbenzene	NA	NA	0.53	0.4	0.32	0.2	0.22	0.18	0.16	0.22	0.2	0.13	0.13	0.094	0.068	0.048

	All	1,3,5-trimethylbenzene	NA	NA	0.53	0.4	0.32	0.2	0.22	0.18	0.16	0.23	0.2	0.13	0.13	0.094	0.068	0.048
		2-ethyltoluene	NA	NA	0.5	0.38	0.3	0.19	0.21	0.17	0.15	0.21	0.18	0.12	0.12	0.087	0.063	0.045
		1,2,3-trimethylbenzene	NA	NA	0.34	0.26	0.2	0.13	0.14	0.11	0.1	0.14	0.13	0.082	0.084	0.059	0.043	0.03
		o-xylene	NA	NA	0.16	0.12	0.094	0.061	0.066	0.054	0.048	0.066	0.057	0.038	0.039	0.028	0.02	0.014
		3-ethyltoluene	NA	NA	0.13	0.095	0.075	0.048	0.053	0.043	0.039	0.053	0.046	0.03	0.031	0.022	0.016	0.011
		benzene	NA	NA	0.46	0.37	0.31	0.23	0.2	0.16	0.14	0.14	0.12	0.088	0.081	0.067	0.05	0.035
		n-nonane	NA	NA	0.22	0.18	0.14	0.1	0.096	0.079	0.07	0.079	0.069	0.048	0.046	0.035	0.026	0.018
		1,2,4-trimethylbenzene	NA	NA	0.14	0.11	0.096	0.071	0.061	0.05	0.044	0.043	0.037	0.028	0.025	0.02	0.015	0.011
		2-ethyltoluene	NA	NA	0.11	0.089	0.074	0.055	0.047	0.039	0.034	0.034	0.03	0.022	0.02	0.016	0.012	<0.01
		benzene	NA	NA	0.54	0.44	0.37	0.26	0.21	0.17	0.13	0.11	0.095	0.072	0.057	0.046	0.038	0.032
	Northern Front Range	n-nonane	NA	NA	0.18	0.14	0.12	0.086	0.068	0.054	0.043	0.036	0.031	0.023	0.018	0.015	0.012	0.011
		1,2,4-trimethylbenzene	NA	NA	0.13	0.11	0.089	0.064	0.05	0.04	0.032	0.027	0.023	0.017	0.014	0.011	<0.01	<0.01

Notes: Only showing chemicals with hazard quotients above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Chemicals are shown sorted from largest to smallest hazard quotients, within a given combination of age group, site, and activity. Entries for development activities in Northern Front Range are not shown because they last a total of less than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a subchronic assessment).

Table E-49. Percentage of Chronic Non-cancer Hazard Quotients, Across the Hypothetical Population, That are Above 1 during Activities in Sequence, by Distance from the 5-acre Development Well Pad/1-acre Production Pad

				Distance from Well Pad (feet)																
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	n-nonane	NA	NA	60%	42%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			benzene	NA	NA	52%	35%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Garfield County: Valley (Rifle)		n-nonane	NA	NA	71%	52%	32%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			benzene	NA	NA	52%	28%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
18 to 59 Years	Garfield County: Ridge Top (BarD)		n-nonane	NA	NA	60%	42%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			benzene	NA	NA	51%	35%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

60+ Years	Garfield County: Valley (Rifle)	n-nonane	NA	NA	71%	51%	32%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	benzene	NA	NA	51%	27%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Ridge Top (BarD)	n-nonane	NA	NA	58%	42%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Ridge Top (BarD)	benzene	NA	NA	49%	34%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	n-nonane	NA	NA	69%	49%	31%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)	benzene	NA	NA	49%	27%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing chemicals with hazard quotients above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Chemical are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Entries for development activities in Northern Front Range are not shown because they last a total of less than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a subchronic assessment).

Table E-50. Largest Chronic Non-cancer Hazard Indices for the Highest Exposed Hypothetical Individuals during Activities in Sequence, by Distance from the 5-acre Development Well Pad/1-acre Production Pad

Age Group	Site	Activity	Chemical or Critical-effect Group	Distance from Well Pad (feet)															
				150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	neurotoxicity	NA	NA	4.2	3.4	2.8	2.1	1.6	1.3	1.1	0.95	0.84	0.61	0.49	0.3	0.37	0.27
			hematological	NA	NA	2.9	2.4	2	1.5	1.2	0.94	0.78	0.58	0.51	0.43	0.35	0.23	0.25	0.19
			respiratory	NA	NA	1.2	1	0.83	0.61	0.47	0.38	0.32	0.28	0.25	0.18	0.14	0.085	0.11	0.078
			systemic	NA	NA	0.68	0.54	0.45	0.33	0.26	0.21	0.18	0.15	0.13	0.097	0.078	0.057	0.056	0.043
		All	hematological	NA	NA	0.85	0.69	0.58	0.43	0.34	0.27	0.22	0.18	0.15	0.12	0.091	0.072	0.063	0.053
			neurotoxicity	NA	NA	0.71	0.58	0.48	0.35	0.28	0.22	0.18	0.15	0.13	0.097	0.077	0.058	0.054	0.044
			respiratory	NA	NA	0.32	0.26	0.22	0.16	0.13	0.1	0.081	0.067	0.057	0.043	0.034	0.026	0.024	0.019
			systemic	NA	NA	0.18	0.15	0.12	0.092	0.073	0.058	0.046	0.039	0.033	0.025	0.02	0.016	0.014	0.011
	Garfield County: Valley (Rifle)	Development	neurotoxicity	NA	NA	4.9	3.7	2.9	1.9	2.1	1.7	1.5	2.1	1.8	1.2	1.2	0.87	0.63	0.44
			hematological	NA	NA	3.1	2.4	1.9	1.2	1.3	1.1	0.94	1.3	1.1	0.74	0.76	0.55	0.4	0.28
			respiratory	NA	NA	1.5	1.1	0.89	0.57	0.62	0.5	0.45	0.63	0.55	0.36	0.37	0.26	0.19	0.13
			systemic	NA	NA	0.81	0.61	0.49	0.31	0.34	0.27	0.25	0.34	0.3	0.2	0.2	0.14	0.1	0.073
		All	hematological	NA	NA	0.72	0.58	0.48	0.36	0.3	0.25	0.22	0.22	0.19	0.14	0.13	0.1	0.078	0.055
			neurotoxicity	NA	NA	0.64	0.51	0.42	0.3	0.28	0.23	0.2	0.21	0.19	0.13	0.12	0.098	0.072	0.051

18 to 59 Years	Northern Front Range		respiratory	NA	NA	0.28	0.22	0.18	0.14	0.12	0.098	0.085	0.087	0.076	0.055	0.051	0.041	0.03	0.021
			systemic	NA	NA	0.16	0.13	0.11	0.078	0.068	0.056	0.049	0.05	0.043	0.032	0.029	0.023	0.017	0.012
			hematological	NA	NA	0.76	0.62	0.51	0.37	0.29	0.23	0.19	0.16	0.13	0.1	0.08	0.064	0.053	0.045
			neurotoxicity	NA	NA	0.53	0.43	0.36	0.26	0.2	0.16	0.13	0.11	0.093	0.071	0.056	0.045	0.037	0.032
			respiratory	NA	NA	0.24	0.2	0.16	0.12	0.093	0.073	0.059	0.05	0.042	0.032	0.025	0.02	0.017	0.014
			systemic	NA	NA	0.14	0.11	0.092	0.066	0.052	0.041	0.033	0.028	0.024	0.018	0.014	0.012	<0.01	<0.01
	Garfield County: Ridge Top (BarD)	Development	neurotoxicity	NA	NA	4.2	3.4	2.8	2.1	1.6	1.3	1.1	0.95	0.83	0.61	0.49	0.3	0.37	0.27
			hematological	NA	NA	2.9	2.4	2	1.5	1.2	0.93	0.78	0.58	0.51	0.43	0.34	0.23	0.25	0.19
			respiratory	NA	NA	1.2	0.99	0.83	0.61	0.47	0.38	0.32	0.28	0.25	0.18	0.14	0.085	0.11	0.078
			systemic	NA	NA	0.68	0.54	0.45	0.33	0.26	0.21	0.18	0.15	0.13	0.096	0.078	0.057	0.056	0.043
		All	hematological	NA	NA	0.85	0.69	0.58	0.43	0.34	0.27	0.22	0.18	0.15	0.11	0.091	0.072	0.063	0.053
			neurotoxicity	NA	NA	0.71	0.58	0.48	0.35	0.28	0.22	0.18	0.15	0.13	0.097	0.077	0.057	0.054	0.044
			respiratory	NA	NA	0.32	0.26	0.22	0.16	0.13	0.1	0.08	0.067	0.057	0.043	0.034	0.026	0.024	0.019
			systemic	NA	NA	0.18	0.15	0.12	0.092	0.073	0.057	0.046	0.039	0.033	0.025	0.02	0.016	0.014	0.011
	Garfield County: Valley (Rifle)	Development	neurotoxicity	NA	NA	4.9	3.7	2.9	1.9	2.1	1.7	1.5	2.1	1.8	1.2	1.2	0.87	0.63	0.44
			hematological	NA	NA	3.1	2.4	1.9	1.2	1.3	1.1	0.94	1.3	1.1	0.74	0.76	0.55	0.4	0.28
			respiratory	NA	NA	1.5	1.1	0.89	0.57	0.62	0.5	0.45	0.63	0.55	0.36	0.37	0.26	0.19	0.13
			systemic	NA	NA	0.81	0.61	0.49	0.31	0.34	0.27	0.25	0.34	0.3	0.2	0.2	0.14	0.1	0.073
		All	hematological	NA	NA	0.72	0.58	0.48	0.36	0.3	0.25	0.22	0.22	0.19	0.14	0.13	0.1	0.077	0.055
			neurotoxicity	NA	NA	0.64	0.51	0.42	0.3	0.27	0.23	0.2	0.21	0.19	0.13	0.12	0.098	0.072	0.051
			respiratory	NA	NA	0.28	0.22	0.18	0.14	0.12	0.098	0.085	0.087	0.076	0.055	0.051	0.041	0.03	0.021
			systemic	NA	NA	0.16	0.13	0.11	0.078	0.068	0.056	0.049	0.05	0.043	0.032	0.029	0.023	0.017	0.012
	Northern Front Range		hematological	NA	NA	0.75	0.62	0.51	0.37	0.29	0.23	0.19	0.16	0.13	0.1	0.079	0.064	0.053	0.045
			neurotoxicity	NA	NA	0.53	0.43	0.36	0.26	0.2	0.16	0.13	0.11	0.093	0.071	0.055	0.045	0.037	0.032
			respiratory	NA	NA	0.24	0.2	0.16	0.12	0.092	0.073	0.059	0.05	0.042	0.032	0.025	0.02	0.017	0.014
			systemic	NA	NA	0.13	0.11	0.092	0.066	0.052	0.041	0.033	0.028	0.024	0.018	0.014	0.012	<0.01	<0.01
60+ Years	Garfield County: Ridge Top (BarD)	Development	neurotoxicity	NA	NA	4.2	3.4	2.8	2.1	1.6	1.3	1.1	0.95	0.84	0.61	0.49	0.3	0.37	0.27
			hematological	NA	NA	2.9	2.4	2	1.5	1.2	0.94	0.78	0.58	0.51	0.43	0.35	0.23	0.25	0.19
			respiratory	NA	NA	1.2	1	0.83	0.61	0.47	0.38	0.32	0.28	0.25	0.18	0.14	0.085	0.11	0.078
			systemic	NA	NA	0.68	0.54	0.45	0.33	0.26	0.21	0.18	0.15	0.13	0.097	0.078	0.057	0.056	0.043
		All	hematological	NA	NA	0.85	0.69	0.58	0.43	0.34	0.27	0.22	0.18	0.15	0.12	0.091	0.072	0.063	0.053
			neurotoxicity	NA	NA	0.71	0.58	0.48	0.35	0.28	0.22	0.18	0.15	0.13	0.097	0.077	0.058	0.054	0.044
			respiratory	NA	NA	0.32	0.26	0.22	0.16	0.13	0.1	0.081	0.067	0.057	0.043	0.034	0.026	0.024	0.019
			systemic	NA	NA	0.18	0.15	0.12	0.092	0.073	0.058	0.046	0.039	0.033	0.025	0.02	0.016	0.014	0.011
	Garfield County: Valley (Rifle)	Development	neurotoxicity	NA	NA	4.9	3.7	2.9	1.9	2.1	1.7	1.5	2.1	1.8	1.2	1.2	0.87	0.63	0.44
			hematological	NA	NA	3.1	2.4	1.9	1.2	1.3	1.1	0.94	1.3	1.1	0.74	0.76	0.55	0.4	0.28
			respiratory	NA	NA	1.5	1.1	0.89	0.57	0.62	0.5	0.45	0.63	0.55	0.36	0.37	0.26	0.19	0.13
			systemic	NA	NA	0.81	0.61	0.49	0.31	0.34	0.27	0.25	0.34	0.3	0.2	0.2	0.14	0.1	0.073

	All	systemic	NA	NA	0.81	0.61	0.49	0.31	0.34	0.27	0.25	0.34	0.3	0.2	0.2	0.14	0.1	0.073
		hematological	NA	NA	0.72	0.58	0.48	0.36	0.31	0.25	0.22	0.22	0.19	0.14	0.13	0.1	0.078	0.055
		neurotoxicity	NA	NA	0.64	0.51	0.42	0.3	0.28	0.23	0.2	0.21	0.19	0.13	0.12	0.098	0.072	0.051
		respiratory	NA	NA	0.28	0.22	0.18	0.14	0.12	0.098	0.085	0.087	0.076	0.055	0.051	0.041	0.03	0.021
		systemic	NA	NA	0.16	0.13	0.11	0.078	0.068	0.056	0.049	0.05	0.044	0.032	0.029	0.023	0.017	0.012
		hematological	NA	NA	0.76	0.62	0.51	0.37	0.29	0.23	0.19	0.16	0.13	0.1	0.08	0.064	0.053	0.045
		neurotoxicity	NA	NA	0.53	0.43	0.36	0.26	0.2	0.16	0.13	0.11	0.093	0.071	0.056	0.045	0.037	0.032
		respiratory	NA	NA	0.24	0.2	0.16	0.12	0.093	0.073	0.059	0.05	0.042	0.032	0.025	0.02	0.017	0.014
	Northern Front Range	systemic	NA	NA	0.14	0.11	0.092	0.066	0.052	0.041	0.033	0.028	0.024	0.018	0.014	0.012	<0.01	<0.01
		hematological	NA	NA	0.76	0.62	0.51	0.37	0.29	0.23	0.19	0.16	0.13	0.1	0.08	0.064	0.053	0.045
		neurotoxicity	NA	NA	0.53	0.43	0.36	0.26	0.2	0.16	0.13	0.11	0.093	0.071	0.056	0.045	0.037	0.032
		respiratory	NA	NA	0.24	0.2	0.16	0.12	0.093	0.073	0.059	0.05	0.042	0.032	0.025	0.02	0.017	0.014

Notes: Only showing critical-effect groups with hazard indices above 0.1. Shading used to differentiate values above 10 (darker blue with white font), values between 1 and 10 (medium blue), values 0.1 to 1 (light blue), and values below 0.1 (gray). Critical-effect groups are shown sorted from largest to smallest hazard indices, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Entries for development activities in Northern Front Range are not shown because they last a total of less than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a subchronic assessment).

Table E-51. Percentage of Chronic Non-cancer Hazard Indices, Across the Hypothetical Population, That are Above 1 during Activities in Sequence, by Distance from the 5-acre Development Well Pad/1-acre Production Pad

				Distance from Well Pad (feet)																
Age Group	Site	Activity	Chemical or Critical-effect Group	150	250	300	350	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	
Up to 17 Years	Garfield County: Ridge Top (BarD)	Development	neurotoxicity	NA	NA	93%	87%	80%	64%	44%	26%	6%	0%	0%	0%	0%	0%	0%	0%	
			hematological	NA	NA	81%	72%	61%	38%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	21%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	97%	91%	83%	59%	65%	49%	40%	64%	56%	16%	19%	0%	0%	0%	
			hematological	NA	NA	85%	73%	59%	21%	26%	1%	0%	25%	10%	0%	0%	0%	0%	0%	
			respiratory	NA	NA	39%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
18 to 59 Years	Garfield County: Ridge Top (BarD)		neurotoxicity	NA	NA	93%	87%	79%	64%	44%	26%	6%	0%	0%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	81%	71%	61%	38%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			respiratory	NA	NA	21%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley		neurotoxicity	NA	NA	97%	90%	82%	58%	65%	49%	40%	64%	55%	16%	19%	0%	0%	0%	0%
			hematological	NA	NA	84%	72%	58%	21%	25%	1%	0%	25%	10%	0%	0%	0%	0%	0%	0%

	(Rifle)		respiratory	NA	NA	39%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60+ Years	Garfield County: Ridge Top (BarD)		neurotoxicity	NA	NA	91%	85%	78%	62%	44%	25%	6%	0%	0%	0%	0%	0%	0%
			hematological	NA	NA	79%	70%	59%	37%	11%	0%	0%	0%	0%	0%	0%	0%	0%
			respiratory	NA	NA	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Garfield County: Valley (Rifle)		neurotoxicity	NA	NA	95%	88%	79%	57%	63%	47%	40%	62%	53%	16%	19%	0%	0%
			hematological	NA	NA	82%	71%	57%	21%	25%	1%	0%	24%	10%	0%	0%	0%	0%
			respiratory	NA	NA	39%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Notes: Only showing critical-effect groups with hazard indices above 1. Shading used to differentiate higher values (darker oranges) from lower values (lighter greens) and from values of 0 (gray). Critical-effect groups are shown sorted from largest to smallest percentage, within a given combination of age group, site, and activity. Some chemicals could not be assigned to any chronic critical-effect group (see Appendix D). Entries for development activities in Northern Front Range are not shown because they last a total of less than 1 year in the 5-acre development scenario with many wells being developed (so we defer to a subchronic assessment).



Residential noise from nearby oil and gas well construction and drilling

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Abstract

Public concern about oil and gas (O&G) operations in residential areas is substantial. Noise from construction and drilling related to O&G operations may be greater than other phases of O&G operations; yet the impacts of audible and low-frequency noise during these operations are not extensively explored nor the effects on health well understood. This study documents the noise levels at a multi-well O&G well pad during construction and drilling in a residential area in Colorado. A-weighted (dBA) and C-weighted (dBC) noise measurements were collected at four locations during development over a 3-month period. The maximum 1-min equivalent continuous sound levels over a 1-month period were 60.2 dBA and 80.0 dBC. Overall, 41.1% of daytime and 23.6% of nighttime dBA 1-min equivalent continuous noise measurements were found to exceed 50 dBA, and 97.5% of daytime and 98.3% of nighttime measurements were found to exceed 60 dBC. Noise levels exceeding 50 dBA or 60 dBC may cause annoyance and be detrimental to health; thus, these noise levels have the potential to impact health and noise levels and associated health effects warrant further investigation.

Keywords Oil and gas operations · Drilling · Construction · Noise · Low-frequency noise · Sound · Health

Introduction

Oil and gas (O&G) development and operations has increasingly occurred near populated areas and has raised public health concerns [1–4]. Research near O&G sites to date has largely focused on chemical emissions from these sites or the potential risks and health effects in nearby populations [5–11]. While noise from O&G operations has been raised as a potential public health concern for communities near these sites [1, 4, 12, 13], the levels of audible and low-frequency noise during O&G operations in residential areas are not well documented in the peer-reviewed scientific literature.

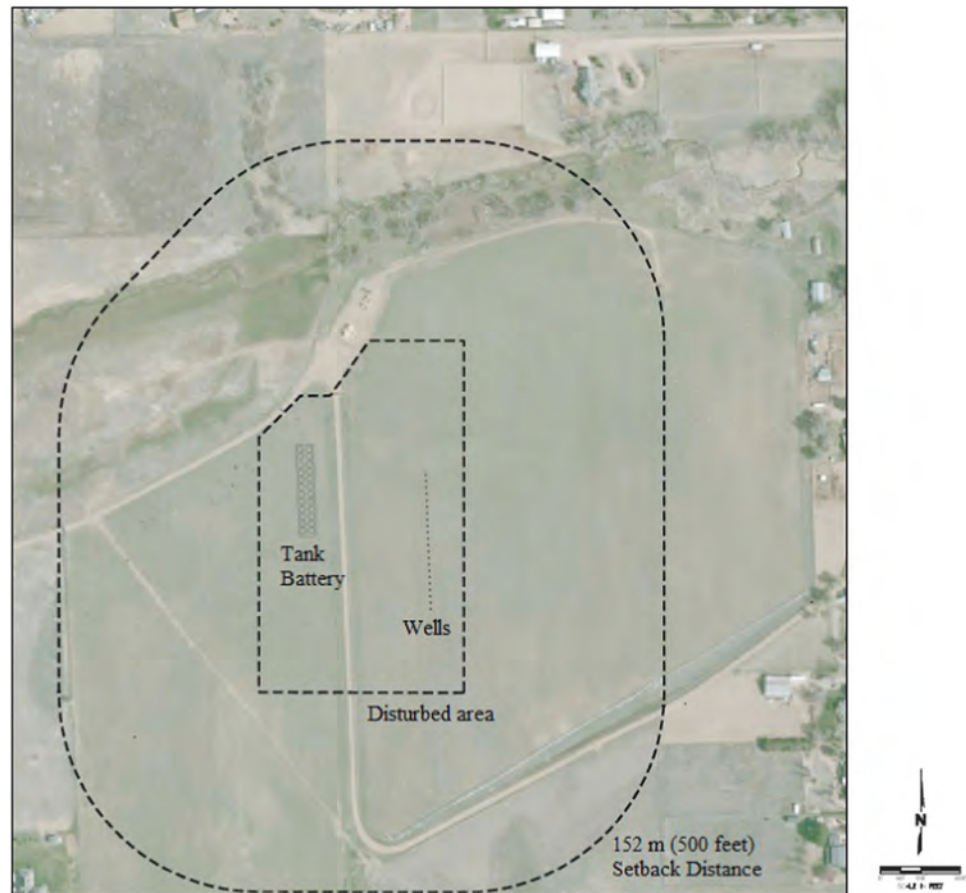
Noise is generated during all stages of the O&G well development and operation life cycle (i.e., exploration, well development, production, and site decommissioning) and can come from numerous sources such as trucks, heavy

equipment, generators, compressors, and gas flaring [1]. For example, in Garfield County, Colorado, audible noise levels at a distance of 1000 ft (304.8 m) were reported to be 69 A-weighted decibels (dBA) during drilling operations [12]. Low-frequency noise is also present during O&G operations [14, 15]. Low-frequency noise is measured using C-weighted decibels (dBC) and can measure audible noise in addition to the perception of pressure [16]. Boyle et al. (2017) found the nighttime C-weighted noise levels to be more than 15 dB greater than A-weighted noise levels for some homes near a compressor station, indicating increased potential exposure to low-frequency noise. Radtke et al. (2017) reported a mean noise level of 80 (SD = 2.1) dBC during hydraulic fracturing with operations running at full capacity without a sound wall. At present, we lack an understanding of the impacts of low-frequency noise levels from O&G operations in urban areas or the effect of incorporating best management practices, which can include noise mitigation by adding sound controls to equipment, constructing a sound wall, and using noise absorbing material [4]. Low-frequency noise and the impacts of mitigation approaches have been evaluated at O&G operations and this previous research has shown that the levels based on testing at isolated areas without outside sound interference and the presence of a sound wall would

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Fig. 1 : Map of location. The map highlights the proposed location of the wells, tank battery, area disturbed from well pad development, and the regulatory setback buffer



be of concern if these operations were near homes [14]. Still, the levels and public health implications of audible and low-frequency noise levels from the various stages occurring during O&G operations are not well understood. Public complaints and health concerns from increased noise are a common issue at many O&G operation sites. For example, between 35 and 55% of survey respondents in the Marcellus Shale region reported noise pollution as a stressor from O&G operations and development [17]. In the State of Colorado, noise was reported to be responsible for 10.4% of the complaints sent by the public to the Colorado Oil and Gas Conservation Commission from November 2001 to June 2013 (COGCC) [18]. More recently, 123 out of 330 (37.3%) complaints received by the COGCC in 2015 were related to noise [19], demonstrating that public concern from the noise related to O&G operations is likely increasing.

In Colorado, the COGCC regulates noise from O&G operations [20]. COGCC Rule 802 states that the maximum permissible noise level is not to exceed 55 dBA during daytime hours (7 am to 7 pm) and 50 dBA during nighttime hours (7 pm to 7 am) at 350 ft (106.7 m) from the noise source in residential, agricultural, and rural zones. COGCC Rule 802.b(1) increases the maximum permissible noise

levels to 80 or 70 dBA during daytime and 75 or 65 dBA during nighttime, varying based on the distance of the nearest building unit, “for pipeline or gas facility installation or maintenance, or the use of a drilling rig, completion rig, workover rig, or stimulation.” Furthermore, during the daytime, the permitted A-weighted noise levels may be increased by 10 dB for up to 15 min in a 1-h period. For low-frequency noise, levels greater than 65 dBC require the operator to send a low-frequency noise impact analysis to the COGCC that identifies any reasonable noise control measures.

While there is relatively little research on residential exposures and health concerns due to noise at O&G sites, several studies have documented health effects from noise exposure from other sources, such as traffic, wind turbines, airports, and railways. These studies indicate that noise starting at in the 50–55 dbA range can cause annoyance, nausea, and headaches, disturb sleep, impair cognitive performance, and is associated with an increased incidence of arterial hypertension, arterial stiffness, myocardial infarction, and stroke [16, 21–25]. For example, exposure to railway noise exceeding 50 dBA is related to an increased risk of cardiovascular diseases [26]; traffic noise in the range of 45–75 dBA was positively associated with

hypertension per 5 dBA increase [27]; and the relative risk of coronary heart disease increased with every 10 dBA increase in weighted day–night traffic noise levels between 52 and 77 dBA [28]. Exposure to low-frequency noise may cause issues such as stress, fatigue, nausea, headache, and sleep disturbance [24, 25, 29]. For low-frequency noise levels, 60 dBC is recommended (65 dBC maximum) for continuous operations in residential areas to minimize health concerns and issues [16]. Furthermore, if the fluctuation in dBC levels are substantial (± 5 dBC), the low-frequency noise criteria should be reduced by 5 dBC, to 55 dBC, to minimize health impacts from low-frequency noise [16].

This study measured and evaluated A-weighted and C-weighted noise levels during construction and well drilling at a 22 O&G well pad in a residential area of Greeley, Colorado USA. To the best of our knowledge, this is the first study evaluating residential audible and low-frequency noise levels during petroleum drilling activities; drilling is often considered to have greater noise levels than other O&G operations, such as production [4]. Our objective was to compare measured noise levels around a multi-well pad to regulatory levels and noise levels that are documented in the literature to have potential for detrimental effects such as annoyance, sleep disturbance, headaches, nausea, or increased cardiovascular risk.

Materials and methods

Site information

We conducted noise monitoring at four residences located between 320 m (1049.9 ft) and 550 m (1804.5 ft) from the center of a large multi-well O&G site (Fig. 1) between February and April 2017. The site is permitted for 22 wells, 22 oil tanks, 22 separators, 4 vapor recovery units, 2 water tanks, 3 modular large volume tanks, and 2 lease automatic custody transfer units [30]. The well pad site, with the expected location of the wells, tank battery, area of disturbance from well pad construction, and 152.4 m (500 ft) setback buffer, is shown in Fig. 1 [30].¹ The dates when the drilling commenced for the location and wells at the site ranged between 29 November 2016 and 23 February 2017; therefore, our sampling period was during a period of well pad construction and drilling activity. The operations at this site used sound mitigation best management practices including the use of a sound wall that is 32 ft in height surrounding the site and use of electronic or modern low-noise equipment [30].

¹ The exact location of noise sampling is not shown to protect the identity of the property owners.

Sound level meter measurements

Noise monitoring was conducted at four residential locations: one each to the south, east, northeast, and northwest of the site. Landowner permission was obtained to access the sites. The locations were confirmed at each subsequent date using a Garmin (Schaffhausen, Switzerland) eTrex VentureCx handheld global positioning system (GPS). The SLM measurements were conducted to exclude other noise sources to evaluate the noise specifically from the O&G operations, rather than from other industrial or community sources, such as the trucking activity from this site. Therefore, when using the SLM, if nearby intermittent community or city noises (e.g., barking dogs, lawn mowers, vehicles/trucks) were encountered during sampling, the researchers waited for those intermittent noises to stop before proceeding with their measurements.

A-weighted and C-weighted noise levels were recorded using a Larson Davis Sound Expert LxT1-SE-FF Sound Level Meter (SLM; Depew, New York) with a PRMLXT1L preamplifier, 377B02 microphone, and a WS001 3.5-inch diameter windscreen. The SLM was calibrated by the manufacturer prior to data collection and re-calibrated before and after each sampling date using a Larson Davis CAL200 set at 114 dBA. The SLM was mounted on a portable tripod and raised to approximately 1.4 m (4.6 ft) off the ground during measurement. Three 5-s measurements of the sound pressure level were taken at each location and the arithmetic average of these three measurements was used. The SLM measurements were collected at the same time as the continuous noise measurement maintenance visits. Noise measurements with a corresponding hourly or gust wind speeds of less than 16.1 kilometers per hour (10 mph) were included in the final data set; all other data were omitted [14]. Wind speed data were obtained from a nearby weather station from wunderground.com and noise measurements were matched with the nearest documented wind speed measurement. A total of 42 dBA and 40 dBC measurements were included in the 5 s SLM results.

Continuous noise measurements

Continuous noise measurements were conducted at the same four locations surrounding the well pad during the same period and location as the SLM measurements. Data were collected for approximately 1 month at the South and East locations from 27 January 2017 to 24 February 2017 and for 2 months at the Northeast and Northwest sites from 24 February 2017 to 24 April 2017.

Noise measurements were collected with Larson Davis (Depew, NY) Spark 703+ and Spark 706RC dosimeters each with a detachable 10.6 mm microphone/preamp with integrated 1 m cable (MPR001) and a windscreen. Noise

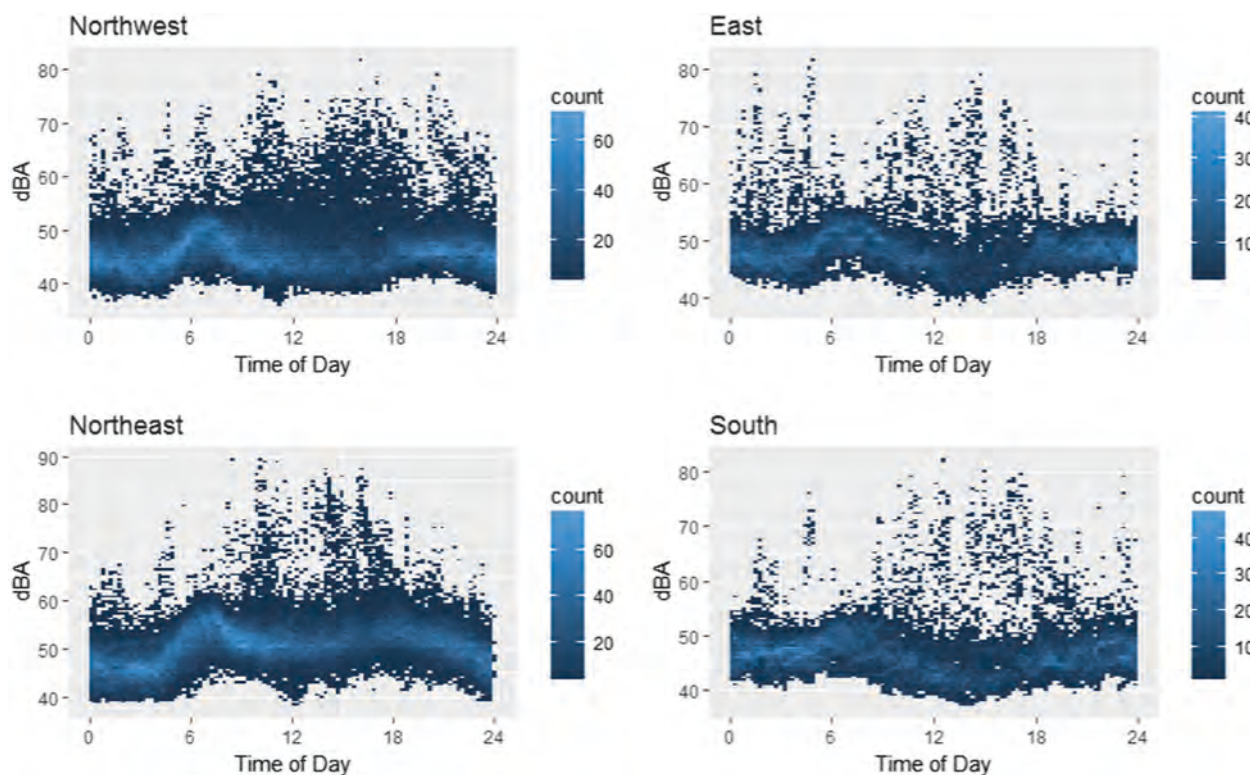


Fig. 2 Heat density of 1-min noise results for A-weighted noise data by time of day. A lighter shade is a greater count of values

measurements were recorded as the 1-min equivalent continuous noise level. The dosimeters were calibrated prior to deployment and were factory calibrated in November 2016. The dosimeter microphones were mounted 1.3 m from the ground and oriented towards the well pad site. Noise was not measured for short periods (30 min to an hour) during data downloads and equipment maintenance, which occurred every three to four days. A total of 244,584 dBA and 250,158 dBC 1-min noise measurements were recorded. Similar to the 5 s measurements, noise measurement with a corresponding average or gust speed greater than 16.1 kilometers per hour were omitted from our data analysis. As a result, 173,521 dBA (70.9% of the total) and 176,969 dBC (70.7% of the total) measurements were included in the analysis.

To consider the difference in day and night noise levels, measurements were divided at the benchmarks described in the COGCC regulations: daytime levels were considered from 7 am to 7 pm and nighttime levels were those between 7 pm and 7 am [20]. The noise levels at the various times in Figs. 2 and 3 were calculated using R v3.2.2 [31] and the ggplot2 package [32].

Comparison to health endpoints and COGCC rules

We used a 50 dBA threshold as a benchmark for all noise measurements regardless of time of day, which is the low end of noise levels that may cause adverse health effects,

such as increased risk of cardiovascular diseases and hypertension [26, 27]. For low-frequency noise we used the 60 dBC benchmark for operations with continuous daytime and nighttime noise recommended to minimize known health impacts, such as nausea and headaches [16]. As we do not know the exact equipment operating at any given moment on the site, we also used the COGCC Rule 802 residential guidelines, which specify a maximum permissible level of 55 dBA during daytime and 50 dBA at night [20]. A noise level less than or equal to 55 dBA is also the US Environmental Protection Agency outdoor level recommended to prevent annoyance and activity disruption [33]. For low-frequency noise, we used the C-weighted noise level that would initiate a noise investigation, which is 65 dBC [20].

Statistics

We calculated the A-weighted and C-weighted average equivalent continuous sound level for the time period of interest ($L_{eq,T}$) using the following:

$$L_{eq,T} = 10 \log_{10} \left(\frac{1}{N} \sum^1 10^{0.1 L_{eq}} \right)$$

where N is the number of 1-min intervals and L_{eq} is the measured sound level over the 1-min time period [34, 35].

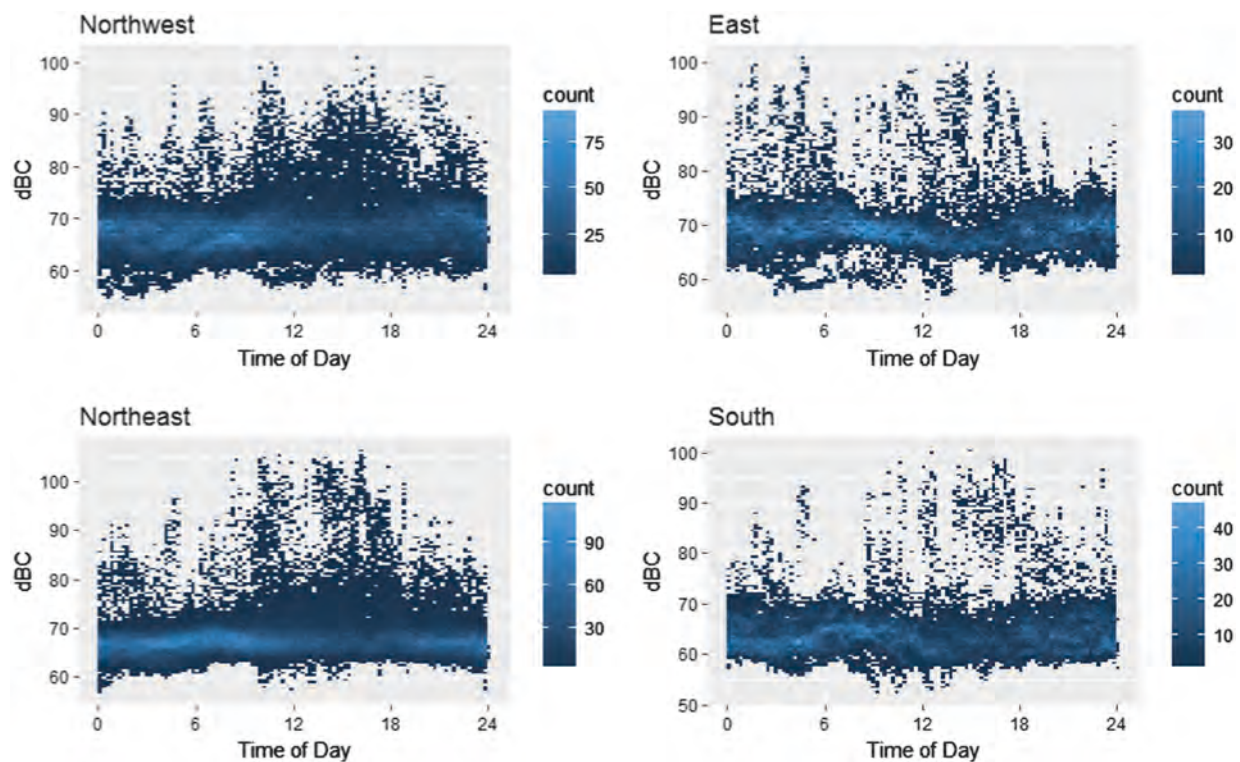


Fig. 3 Heat density of 1-min noise results for C-weighted data by time of day. A lighter shade is a greater count of values

Table 1 Short-term sound level meter 5-s data for A-weighted and C-weighted noise levels at the four locations

Location	East		South		Northeast		Northwest	
Weight	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC
Count ^a	7	7	8	8	13	12	14	13
Minimum	43.2	59.8	34.8	58.5	41.7	62.3	42.2	63
Median	45.4	66.2	40.4	62.1	50	65.9	45.2	65.6
Maximum	50	68.1	50.1	67.6	59.8	82	50.8	76.7

^aCount includes the number of 5 s noise measurements taken at each site over a 3-month period after omitting the data with high wind

We used the absolute difference between decibel levels when describing the difference between recorded or equivalent continuous noise measurements values.

Results

The summary of the results of the periodic three 5 s A-weighted and C-weighted SLM daytime noise level measurement at the four sampling locations are shown (Table 1). These measurements were taken during time periods without outside community noise or noise from

traffic or trucking associated with the O&G operations. The median audible noise measurements ranged from 40.4 dBA at the South location to 50 dBA at the Northeast location. The median low-frequency noise levels ranged from 62.1 dBC at the South location to 66.2 dBC at the East location. The maximum A-weighted noise measurement was 59.8 dBA at the Northeast location and the maximum C-weighted noise measurement was 82 dBC at the Northeast location.

The summary of the results from the monthly continuous noise monitoring are shown for A-weighted (Table 2) and C-weighted (Table 3) noise levels. The monthly equivalent continuous levels ranged from 51.5 dBA at the northwest location to 60.2 dBA at the northeast location. The median levels were similar to arithmetic means and variance across locations were similar. The minimum 1-min equivalent continuous level recorded was 35.9 dBA and the maximum 1-min equivalent continuous noise measurement was 89.2 dBA. The low-frequency monthly equivalent continuous noise measurements ranged from 73.1 dBC at the northwest location to 80.0 dBC at the northeast location. The minimum observed 1-min equivalent continuous noise level was 52.4 dBC and the maximum was 106.4 dBC.

The percentage of 1-min noise measurements over levels of concern are also shown by location for dBA (Table 2) and dBC (Table 3). The maximum percentage of

Table 2 Summary statistics for the 1-min A-weighted noise levels collected at varying distances around an oil and gas production site measured over 3 months

	East	South	Northeast Visit 1	Northwest Visit 1	Northeast Visit 2	Northwest Visit 2
Dates	1 Jan 2017 to 24 Feb 2017	1 Jan 2017 to 24 Feb 2017	24 Feb 2017 to 24 Mar 2017	24 Feb 2017 to 24 Mar 2017	24 Mar 2017 to 24 Apr 2017	24 Mar 2017 to 24 Apr 2017
Count of included 1-min measurements ^a	22,742	26,239	30,343	30,234	32,017	31,946
Count of measurements excluded due to wind	11,913	14,030	9,803	9,912	12,737	12,668
Minimum (dBA)	38.4	37.2	38.3	35.9	38.8	37.0
Arithmetic average (dBA)	48.7	47.0	50.5	46.3	51.1	46.8
Equivalent continuous sound level (L_{eq}) (dBA)	54.6	54.2	60.2	51.5	57.8	53.5
Median (dBA)	48.2	46.6	50.4	45.8	50.9	45.8
Standard deviation (dBA)	4.3	4.5	5.3	4.1	4.8	5.1
Maximum (dBA)	81.5	82.0	89.2	79.2	87.4	81.7
Percentage of measurements >50 (day)	30.2%	17.6%	71.2%	13.9%	77.5%	27.5%
Percentage of measurements >55 (day)	7.4%	5.9%	19.3%	5.0%	24.2%	11.1%
Percentage of measurements >50 (night)	24.4%	13.9%	36.2%	11.5%	42.8%	11.6%

^aOnly includes data when hourly average wind speed or wind gust speed is less than 10 mph

measurements found to exceed 50 dBA was 77.5% during the day and 42.8% during the night, both occurring at the Northeast location during the second visit. During the day, the maximum percentage of measurements that exceeded 55 dBA was 24.2%, also at the Northeast location. For low-frequency noise, 100% of the measurements were found to exceed 60 dBC for both day and night measurements at the Northeast location during visit 2. More than 98% of the measurements during the day and night at the east, northeast, and northwest locations were greater than 60 dBC.

Across all locations from the 3-month period, 41.1% of daytime and 23.6% of nighttime 1-min equivalent continuous noise measurements exceeded 50 dBA and 12.7% of daytime and 4.5% of nighttime measurements exceeded 55 dBA. For low-frequency noise, 97.5% of daytime and 98.3% of nighttime measurements exceeded 60 dBC and 80.0% of daytime and 78.8% of nighttime measurements exceeded 65 dBC.

A time series of daily dosimeter A-weighted and C-weight noise level readings are shown for each of the four locations in Fig. 2 and Fig. 3, respectively. For each location, A-weighted noise increased in the morning, between 7 am to 8 am, decreased around 11 am, and a second increase was observed again around 4 pm (16:00). The C-weighted noise level results follow a similar pattern as the A-weighted noise levels; however, the peaks are less pronounced.

Discussion

This study measured and evaluated continuous audible and low-frequency noise levels during O&G well pad construction and drilling in a residential area. The monthly equivalent continuous noise levels were as low as 51.5 dBA and 73.1 dBC and as high as 60.2 dBA and 80.0 dBC. This work advances the literature on the environmental noise from O&G operations by collecting continuous 1-min A-weighted and C-weighted noise level data over a 3-month time period. The data were collected during construction and drilling of a large, multi-well pad in a residential area, a phenomenon that is increasingly common in the US as O&G development transitions towards larger operations on fewer pads, especially in more populated areas.

The maximum and monthly equivalent continuous A-weighted noise measurement results are of note because they are in excess of the 50 dBA threshold that may cause adverse health effects, such as increased risk of cardiovascular diseases and hypertension [26, 27]. The low-frequency noise levels we observed are of concern as they often exceeded the level of 60 dBC recommended to minimize impacts such as nausea and headaches [16]. The equivalent continuous noise measurement levels recorded at the northeast location were 60.2 dBA and 80.0 dBC from 24 February 2017 to 27 March 2017, which significantly exceeds the 50 dBA and 60 dBC recommended levels. Also, 41.1% of daytime and 23.6% of nighttime dBA 1-min

Table 3 Summary statistics for the 1-min C-weighted noise levels collected at varying distances around an oil and gas production site measured over 3 months

	East	South	Northeast Visit 1	Northwest Visit 1	Northeast Visit 2	Northwest Visit 2
Dates	1 Jan 2017 to 24 Feb 2017	1 Jan 2017 to 24 Feb 2017	24 Feb 2017 to 24 Mar 2017	24 Feb 2017 to 24 Mar 2017	24 Mar 2017 to 24 Apr 2017	24 Mar 2017 to 24 Apr 2017
Count of included 1-min measurements ^a	26,187	26,241	30,333	30,219	32,026	31,963
Count of measurements excluded due to wind	14,032	14,026	9,813	9,927	12,728	12,663
Minimum (dB(C))	56.2	52.4	57.1	56.9	59.6	54.5
Arithmetic average (dB(C))	69.7	64.4	67.9	68.5	68.7	68.3
Equivalent continuous sound level (L_{eq}) (dB(C))	77.3	73.8	80.0	73.1	78.2	74.6
Median (dB(C))	69.1	63.6	67.0	68.2	67.6	67.4
Standard deviation (dB(C))	4.9	4.9	4.9	3.9	4.8	5.3
Maximum (dB(C))	100.9	100.3	105.5	99.0	106.4	100.8
Percentage of measurements >60 (day)	99.1%	86.7%	99.9%	98.4%	100.0%	99.2%
Percentage of measurements >65 (day)	91.8%	33.6%	87.2%	85.0%	95.6%	79.3%
Percentage of measurements >60 (night)	98.7%	91.4%	99.8%	100.0%	100.0%	99.6%
Percentage of measurements >65 (night)	90.1%	35.1%	83.0%	87.9%	80.1%	93.1%

^aOnly includes data when hourly average wind speed or wind gust speed is less than 10 mph

equivalent continuous noise measurements were found to exceed 50 dBA and 97.5% of daytime and 98.3% of nighttime measurements were found to exceed 60 dBC. As the review by Basner et al. (2014) notes, nighttime average outdoor noise levels between 40 and 55 dBA are associated with adverse health effects, which highlights the long-term impact of continuously operating O&G sites. The low-frequency noise from O&G operations are at levels that may cause the common symptoms reported by individuals who reside in close proximity to O&G operations, such as sleep disturbance and headaches [11].

The 5-s SLM data were collected to explore the short-term noise levels without background noise or noise from nearby trucking activity. These results were collected in person so that the noise levels were attributable to the well pad alone and the methods more closely align with the shorter-term data collection often used to evaluate industrial noise levels. The maximum SLM measurements were 59.8 dBA at the Northeast location and 82 dBC at the Northeast location, which also exceed associated health concerns. Overall, the SLM values reported are indicative of the noise directly attributable to the O&G operations during the construction and drilling of this well pad.

The results of the operator's baseline noise test at this site conducted on 11 November 2016 found a 42.8 dBA and 55.8 dBC average noise level over a midday 1-h period with calm wind (Session Report 12/20/2016, downloaded from

COGIS). The operator baseline levels were recorded at the south end of the site, approximately 40 ft from the nearest home. Our monthly equivalent continuous noise measurement results indicate an increase of between 8.7 to 17.4 dBA and 17.3 to 24.2 dBC over the operator's 1-h baseline measurement, depending on the time and location. Thus, the noise levels increased substantially over the baseline measure during the well pad construction and drilling. While there may be some differences between the operator's baseline noise measured at the well pad site and the noise levels recorded at our monitoring sites near homes, the operator's baseline measurements are likely a good approximation of baseline noise at four monitoring locations in this residential area.

The site we studied incorporated numerous best management practices for noise reduction. Their sound mitigation best management practices included: (1) 9.75 m (32 ft.) sound walls around the perimeter of the location during drilling and completion; (2) compliance with the municipal noise regulations (which includes requirements such as venting exhaust away from occupied buildings and special mitigation strategies for sensitive areas such as near schools and hospitals); (3) use of electric or modern low-noise diesel to power equipment; (4) continuous monitoring of noise by the operator; (5) completion of a baseline noise study; and (6) the operator to remedy sound levels exceeding 65 dBC measured from the nearest building unit within 48 h [30].

We find that the use of these best management practices was not sufficient to reduce noise levels to those below the operator find that the use of these best management practices was not sufficient to reduce noise levels to those below the operator proposed levels or levels associated with potential health concerns in the scientific literature.

Previous research evaluating noise under maximum operating conditions in unpopulated areas found all drilling, hydraulic fracturing, and completion at O&G sites to have noise levels greater than 65 dBC at locations with and without sound walls [14]. Based on our results, the dBC levels around this O&G operations site were also consistently greater than 65 dBC. For example, 93.1% of the nighttime measurements were found to exceed 65 dBC at the Northwest location from 24 March 2017 to 24 April 2017. Yet, the direct comparison of studies relating to noise from O&G operations is challenging due to the varying site equipment and operations, sound mitigation practices in place, and the presence of other community noise sources.

This study has several features that are improvements over existing studies, including long-term noise measurements at multiple locations and the simultaneous measurement of both low- and high-frequency noise. The continuous noise measurements demonstrate the environmental noise levels in this residential area from all activities, including from other community noises and trucking activity commonly associated with O&G development, were well into the range thought to affect health. Trucking activity at this site was reported as a concern to the COGCC by residents [30]. The concerns reported by community members near this location confirm that the noise levels from O&G trucking activity may be considered a nuisance for those residing near these operations and have the potential to cause stress, annoyance, sleep disruption, and cardiovascular impacts. Furthermore, the comparison of the 3 months of noise levels to the operator's baseline data collected from this site highlight the relevance and usefulness of the continuous noise data. Through the use of 1-min noise data collected continuously over a month at each location, which is over a much longer duration and offers more information than is generally reported at one of these sites, this work offers a more thorough understanding of the noise levels experienced by local residents living near a site with 24-h O&G operations.

The limitations of this work include representativeness of our measures and the averaging approach used to capture levels over time. These results, based on the continuous sampling at a single large multi-well pad over 3 months, may not be indicative of the noise from O&G operations at other locations with different topography, wind patterns, or noise mitigation strategies. Other noise sources from the community, such as local traffic or other household noises including other electronic or mechanical equipment, are

present and will differ from site to site. Therefore, the noise levels we observed may not translate to the construction and drilling of all well pads and our results may or may not be representative of other multiwell pads with similar equipment. A second limitation is that due to the methods used to estimate long-term averages, the fluctuations from short-term loud noise levels that are less than 1 min in length may not be captured [16]. Future studies should consider pairing continuously collected noise data with operations data to separate noise from O&G operations from other residential or community noise sources.

Additional studies are needed to determine if the noise levels we measured are representative of other communities with large, multi-well O&G construction and drilling sites. These studies could also assess the impact of these levels on resident health, and whether mitigations that have been implemented, such as sound walls and electric powered equipment that reduce engine noise, can be further modified or managed to be more effective in reducing community noise exposure for nearby residents. Future efforts will document noise and air pollution levels at this site during hydraulic fracturing ("fracking") and the production stage. The noise levels surrounding these operations could also potentially be recorded using crowdsourcing methods and smartphone technology [36–39]. Overall, future research should focus on documenting noise level and resident health concerns due to high level, shorter duration audible and low-frequency noise as well as impacts on susceptible populations that may be disproportionately impacted by noise from O&G operations [4].

The measured noise levels in this and another study highlight the inadequacy of the current 152.4 m regulatory setback distance between O&G operations and residential buildings in Colorado [14, 20]. These data indicate that exposures to both audible and low-frequency noise exceed the level that can cause annoyance, sleep disturbance, cardiovascular impacts, and other health effects. We measured the noise levels at distances between 320 m (1049.8 ft) and 550 m (1804.5 ft) from the center of the well pad, which exceeds the regulatory setback distance. To the extent that this site is representative of O&G operations in Colorado, these results suggest that a setback distance of more than 500 ft (152.4 m), or other noise mitigation, will likely be needed to reduce community noise to levels below both health-based and COGCC standards.

Specific to Colorado regulatory efforts, we recommend that equivalent continuous noise levels for 24/7 operations should be required to be kept below 60 dBC to minimize annoyance and other impacts related to low-frequency noise [16]. Given the typical variation in dBC levels, it may also be appropriate to decrease the low-frequency noise criteria to 55 dBC to minimize health impacts from low-frequency noise. The current COGCC recommendation that 65 dBC will trigger an investigation by a noise consultant is in

our judgment unlikely to reduce noise levels without changes in both site operations, mitigation approaches, and enforcement. Indoor low-frequency noise levels should also be considered as low-frequency noise is often less attenuated by homes and buildings potentially creating higher indoor levels through standing wave patterns in rooms [25]. The investigation of noise often requires a complaint and may not capture the highest noise levels. Publicly available continuous real-time noise monitoring results may offer much greater reporting, transparency, and accountability for both operators and nearby residents. Furthermore, the COGCC noise levels for residential areas (50 dBA) and other specific activities, such as the use of drilling rigs (75 or 70 dBA), should be reconsidered to align with the 40 dBA nighttime levels that are recommended to prevent health effects from nighttime noise [24].

Conclusion

Average noise levels at an O&G well pad during construction and drilling exceeded levels associated with annoyance, sleep disturbance, and cardiovascular health effects in studies involving noise sources such as traffic, airport, wind turbine, and railway related noise pollution. Furthermore, while low-frequency noise has received less attention than traditional A-weighted noise level research, these results highlight the need to further understand both the levels and health impacts of low-frequency noise in residential areas during drilling operations. The measurements collected during this study were also found at a distance greater than 152.4 m, thus highlighting that homes in closer proximity to operations will likely experience noise exposure at levels of concern even with the implementation of sound mitigation best management practices. Overall, further research is needed to address noise levels and test appropriate noise mitigation interventions to reduce exposure near O&G operations in residential areas.

Disclaimer

Any opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation

Acknowledgements This work was funded by support from the National Science Foundation (NSF CBET-1240584; www.airwatargas.org) and research was conducted as part of the AirWaterGas Sustainability Research Network. We thank Kelsey Barton and Jonathan Heywood for this assistance with this work.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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SERIOUS AREA OZONE SIP: PLANNING UPDATE



AIR QUALITY CONTROL COMMISSION
2020 RETREAT - JUNE 17, 2020

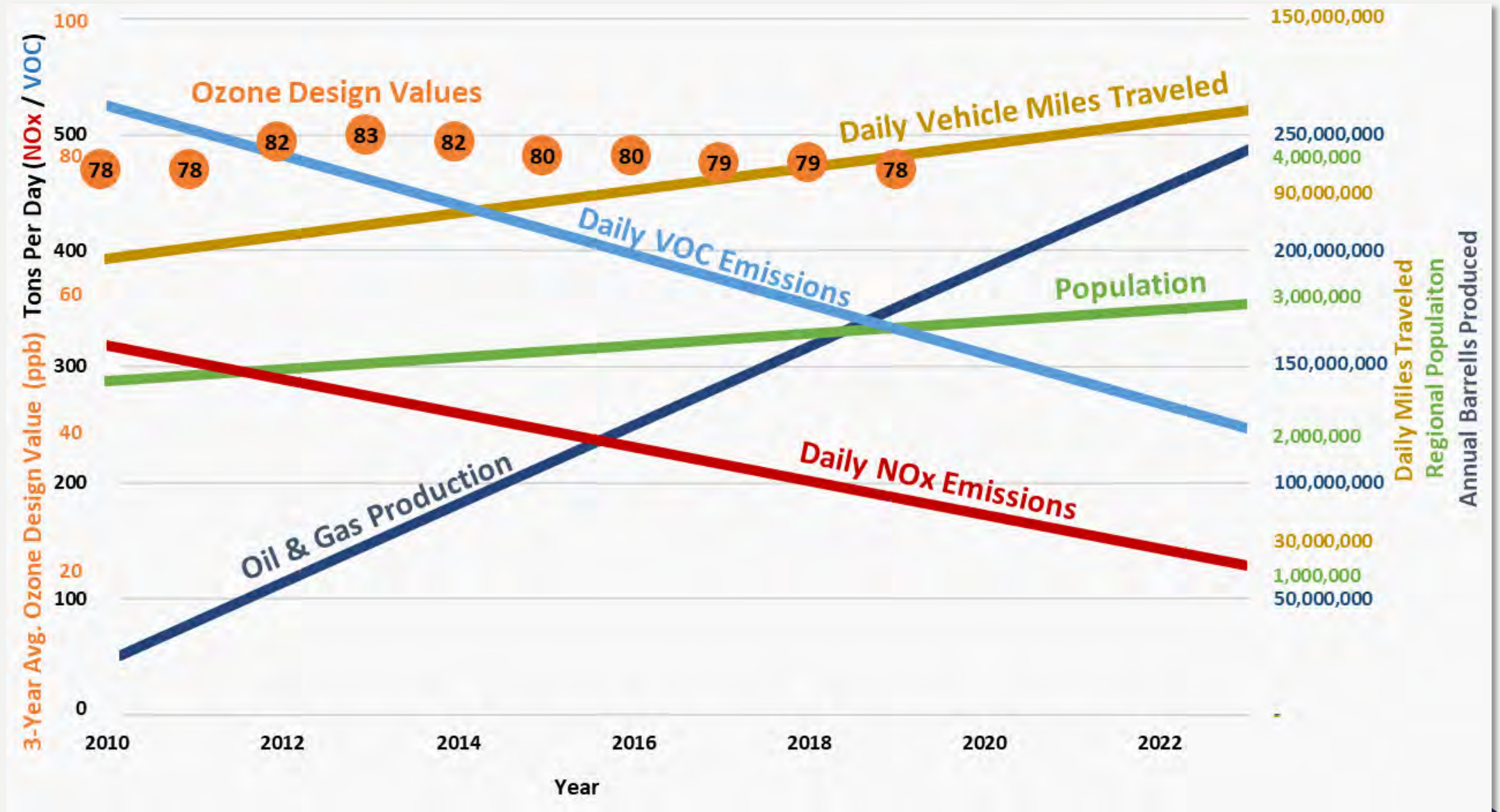
AMANDA BRIMMER
TECHNICAL DIRECTOR, RAQC

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JESSICA FERKO
AQ PLANNER, RAQC



REGIONAL TRENDS (2010-2023)



NUMEROUS EMISSIONS CONTROL PROGRAMS ALREADY IN PLACE

- New vehicle emission standards**
- Inspection and maintenance program**
- Gasoline and diesel fuel standards and requirements**
- National small engine, non-road and off-road limits**
- Industrial source permitting and emission controls**
- Numerous standards for commercial solvents/paints/coatings supplies and use**
- Architectural and industrial maintenance coatings and consumer products**
- Oil and gas industry regulations**
- Transportation planning and transit**
- Public education and outreach**

ROLLING 3-YEAR OZONE DESIGN VALUES

4 th -High 8-Hour Average Ozone Concentrations					
Monitor	2016	2017	2018	2019	2020*
Chatfield State Park	78	74	83	78	62
NREL	83	74	80	75	65
Rocky Flats	79	75	81	72	63
Fort Collins - West	76	75	81	71	70
Highland	72	72	77	73	61
Welch	75	75	66	72	59
Greeley - Weld Tower	67	74	72	65	60
Rocky Mtn. Nat'l Park	69	67	74	65	61
Aurora East	66	69	72	66	60
CAMP	70	67	71	67	54
La Casa	69	69	72	65	56
Fort Collins - CSU	70	66	72	64	59
Welby	66	68	69	60	59
Boulder Reservoir ¹		73	77	69	63
Blackhawk ²				69	63

3-Year Average Design Value		
2016-2018	2017-2019	2018-2020
78	78	74
79	76	73
78	76	72
77	75	74
73	74	70
72	71	65
71	70	65
70	68	66
69	69	66
69	68	64
70	68	64
69	67	65
67	65	62
75	73	69
	69	66

¹ Boulder Reservoir monitor started operations August 2016

² Blackhawk monitor started operations July 2019

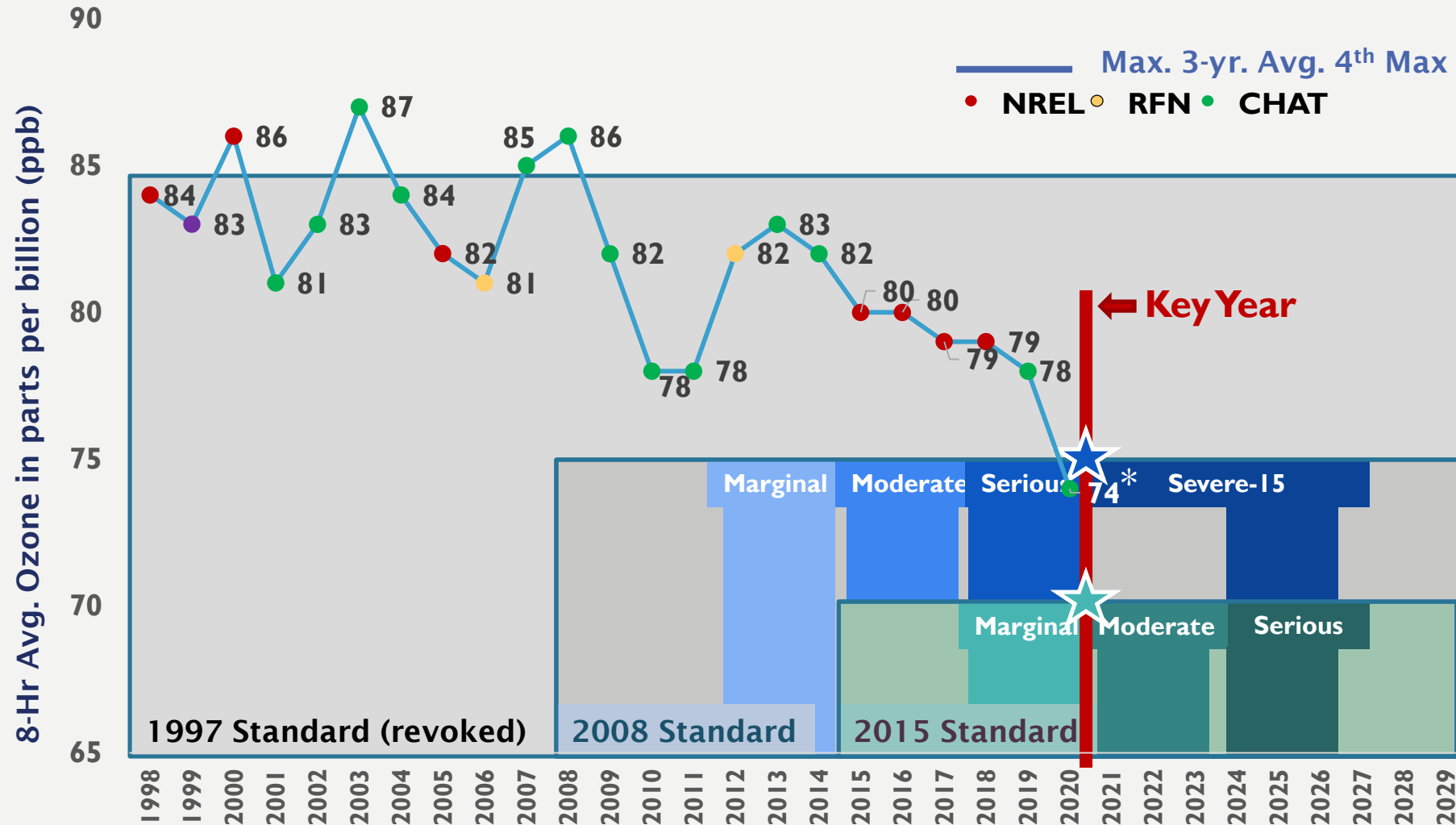
*Current as of 6/9/20

Red = exceeds 75 ppb standard

Yellow = exceeds 70 ppb standard

8-HOUR OZONE TRENDS AND FEDERAL STANDARDS

3-Year Design Values in the Denver Metro/North Front Range



8-Hour Ozone Standard: Based on a three-year average of the annual forth-highest daily 8-hour maximum ozone concentration.

*Current as of 6/9/20.

75 PPB OZONE NAAQS NONATTAINMENT AREAS

Marginal: Maintenance

Baton Rouge, LA	Cleveland-Akron-Lorain, OH	Memphis, TN-MS-AR
Charlotte-Rock Hill, NC-SC	Columbus, OH	St. Louis-St. Charles-Farmington, MO-IL
Cincinnati, OH-KY-IN	Knoxville, TN	Washington, DC-MD-VA

Moderate: Maintenance

Atlanta, GA

Marginal: Attaining

Allentown-Bethlehem-Easton, PA	Lancaster, PA	Seaford, DE
Calaveras County, CA	Pittsburgh-Beaver Valley, PA	Tuscan Buttes, CA
Chico (Butte County), CA	Reading, PA	Upper Green River Basin Area, WY
Dukes County, MA	San Francisco Bay Area, CA	
Jamestown, NY	San Luis Obispo (Eastern San Luis Obispo), CA	

Moderate: Attaining

Baltimore, MD	Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation
Inland Sheboygan County, WI	

Marginal: Not Attaining

Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE

Moderate: Not Attaining

Imperial County, CA	Phoenix-Mesa, AZ	Shoreline Sheboygan County, WI
Mariposa County, CA		

Serious: Not Attaining (Attainment Date: July 2021)

Chicago-Naperville, IL-IN-WI	Houston-Galveston-Brazoria, TX	New York-N. New Jersey-Long Island, NY-NJ-CT
Dallas-Fort Worth, TX	Kern Co (Eastern Kern), CA	
Denver-Boulder-Greeley-Ft. Collins, CO	Morongo Band of Mission Indians	San Diego County, CA
Greater Connecticut, CT	Nevada Co. (Western part), CA	Ventura County, CA

Severe 15/Extreme: Not Attaining

Los Angeles-San Bernardino Counties (West Mojave Desert), CA	San Joaquin Valley, CA
Los Angeles-South Coast Air Basin, CA	Riverside Co. (Coachella Valley), CA
	Sacramento Metro, CA

MODERATE VS. SERIOUS AREA SIP REQUIREMENTS

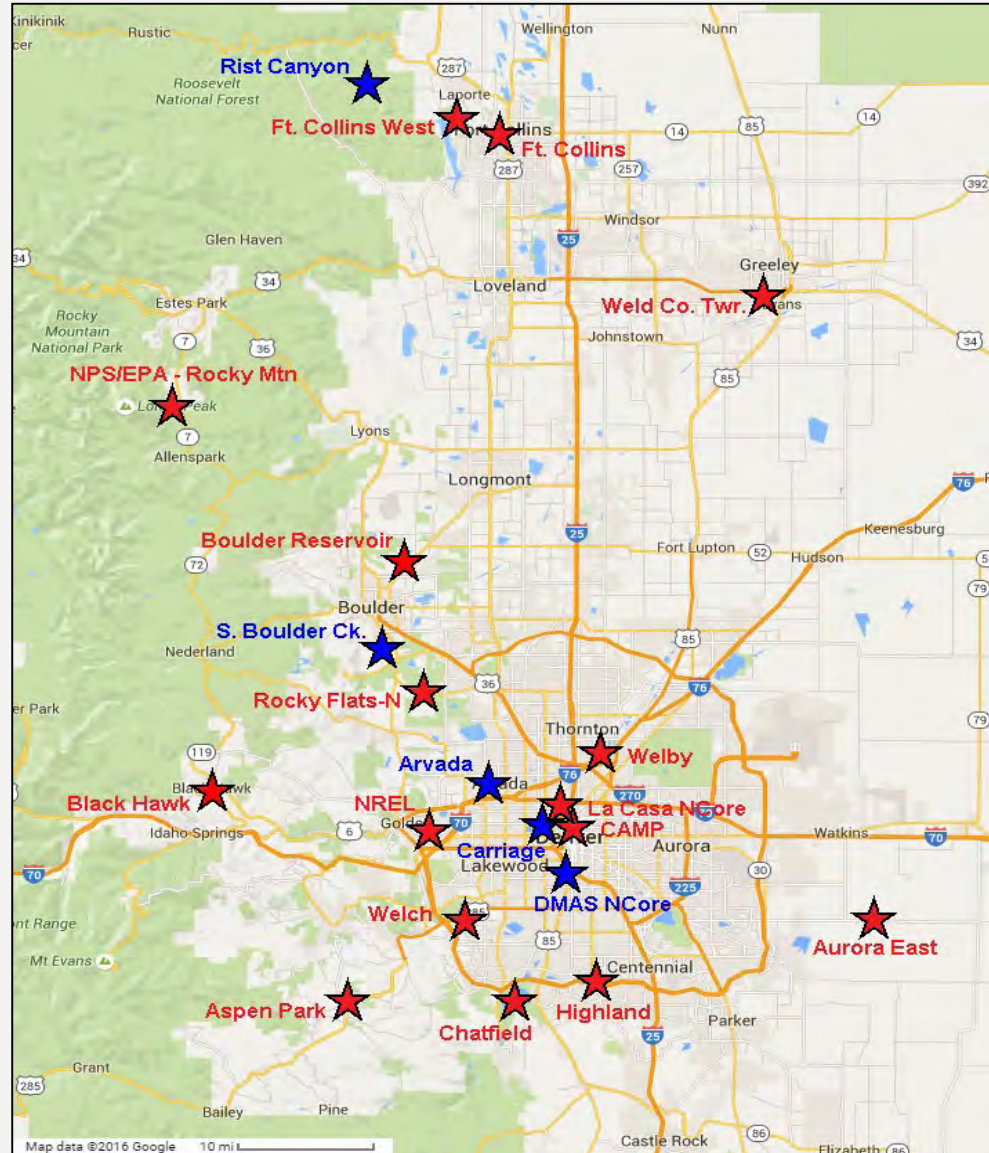
	Moderate	Serious
Photochemical Modeling	2017 Future Year	2020 Future Year
Reasonable Further Progress (RFP)	15% ↓ VOC 2012-2017	+9% ↓ VOC or NO _x 2018-2020
Reasonably Available Control Technology (RACT SIP)	Major Source = 100 tpy (NO _x or VOC)	Major Source = 50 tpy (NO _x or VOC)
Reasonably Available Control Measures	✓	✓
Inspection/Maintenance Program	Basic	Enhanced
New Source Review (NSR SIP) Emission offset ratio for VOC/NO _x	1.15:1	1.2:1
Contingency Measures 3% reduction in VOC and/or NO _x	✓	✓
Motor Vehicle Emissions Budgets	✓ (set at 2017 levels)	✓ (set at 2020 levels)
Clean Fuel-Fleet Programs	n/a	✓ new
Transportation Control	n/a	✓ new

SERIOUS SIP CHAPTERS

- **Ozone Monitoring (Ch. 2)**
- **2017 Base Year Emissions Inventory (Ch. 3)**
- **2020 Future Year Emissions Inventory and Reasonable Further Progress (RFP) Demonstration (Ch. 4)**
- **Attainment Demonstration And Weight of Evidence Analysis (Ch. 5)**
- **Reasonably Available Control Technology (RACT) for existing sources (Ch. 6)**
- **Reasonably Available Control Measures (RACM) Analysis (Ch. 7)**
- **Motor Vehicle Inspection and Maintenance (I/M) Program (Ch. 8)**
- **Nonattainment New Source Review (NSR) for new sources (Ch. 9)**
- **Contingency Measures Plan (Ch. 10)**
- **Motor Vehicle Emissions Budgets (MVEB) (Ch. 11)**
- **Clean Fuel Fleet Program (Ch. 12)**



OZONE MONITORING: NETWORK



Denver Metro/North Front Range:

- 15 stations operated by the Colorado Air Pollution Control Division (APCD)
- 2 stations in Rocky Mountain National Park
 - 1 operated by the National Park Service (NPS)
 - 1 operated by the U.S. Environmental Protection Agency (EPA)

Red = Current sites in operation in 2019

Blue = Sites since 2006 that are no longer in operation

OZONE MONITORING: DATA COLLECTION AND QUALITY CONTROL

- **Colorado Ozone Monitoring Season:**
 - **Through 2015**
 - **March 1 - September 30**
 - **Since 2016**
 - **Year-Round (peak season June - September)**
- **Data Quality Assurance:**
 - **Colorado has current EPA-approved:**
 - **Annual Network Plan**
 - **5-Year Network Assessment**
 - **Annual air monitoring data certification due to EPA by May 1st**
 - **Data collected for January 1 – December 31 of prior year**
 - **A valid sampling day is one in which at least 75% of the hourly averages are recorded**

SERIOUS SIP CHAPTERS

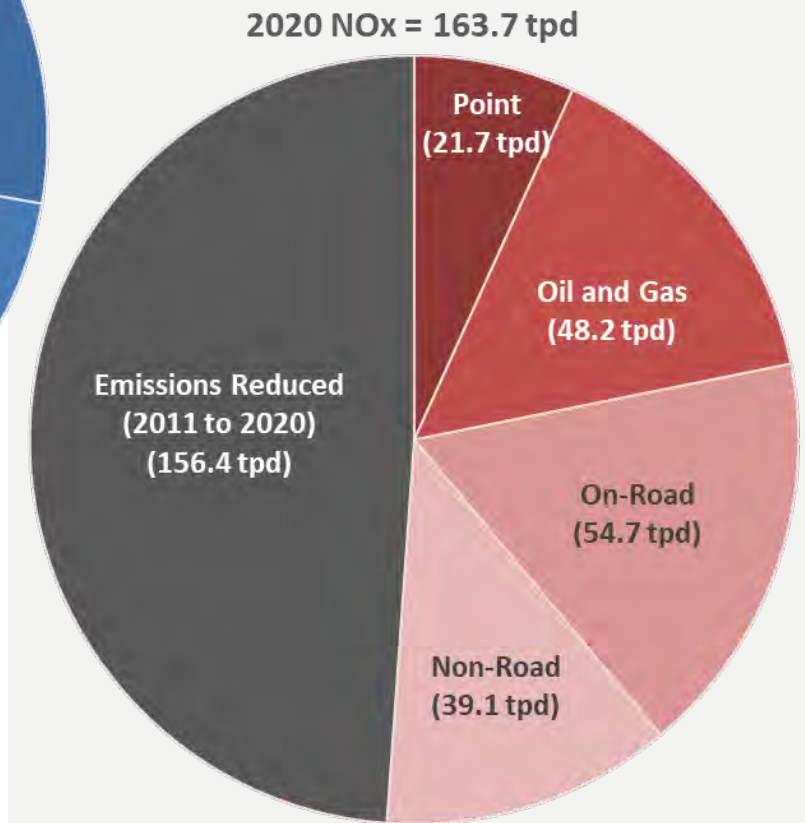
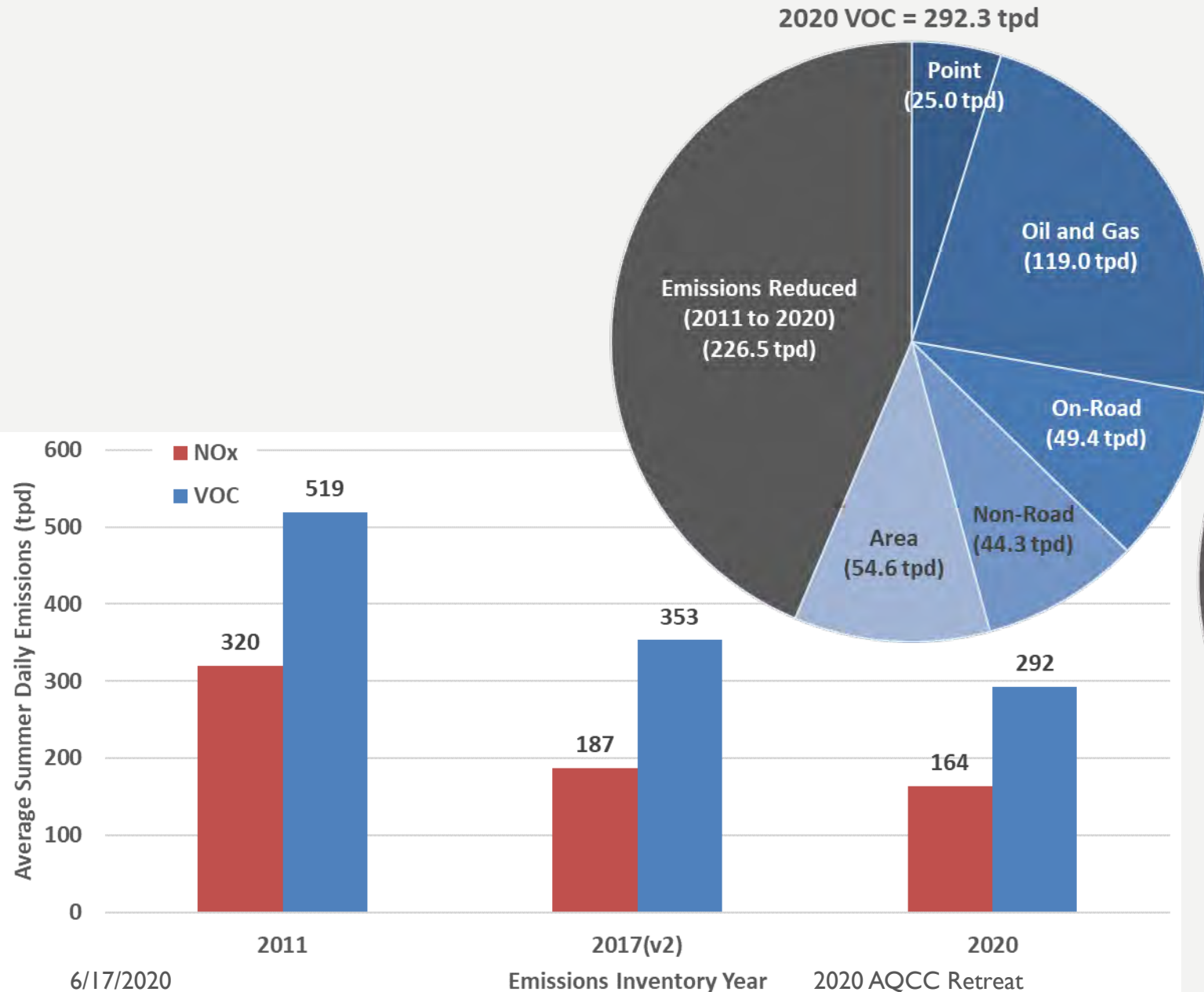
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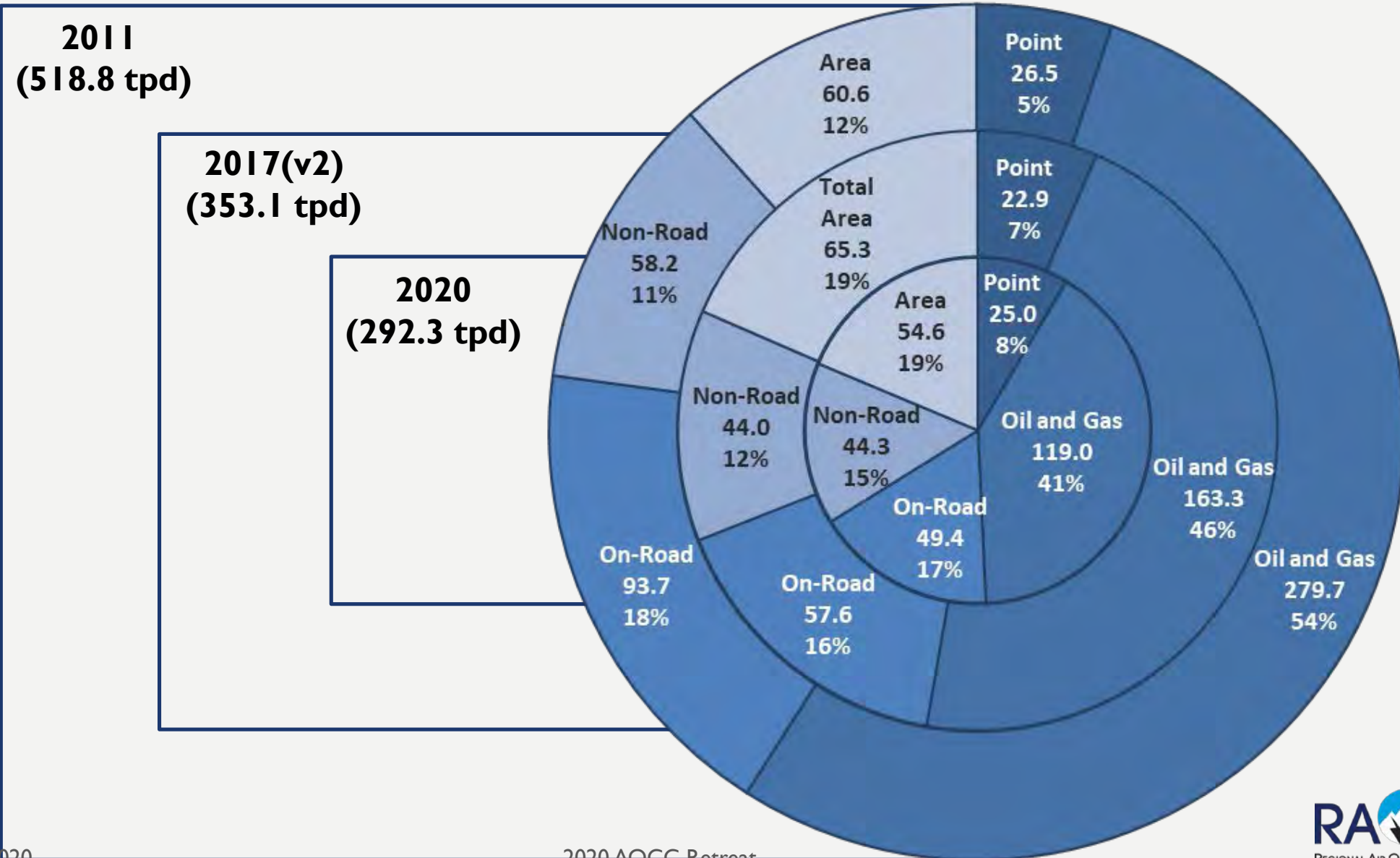
2017 AND 2020 VOC AND NOX EMISSIONS INVENTORIES

- 2017 Base Year Inventory:
 - Originally submitted to EPA as part of the Moderate SIP in May 2017
 - Inventory was updated as part of Serious SIP development to reflect new calculation methodologies, actual instead of projected data, and updated modeling platforms
- 2020 Attainment Year Inventory
 - Emission based on projected growth
 - Incorporates both current and on the way federal and state control programs
- Uses of Inventories
 - Input for photochemical modeling as part of attainment demonstration
 - Reasonable Further Progress plan
 - Set Motor Vehicle Emissions Budgets
 - Assess Contingency Measures

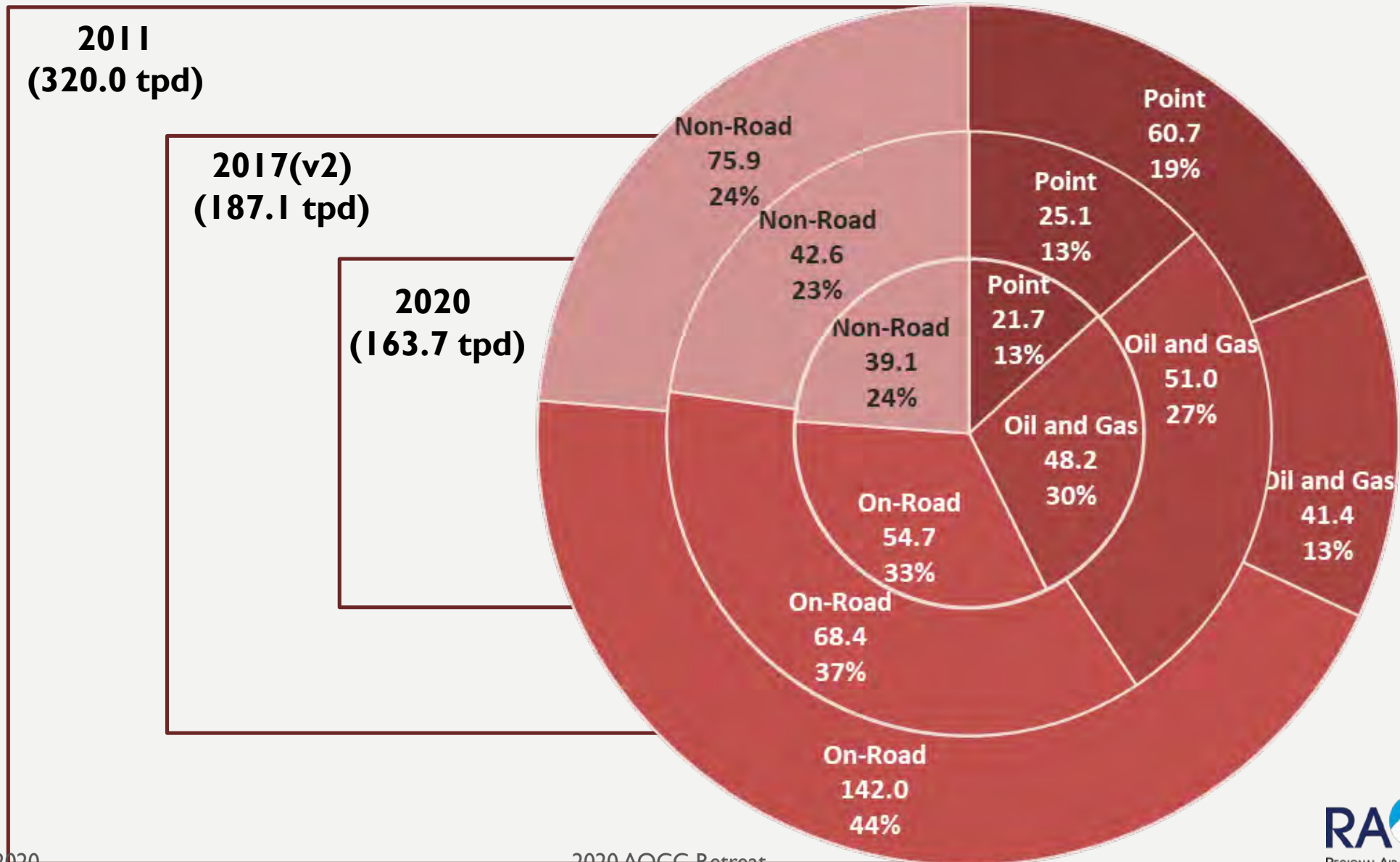
REDUCTIONS FROM BASE YEAR INVENTORY



VOC EMISSION INVENTORIES

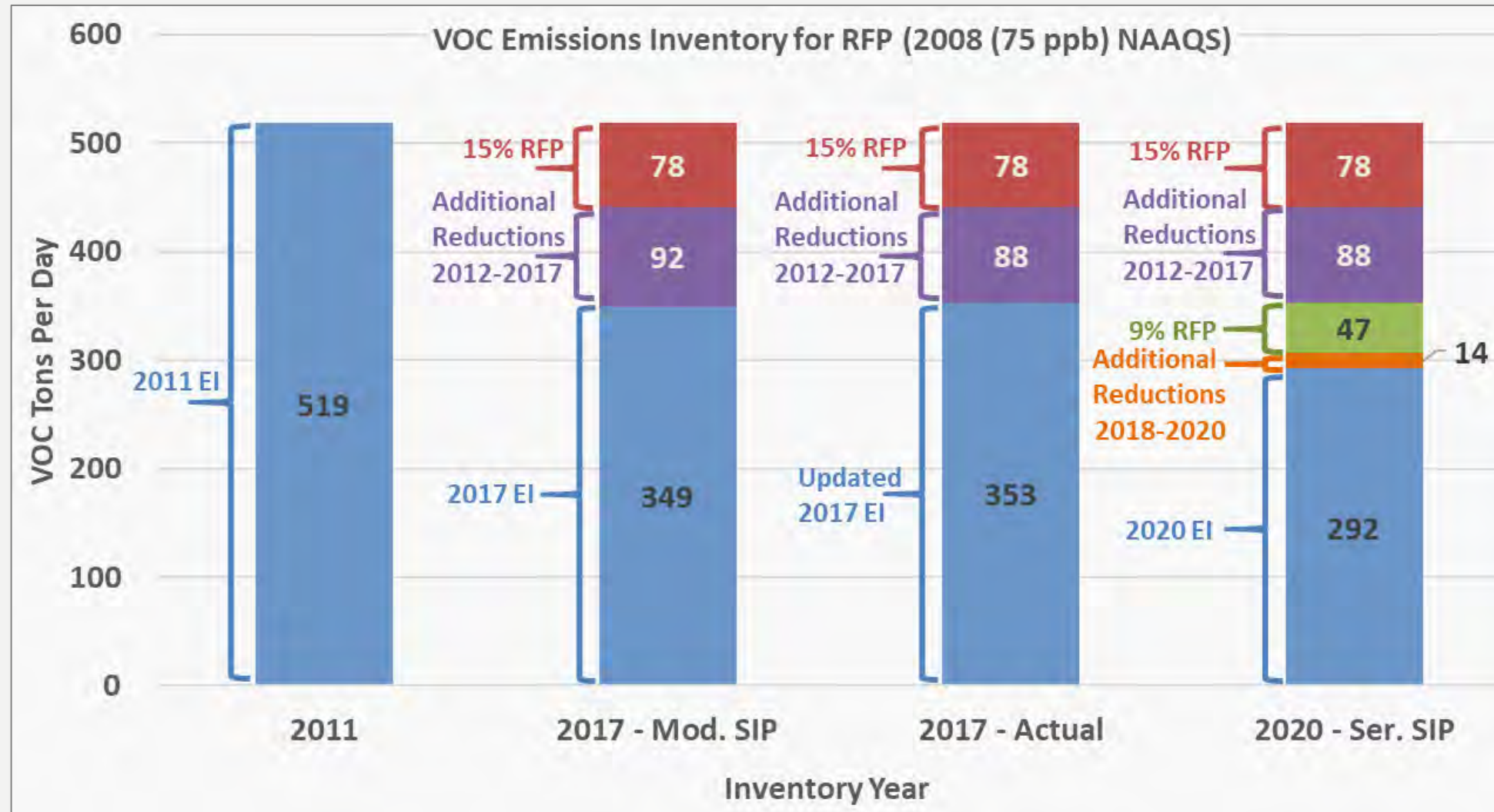


NOX EMISSION INVENTORIES



REASONABLE FURTHER PROGRESS (RFP)

Requires a 9% reduction in VOC (or NO_x) between 2017 and 2020 based on initial base year (2011) inventory

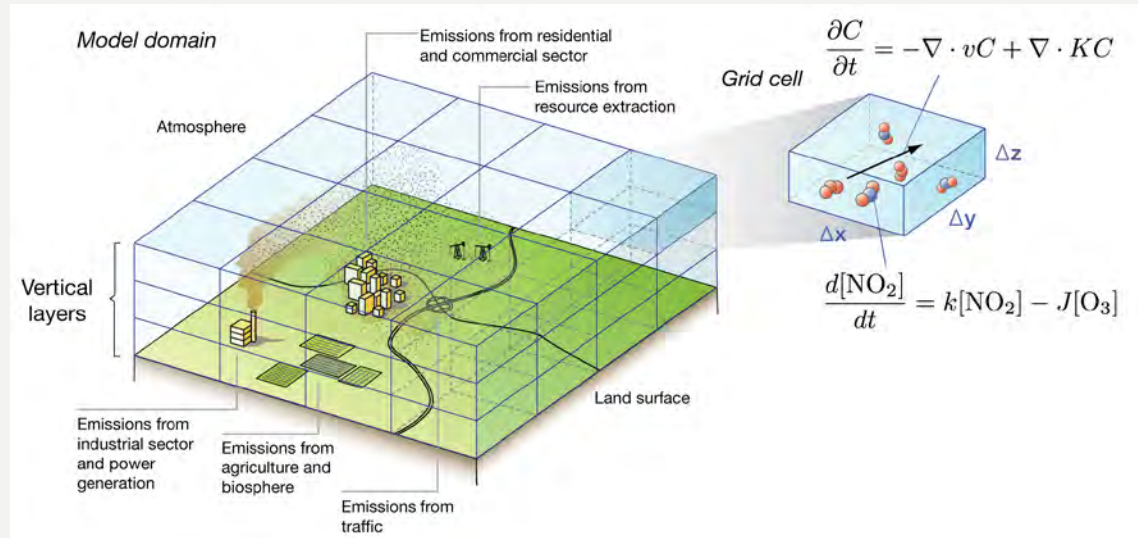


SERIOUS SIP CHAPTERS

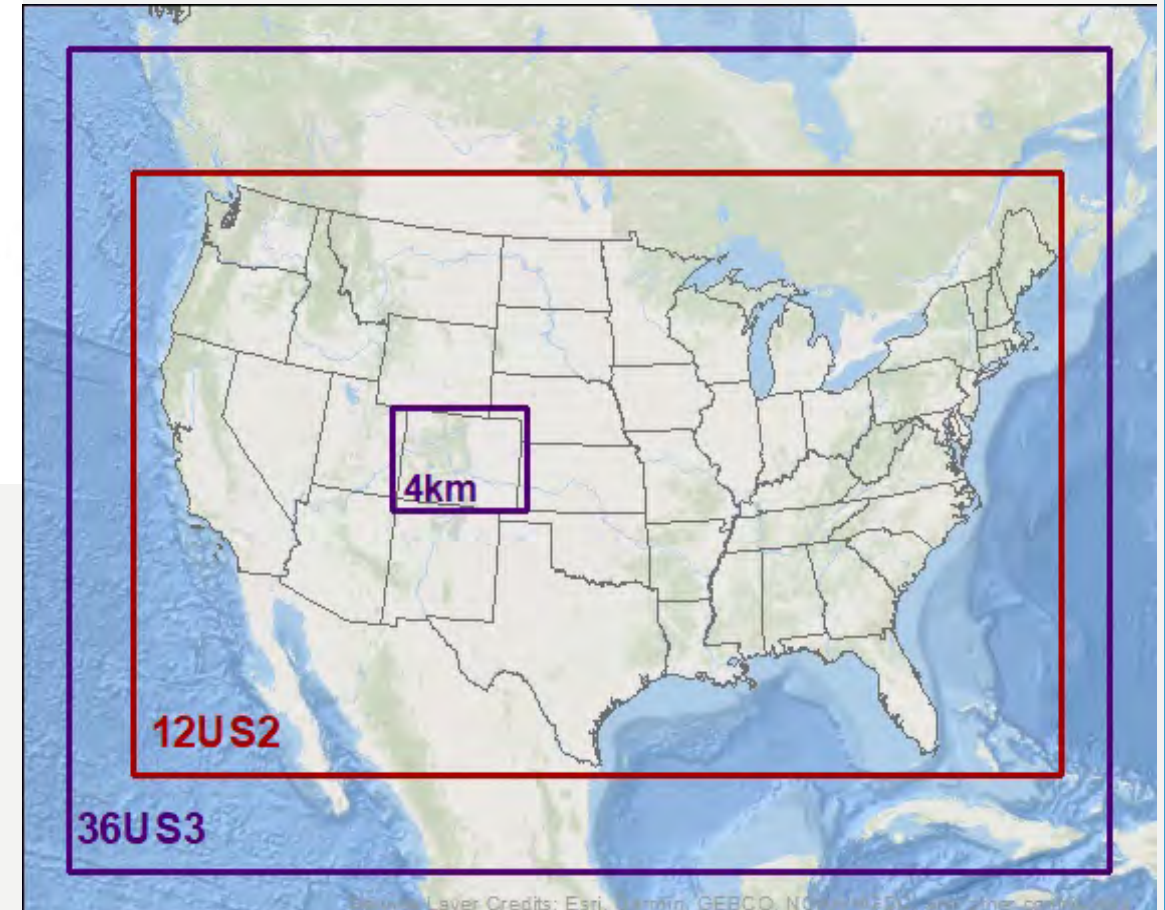
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PGM Divides Modeling Domain into Boxes (Grid Cells)



DM/NFR NAA 36/12/4-km Domains



- 36/12/4-km Grid Resolution Modeling Domains

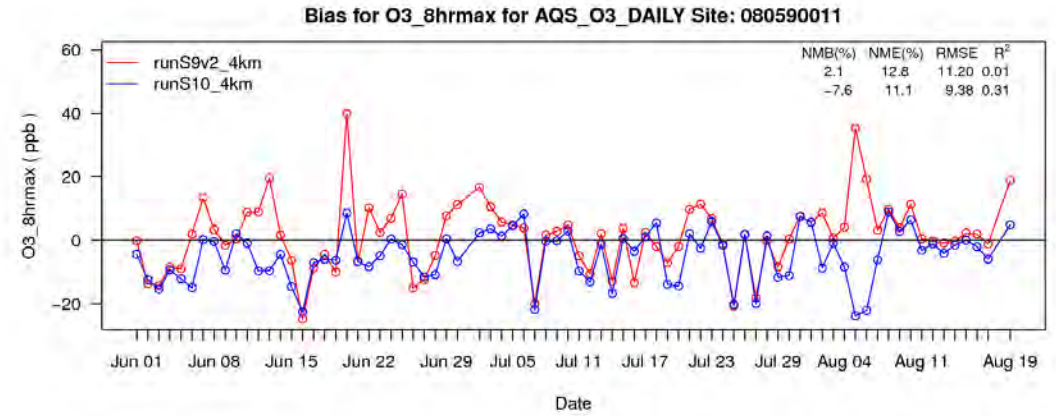
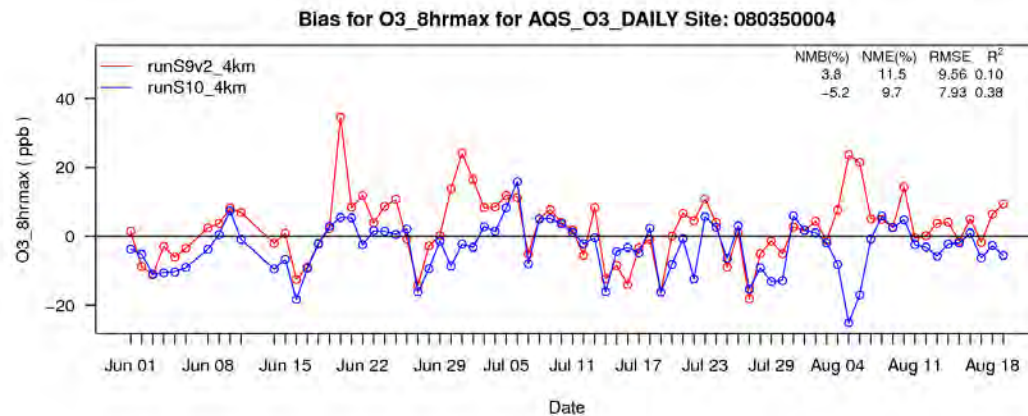
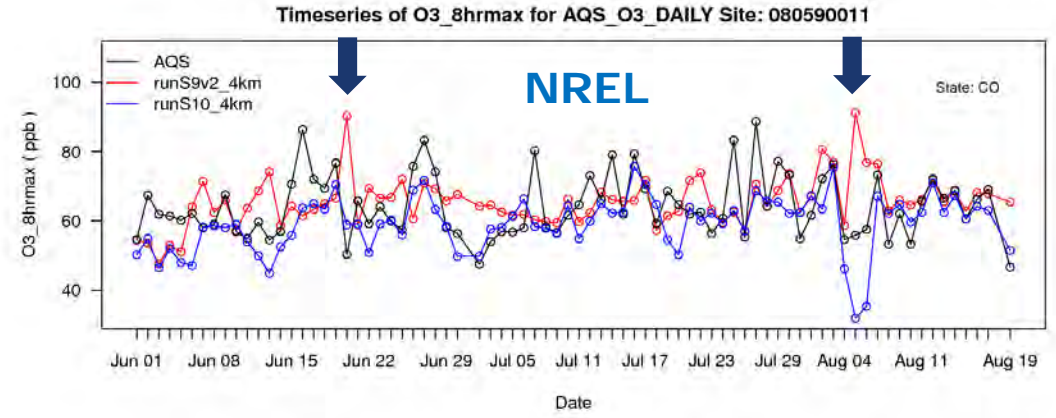
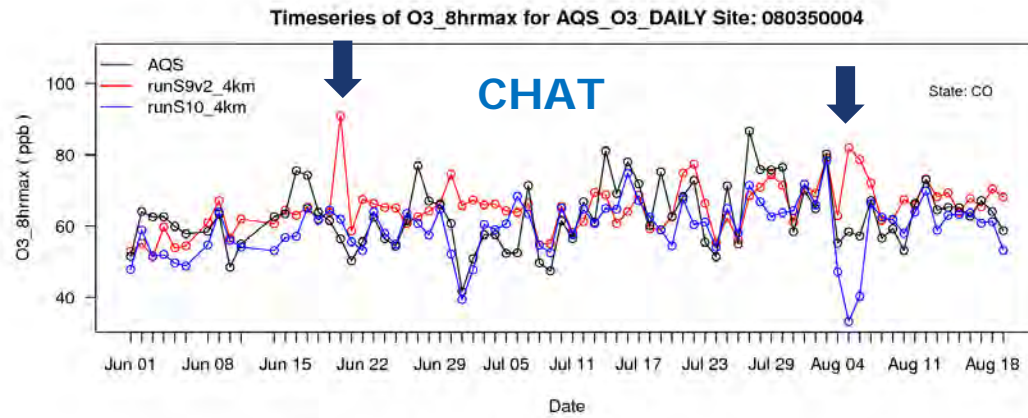
- Two-way grid nesting between domains
- 4-km Domain covering Colorado
- 36/12-km domains same as EPA's 2016v1 modeling platform

- Can use EPA 36/12-km emission inputs

- June 4th – RAQC Modeling Forum – Presentations and recording available at raqc.org

S9 and S10 DMAX8 Ozone (top) and Bias (bottom) Time Series

- S9 overestimation due to large model miss on a few days, such as June 20 and Aug 5
- S10 general ozone underestimation



Ozone Bias & Error & Design Value Projection Procedures

- Green achieves Performance Goal
 - Yellow achieves Performance Criteria
- CAMx S10 (WRF/NAM) Base Case

AQS ID	Name	NMB	NME	FB	FE
80050002	HIGH	-1.7	9.7	-1.9	10.1
80310002	CAMP	2.0	10.0	1.8	10.2
80350004	CHAT	-5.2	9.7	-5.3	10.1
80410013	ACAD	-5.4	9.8	-6.1	10.2
80410016	MANI	1.7	8.9	1.3	8.7
80590005	WELC	-0.8	9.5	-0.8	9.6
80590006	RFNO	-4.5	9.1	-4.7	9.4
80590011	NREL	-7.6	11.1	-7.9	11.8
80677001	IGNA	0.8	9.6	0.8	9.7
80690007	RMNP	-0.8	9.0	-0.7	9.1
80690011	FTCW	-6.4	9.5	-6.6	9.9
80691004	FTCO	2.4	9.7	2.4	9.8
80830006	CORT	5.7	9.3	5.6	9.1
80830101	MESA	1.6	8.0	1.4	7.9
81230009	WELD	-5.7	9.0	-6.2	9.5
CASTNet	Name	NMB	NME	FB	FE
ROM206	ROM1	-0.1	8.3	-0.1	8.4
ROM406	ROM2	-0.8	9.0	-0.7	9.1

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Highest Modeled MDA8 Ozone Days at NREL with Corresponding Observed Values

- EPA Guidance recommends using the top 10 modeled ozone days to develop Relative Response Factors (RRFs)

$$RRF = \sum \text{Ozone}_{2020} / \sum \text{Ozone}_{2016}$$

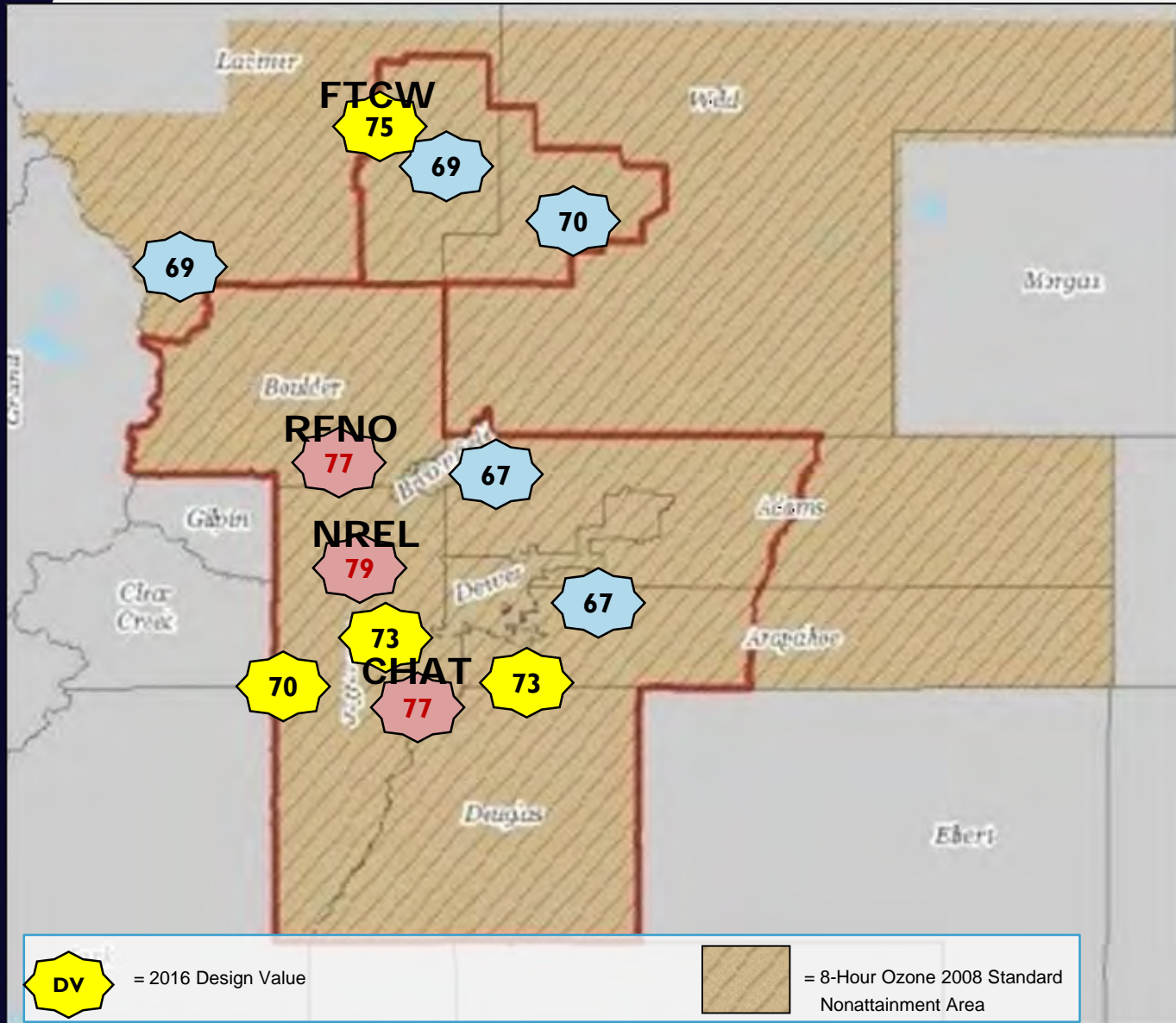
$$\text{Ozone DVF} = \text{Ozone DVB} \times RRF$$

- Top 10 modeled ozone days (green)
- Top 10 modeled days overlaps with many top 20 observed ozone days (yellow)
- Alternative 2020 ozone DV projection approach to add ozone MPE criteria when selecting top 10 days (blue):
 - Require predicted/observed ozone values to be within 10% and 15% of each other

2020 AQCC Retreat

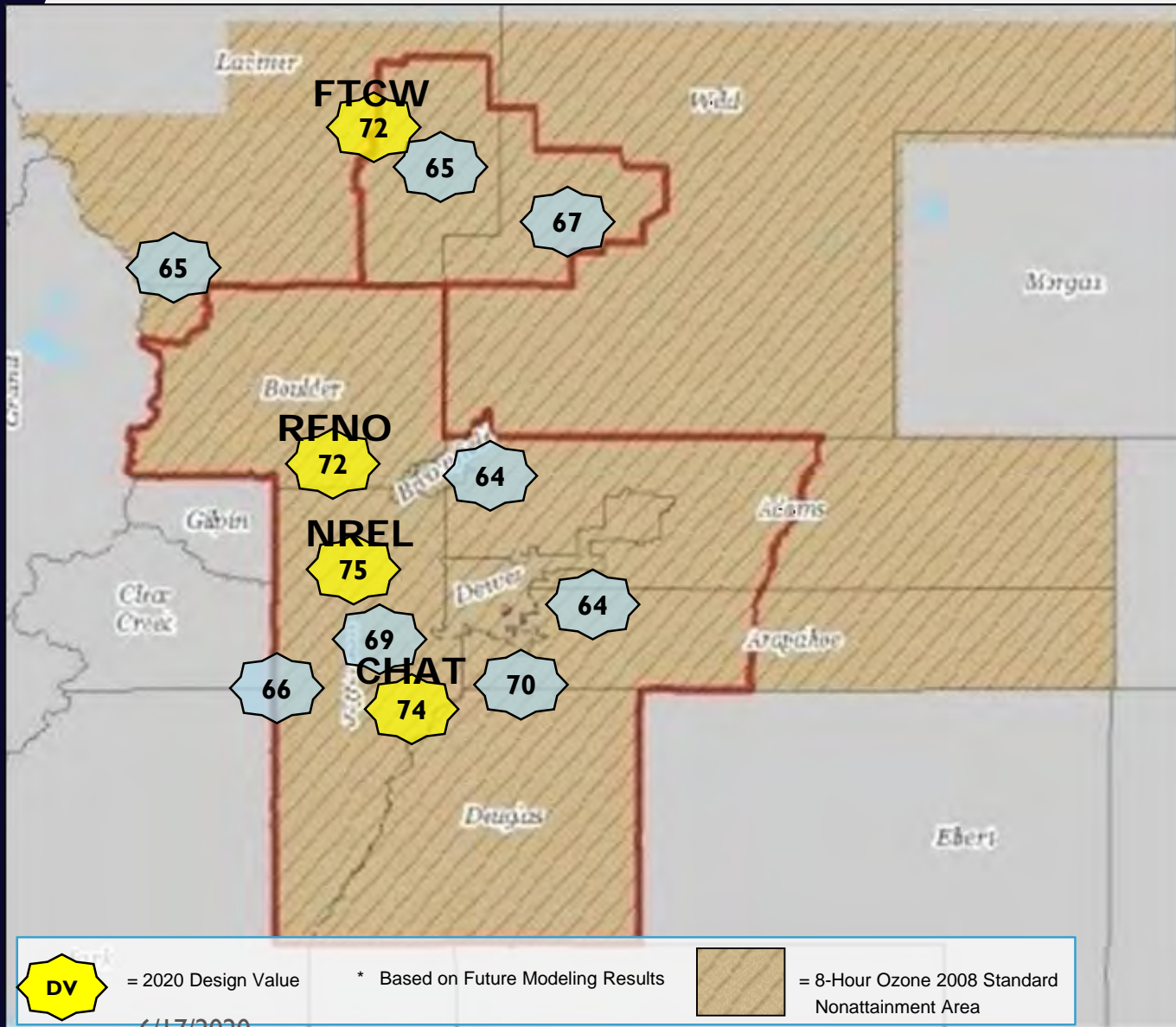
Date	Obs	S10	Bias	Bias%
7/16/2016	79.3	75.7	-3.5	-4%
8/3/2016	76.3	75.3	-0.9	-1%
6/27/2016	83.3	71.7	-11.6	-14%
8/12/2016	72.1	71.0	-1.1	-2%
7/17/2016	69.3	70.4	1.1	2%
6/19/2016	76.6	70.3	-6.3	-8%
6/26/2016	75.8	68.9	-6.9	-9%
7/27/2016	88.6	68.6	-20.0	-23%
8/14/2016	68.8	67.2	-1.5	-2%
8/1/2016	61.5	67.1	5.6	9%
8/7/2016	73.3	67.1	-6.1	-8%
7/6/2016	58.0	66.3	8.3	14%
7/28/2016	64.3	65.6	1.4	2%
7/29/2016	77.1	65.4	-11.7	-15%
7/13/2016	66.1	64.9	-1.2	-2%
6/17/2016	72.0	64.9	-7.1	-10%
8/9/2016	62.0	64.7	2.7	4%
7/18/2016	59.3	64.7	5.5	9%
7/10/2016	61.5	64.4	2.9	5%
8/16/2016	66.3	64.2	-2.1	-3%
7/21/2016	61.9	63.9	2.0	3%
6/16/2016	86.3	63.7	-22.6	-26%
8/2/2016	72.1	63.4	-8.7	-12%
6/18/2016	69.4	63.3	-6.0	-9%
6/28/2016	74.1	63.3	-10.9	-15%
8/17/2016	69.0	63.0	-6.0	-9%
7/25/2016	83.3	62.9	-20.3	-24%
7/15/2016	61.9	62.4	0.6	1%
8/11/2016	65.6	62.4	-3.2	-5%
8/13/2016	66.5	62.4	-4.1	-6%

2016 5-YEAR BASE DESIGN VALUES (DVB)



Monitor	2016 Design (ppb) Value
Chatfield	77.3
Rocky Flats North	77.3
NREL	79.3
Fort Collins West	75.7
Welby	67.0
Highlands	73.0
Aurora East	67.7
Welch	73.0
Aspen Park	70.0
Rock Mountain NP	69.0
Fort Collins CSU	69.0
Greeley	70.0

2020 MODELED ATTAINMENT DEMONSTRATION



2020 AQCC Retreat

Monitor	2020 S10 3x3 Design Value (ppb)
Chatfield	74.4
Rocky Flats North	72.7
NREL	75.9
Fort Collins West	72.0
Welby	64.4
Highlands	70.6
Aurora East	65.3
Welch	69.7
Aspen Park	66.3
Rocky Mountain NP	65.7
Fort Collins CSU	65.7
Greeley/Weld Twr	67.0

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WEIGHT OF EVIDENCE ANALYSIS

- Sensitivities:
 - Exclusion of Exceptional Events
 - Model Performance Attainment Test Using Various Bias Thresholds
- Weather-Corrected Trends
- Trends in Ambient Air Quality and Emissions
- Additional Measures Implemented Between 2017 and 2020 that Reduce Emissions

7 x 7 Matrix with 4 km Grid

	1	2	3	4	5	6	7
1	4 km	4 km	4 km	4 km	4 km	4 km	4 km
2	4 km	4 km	4 km	4 km	4 km	4 km	4 km
3	4 km	4 km	4 km	4 km	4 km	4 km	4 km
4	4 km	4 km	4 km	<i>Monitor</i>	4 km	4 km	4 km
5	4 km	4 km	4 km	4 km	4 km	4 km	4 km
6	4 km	4 km	4 km	4 km	4 km	4 km	4 km
7	4 km	4 km	4 km	4 km	4 km	4 km	4 km

Monitor	2020 S10 3x3 Design Value (ppb)	2020 S10 1x1 Design Value (ppb)	2020 S10 7x7 Design Value (ppb)	Without Flagged Exceptional Events (3x3)	2020 S10 15% Performance Criteria (3x3)
Chatfield	74.4	74.5	73.7	73.9	74.4
Rocky Flats North	72.7	72.8	72.9	72.2	73.2
NREL	75.9	76.8	75.2	74.7	76.0
Fort Collins West	72.0	72.0	71.6	70.2	72.1

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SIP RACT Basics

- RACT – lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility
 - Source specific RACT
 - Minor source permitting
 - Major source permitting
 - Categorical RACT
- Moderate or higher nonattainment areas must meet VOC and NO_x reasonably available control technology (RACT) requirements:
- Category of VOC sources covered by a control techniques guideline (CTG) issued between 11/15/1990, and the date of attainment
- Other major stationary sources of VOC or NO_x
 - Moderate: ≥ 100 tpy
 - Serious: ≥ 50 tpy

SIP RACT Basics

- Reasonably Available Control Technology (RACT) SIPs must
 - Contain adopted RACT regulations
 - CTG VOC source categories
 - Major sources
 - Conclude that existing provisions are still RACT
 - Contain negative declarations (no sources)
- States must refer to
 - Current EPA guidance – Control Technique Guidelines (CTG) and Alternative Control Techniques (ACT)
 - Current economic and technological feasibility
 - Other available and relevant information
- RACT must be implemented by July 20, 2021

Categorical RACT

- Control Techniques Guidelines (CTG) – EPA recommendations on how to control VOC emissions from a specific source category
- Alternative Control Techniques (ACT) – available control technologies and respective cost effectiveness
- Reviewed Regulation Number 7
 - General and Categorical RACT requirements
- Reviewed
 - CTGs and Determined Colorado subject sources
 - ACTs
 - RACT/BACT/LAER Clearinghouse (RBLC)
 - EPA Menu of Control Measures
 - New Source Performance Standards (NSPS)
 - National Emission Standards for Hazardous Air Pollutants (NESHAP)
 - Other state ozone NAA regulations

2008 Ozone NAA RACT History

- 2016
 - CTGs: industrial cleaning solvent, lithographic and letterpress printing
 - Major sources (≥ 100 tpy): incorporation by reference of NSPS/MACT, combustion process adjustment, major source RACT analysis requests
- 2017 – oil and gas CTG
- 2018
 - CTGs: wood furniture coating
 - Major sources (≥ 100 tpy): combustion equipment, brewing
- 2019
 - Major sources (≥ 50 tpy): solvent use, incorporation by reference of NSPS/MACT, expand combustion equipment requirements, major source RACT analysis requests
- 2020 – in process
 - RACT analyses from some major sources due July 1, 2020
 - Develop any additional SIP RACT requirements in Regulation Number 7 fall/winter 2020
 - Submit RACT SIP to EPA 2021
 - RACT must be implemented by July 20, 2021

Major (≥ 50) Sources

VOC

- ACH Foam
- Atlas Roofing
- Avago Technologies
- BASF Corporation
- Boulder Scientific
- Carestream
- Circle Graphics
- Coblaco
- Coors Brewing Endline
- Costco
- Frederic Printing
- Front Range Energy
- Golden Aluminum
- Greeley Energy Facility
- Intertape
- Magellan Pipeline
- Musket Corporation
- Northern Priming and Prestain
- Owens Corning Roofing
- Rocky Mountain Prestain
- Sandoz
- Sun Mountain
- TruStile Doors
- Upsher-Smith

6/17/2020

2020 AQCC Retreat

NOx

- Astrazeneca
- Avago Technologies
- Centura Health St. Anthony Hospital
- Comcast
- CoorsTek – Ninth Street & Clear Creek Valley Plant
- Cyxtera Communications
- Denver – DIA
- Front Range Energy
- Golden Aluminum
- Greeley Energy Facility
- Leprino Foods
- Nestle Purina
- PSCo – Blue Spruce
- PSCo Lookout Center
- Qwest
- SWG – Arapahoe & Valmont
- Swift Beef
- University of Colorado Denver Anschutz
- Waste Management – DADS

Serious NAA Major Source RACT Option(s)

- Revise enforceable permit limits < 50 tpy
- Comply with established Regulation Number 7 RACT requirements
 - Oil and gas CTG, pharmaceuticals, printing operations, etc
- Incorporate NSPS/MACT requirements
 - Example, engines (NSPS IIII)
- Expand Regulation Number 7 RACT requirements
 - Example, 2019 expansion of combustion equipment requirements
- Establish new categorical RACT requirements in Regulation Number 7 – evaluating
 - Wood coatings
 - Digital printing
 - Bakery ovens
 - Foam manufacturing
 - Asphalt roofing manufacturing
 - Turbines
 - Boilers 50-100 MMBtu/hr
 - Landfill and biogas fired engines
 - Chemical manufacturing

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RACM Evaluation Criteria

- 1) Necessary to demonstrate attainment
- 2) Are technologically or economically feasible
- 3) Have been successfully implemented in other Serious nonattainment areas
- 4) Could be implemented by ozone season 2020
- 5) Could qualify as SIP measures by being:
 - Quantifiable;
 - Enforceable;
 - Permanent; and
 - Surplus

RACM Evaluation

Categories of Strategies Evaluated

- Oil and Gas
- Vehicle
 - Inspection and Maintenance (I/M)
 - Fuels
- Transportation and Land Use
- Local Government Policies
- Outreach

Conclusion

- No strategies were determined to be RACM for the Serious SIP
- However, many are still being evaluated for future implementation through the RAQC Control Strategy Committee

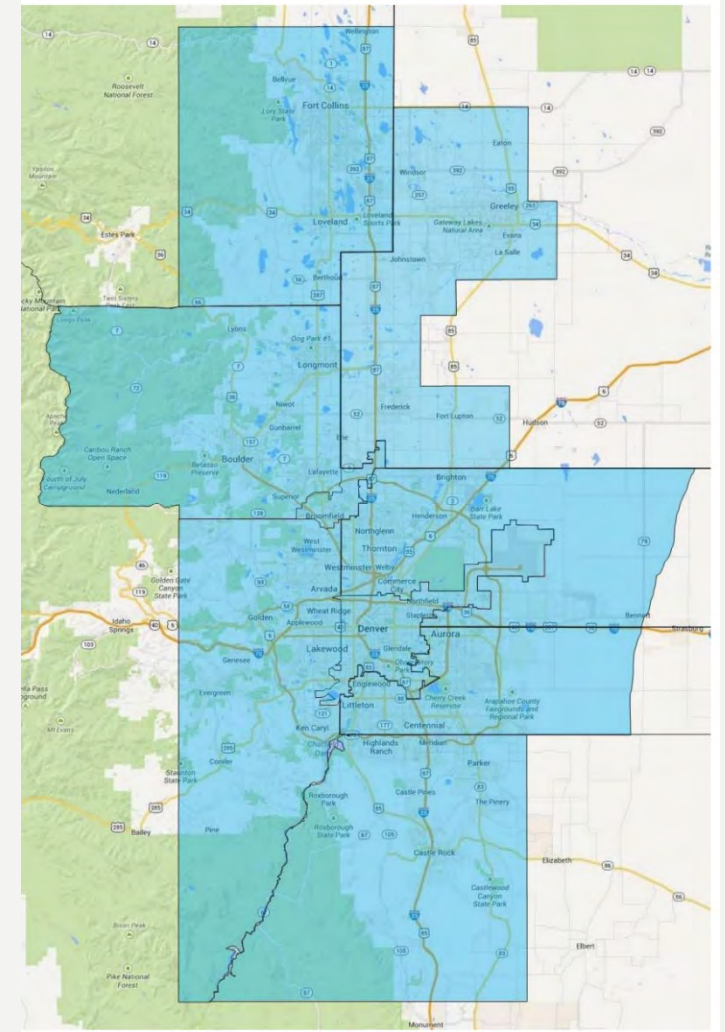
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ENHANCED I/M PROGRAM REVISIONS

- **2016-Reincorporated North Front Range into the I/M SIP**
 - Larimer/Weld had been State-Only enhanced counties since 2010
 - Needed to show Moderate attainment
- **New ‘Serious’ I/M Compliance Statement**
 - Serious NA requires an Enhanced I/M Program
 - A requirement that Colorado already meets (since 1995)
- **Minor revisions to inspection procedures and clarity of the rule**
 - Clean screen low emitter index update
 - OBD Readiness and pass/fail criteria
 - OBD Fraud Identification
 - Etc
- **All I/M SIP revisions from 2013 – 2017 were approved By EPA February 7, 2019**
- **New closing statement confirming Colorado’s current I/M program meets the Enhanced I/M Performance Standard**
 - Thereby meeting SIP requirements for I/M in Serious Nonattainment



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NANSR - OVERVIEW

- DM/NFR ozone nonattainment is now a “serious” nonattainment area
- LAER/offset/permitting requirements now apply to lower emitting new/modified facilities
- All existing sources between 50-100 tpy now have to obtain operating permits
- Sources can avoid NANSR by controlling emissions upfront to not trigger thresholds
- NANSR will not lower existing emissions but will prevent new emissions from future subject sources

NANSR

- Nonattainment NSR applies to new major sources or major modifications at existing sources for pollutants where the area the source is located is not in attainment with the National Ambient Air Quality Standards (NAAQS)
- Nonattainment NSR programs have to require
 - Lowest achievable emission rate (LAER) pollution controls
 - Emission offsets – emissions increase from new source or modification must be “offset”
 - Sources have to obtain “Title V” operating permits in addition to the construction permits that contain the facility requirements
 - This provides opportunity for greater public involvement

NANSR - APPLICABILITY

Nonattainment Status	Threshold for Major stationary source (in ozone nonattainment area)	Major modification (Physical change resulting in a significant increase of emissions)	Offsets, for ozone nonattainment*
Marginal			at least 1.1:1
Moderate	100 tpy VOC or NOx	40 tpy VOC or NOx	at least 1.15:1
Serious	50 tpy VOC or NOx	25 tpy VOC or NOx	at least 1.2:1
Severe	25 tpy VOC or NOx	25 tpy VOC or NOx	at least 1.3:1
Extreme	10 tpy VOC or NOx	any increase of VOC or NOx	at least 1.5:1

*Offsets can be found by reducing emissions from other sources within the nonattainment area or acquiring credits from an “emission bank”

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CONTINGENCY MEASURES OVERVIEW

Clean Air Act Requirement:

- SIP must provide for implementation of contingency measures if an area fails to attain the ozone standard by the applicable attainment date (i.e. July 2021) or fails to meet Reasonable Further Progress (RFP).

Contingency Measures:

- Shall take effect without further action by the State or EPA
- Should represent 1-year's worth of progress (~3% of baseline (i.e. 2011) emissions inventory)

$$518.8 \text{ tpd VOC} * 3\% = 15.6 \text{ tpd VOC}$$

OR

$$320.0 \text{ tpd NOx} * 3\% = 9.6 \text{ tpd NOx}$$

Contingency Measures = a combination of VOC and/or NOx reductions

CONTINGENCY MEASURES

- State's may use federal measures to meet the Contingency Plan requirement.
- Future year reduction in NOx and VOC from on-road mobile source emissions is being used for the Serious SIP.

		Emissions (tpd)*		
Line #	Description	VOC	NOx	
3% Contingency Requirement				
1	NAA 2011 base year emissions inventory	518.8	320.0	
2	3% contingency reduction goal (NOx and/or VOC)	1.0%	2.0%	3% needed
3	3% contingency reduction goal (NOx and/or VOC)	5.2	6.4	
4	NAA 2020 on-road mobile emissions inventory	49.9	56.8	
5	NAA 2022 on-road mobile emissions inventory	44.5	47.3	4% achieved
6	Total creditable mobile source reductions in 2022	5.4	9.5	
7	% contingency reductions achieved	1.0%	3.0%	
8	Excess (+) / Shortfall (-)	0.2	3.1	
Is 3% Contingency Requirement Met?		Yes	Yes	

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MOTOR VEHICLE EMISSIONS BUDGETS

- Motor Vehicle Emissions Budgets (MVEB) are the total allowable emissions, as defined in a submitted or approved SIP, allocated to highway and transit vehicle use for the purpose of attaining the National Ambient Air Quality Standards (NAAQS)
- MVEBs are required for Transportation Conformity to:
 - Ensure federally funded or approved highway and transit activities “conform to” the purpose of the SIP (i.e. do not exceed the allowable emissions budget)
- Current budgets for nitrogen oxides (NO_x) and volatile organic compounds (VOC) for the 2008 Ozone NAAQS were established in 2016 and found adequate by EPA in 2018.

MVEB SUBREGIONS

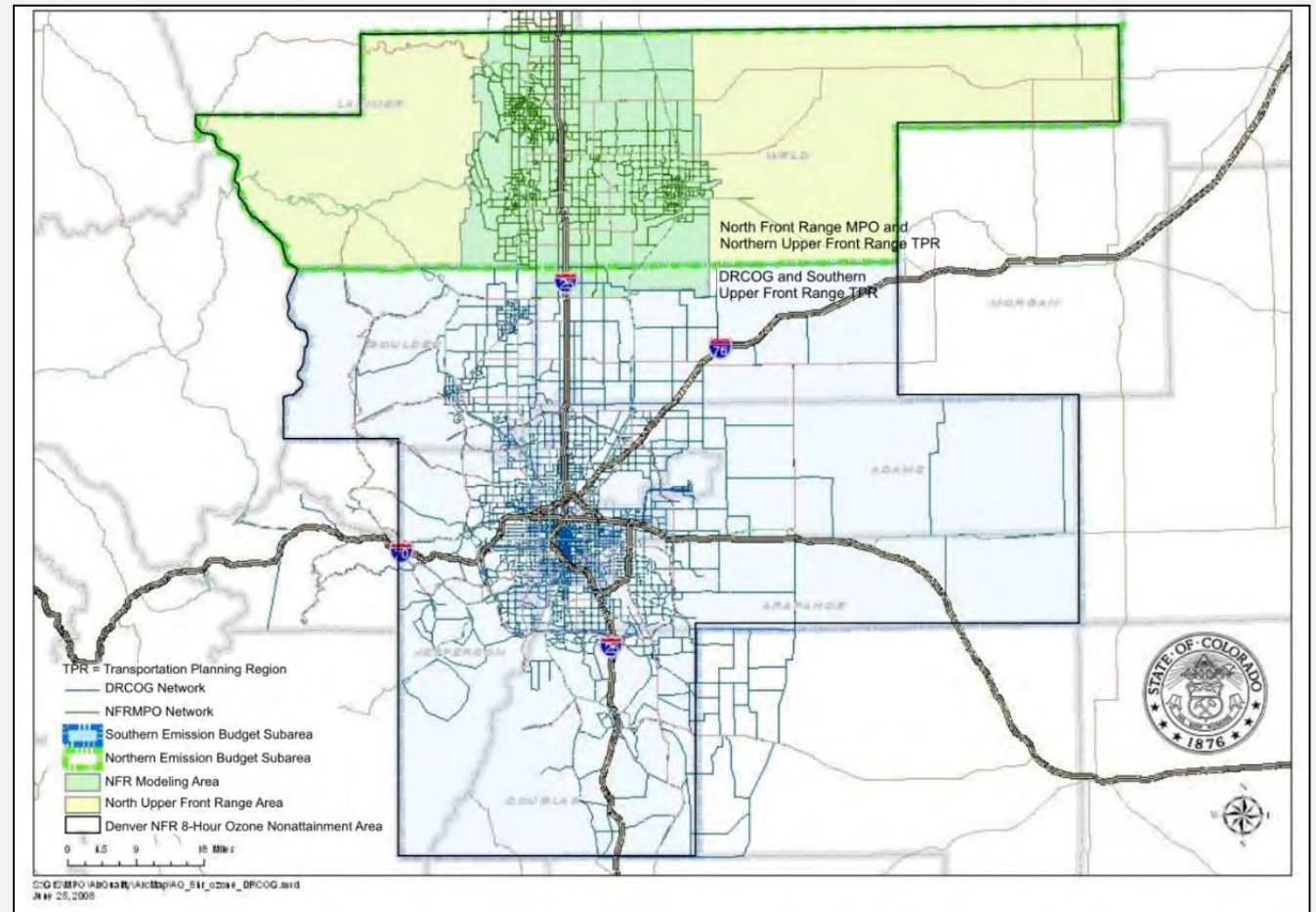
Both a regional and two subregional budgets are set for the two metropolitan planning areas within the ozone nonattainment area:

Northern Subregion

North Front Range Metropolitan Planning Organization (NFRMPO) planning area and northern portion of Upper Front Range Transportation Planning Region (TPR)

Southern Subregion

Denver Regional Council of Governments (DRCOG) planning area and southern portion of Upper Front Range TRP



SETTING OF NEW BUDGETS

- New, updated budgets are being set as part of the Serious SIP revision
- Based on 2020 mobile source emissions inventory
- Will be in effect for:
 - 2008 (75 ppb) Ozone NAAQS
 - 2015 (70 ppb) Ozone NAAQS
- Will be effective upon EPA's finding of adequacy or approval
 - Estimated mid to late 2021

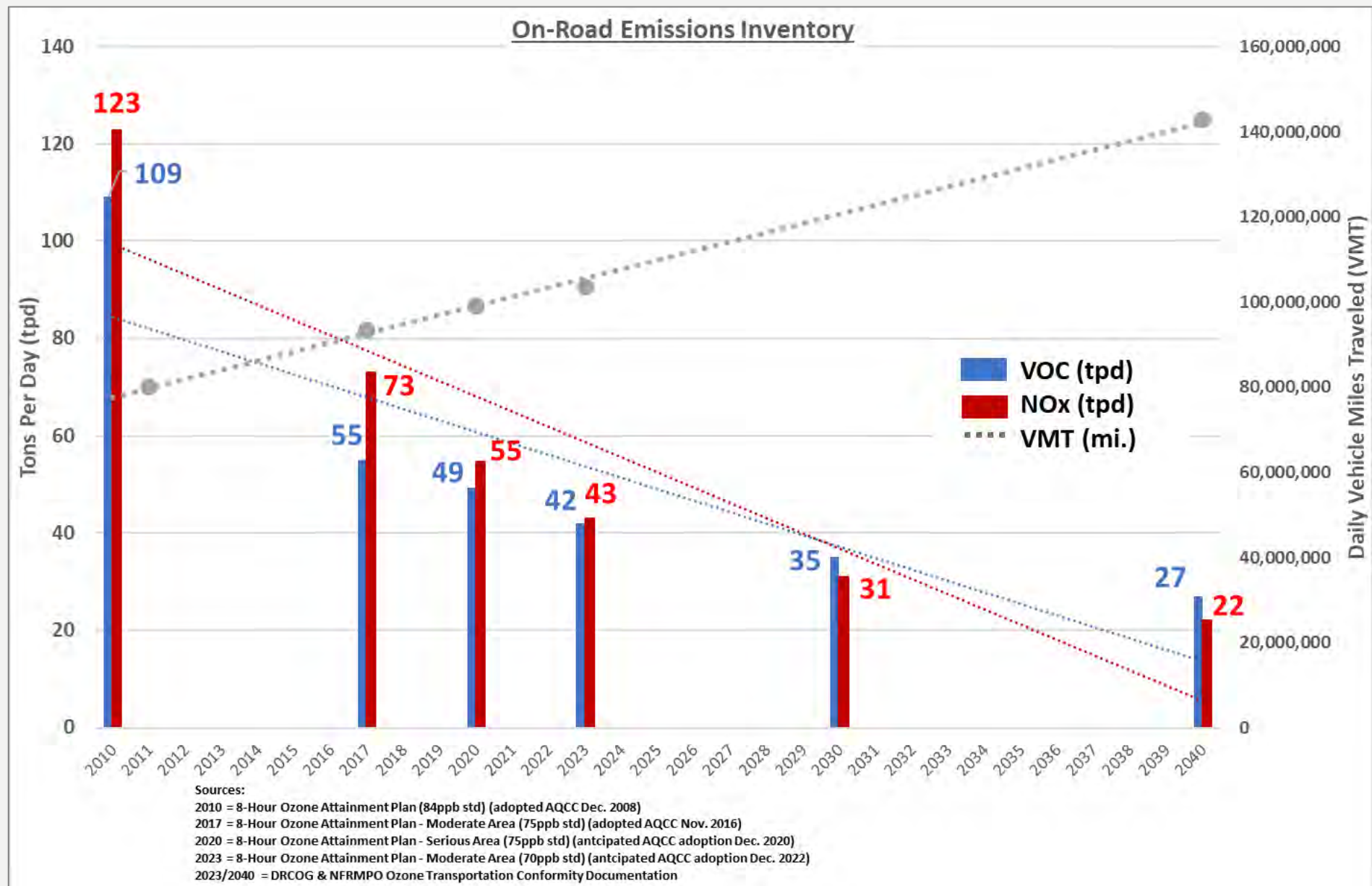
Motor Vehicle Emissions Budgets	2020	
	VOC (tpd)	NO _x (tpd)
Northern Subarea Budget (NFRMPO& UFR TPR Subarea)	8.2	9.7
Southern Subarea Budget (DRCOG & UFR TPR Subarea)	41.2	45.0
Total Nonattainment Area Budget (Entire Nonattainment Area)	49.4	54.7

* MVEB and subsequent conformity analyses are expressed as whole numbers.

6/17/2020

2020 AQCC Retreat

MVEB NOX AND VOC TRENDS



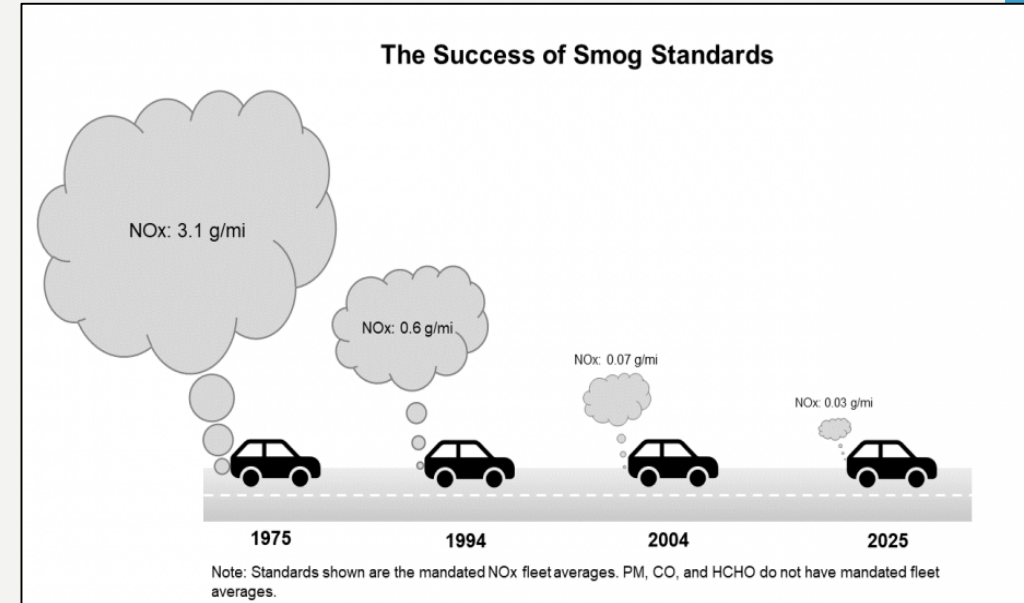
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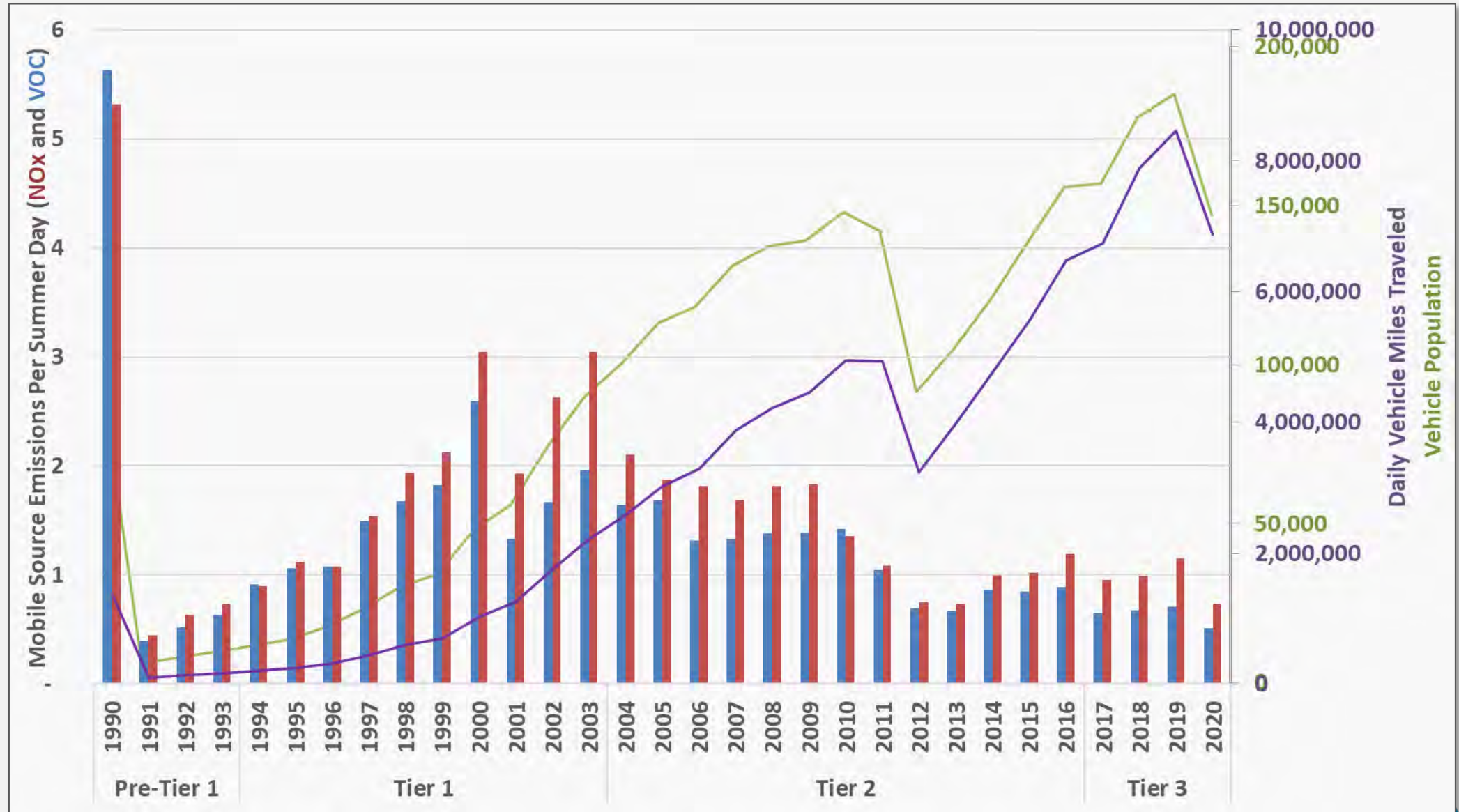


CLEAN FUEL FLEET PROGRAM

- Requires fleet operators with 10 or more centrally-fueled vehicles or vehicles capable of being centrally-fueled to include a specified percentage of clean-fuel vehicles (CFV) in their purchases each year.
- In March 2016, EPA noted, "These standards [i.e. CFV standards] have in effect been superseded by newer, more stringent standards", thus confirming that Tier 2 (i.e. Model Year 2004+) and newer vehicles exceed the requirements of the Clean Fuel Fleet Program (CFFP).
- Texas and Georgia have EPA approved SIPs that demonstrate that current vehicle standards (i.e. Tier 2/Tier 3) exceed the CFFP requirement.
- EPA has proposed revisions to this requirement, which will likely include a Zero Emission Vehicle (ZEV) component and which Colorado should be able to meet with the adoption of AQCC Reg. No. 20 in 2019.



DM/NFR NONATTAINMENT AREA ON-ROAD FLEET TRENDS



SERIOUS SIP SCHEDULE: REVIEW AND APPROVAL

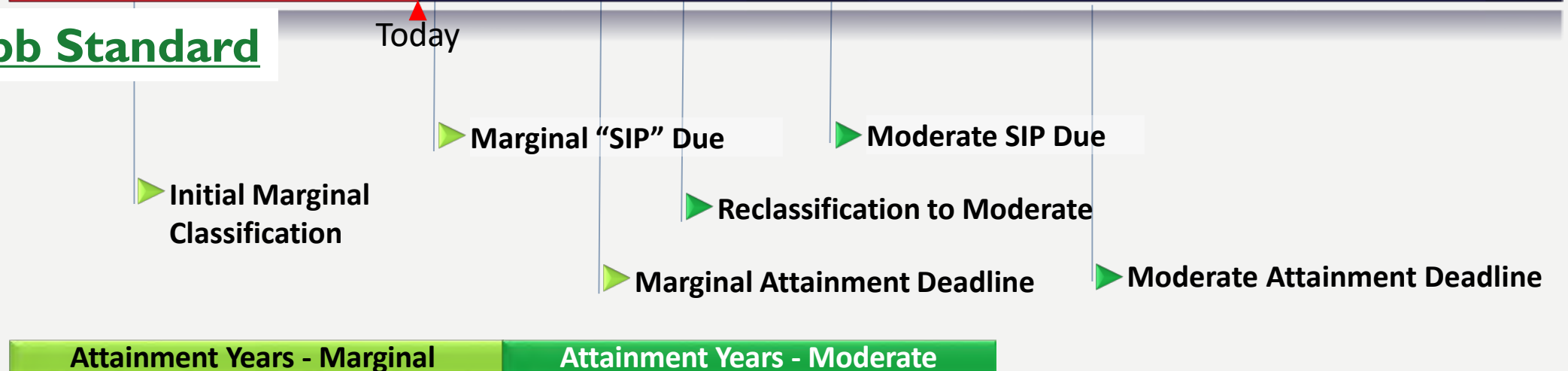
Action	Date
RAQC Board Review of SIP Chapters	Jan. –June 2020
DRAFT Proposed SIP to RAQC Board	July 10, 2020
FINAL Proposed SIP to RAQC Board for Endorsement	August 7, 2020
AQCC SIP Public Comment and Rulemaking Process	Sept. – Dec. 2020
Request for Rulemaking Hearing	Sept. 17, 2020
AQCC Rulemaking Hearing and SIP Approval	Dec. 16-18, 2020
Colorado Legislative Review of SIP Regulations	Jan. 2021
Serious SIP Submittal to EPA	Feb. 2021

OZONE PLANNING TIMELINE

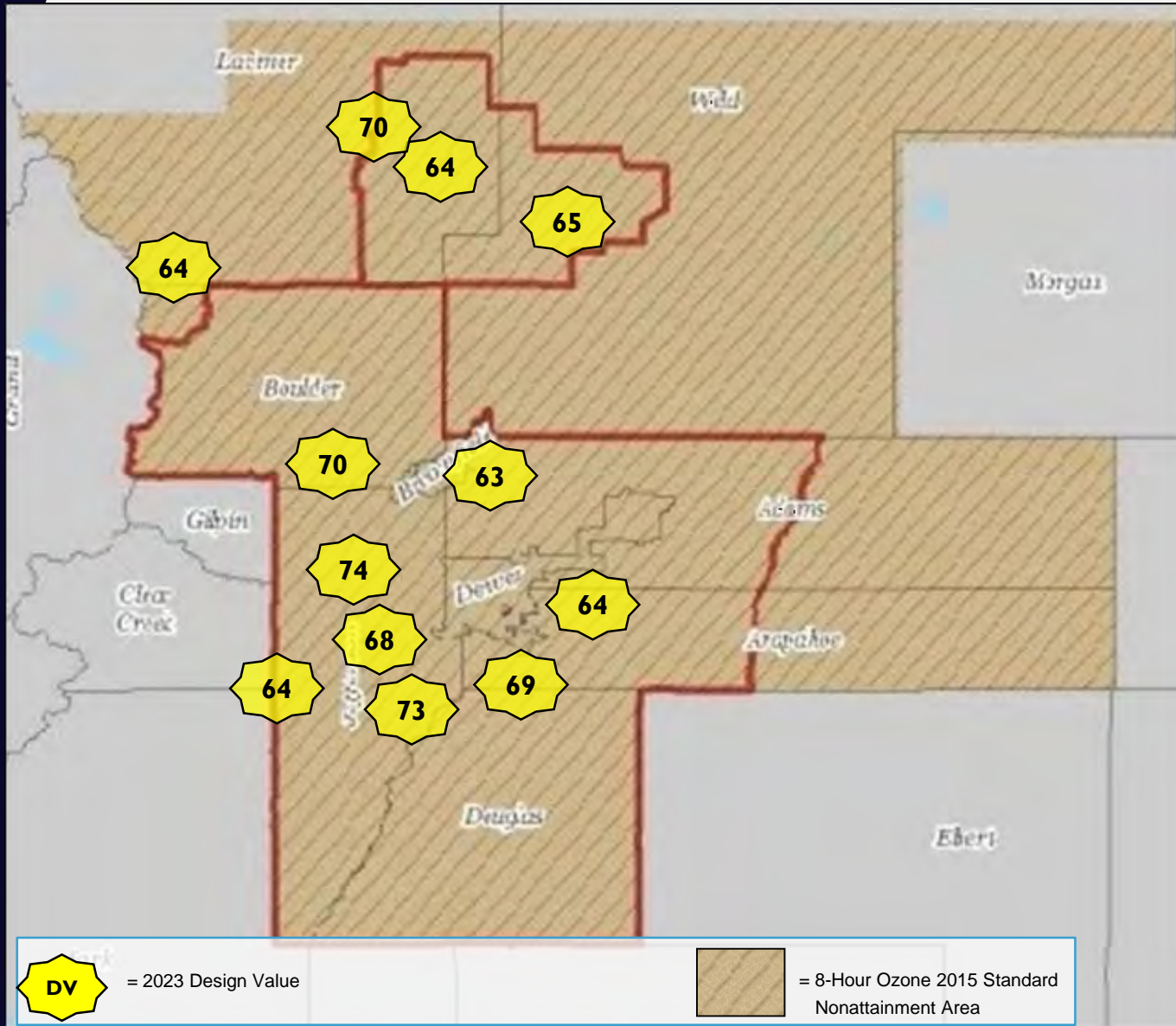
75 ppb Standard



70 ppb Standard

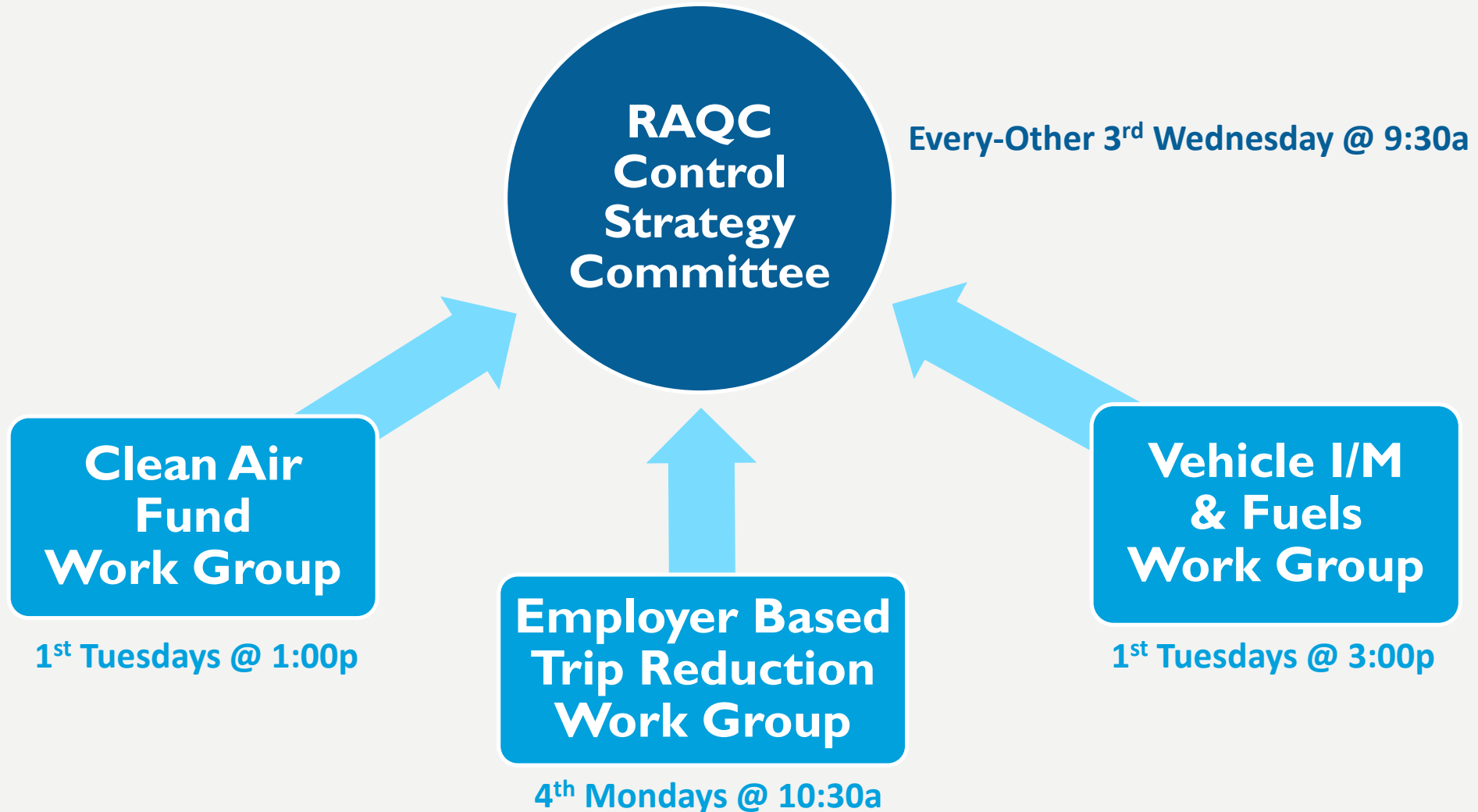


2023 FORECAST DESIGN VALUES (DVF) (3X3)



Monitor	2023 S10 3x3 Design Value (ppb)
Chatfield	73.1
Rocky Flats North	70.9
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Fort Collins West	70.8
Welby	63.4
Highlands	69.5
Aurora East	64.3
Welch	68.2
Aspen Park	64.8
Rocky Mountain NP	64.8
Fort Collins CSU	64.6
Greeley/Weld Twr	65.9

RAQC CONTROL STRATEGY COMMITTEE



Meetings open to the public. raqc.org/control-strategy-committee-information/
Sign-up for notifications: raqc.org/email-signup/



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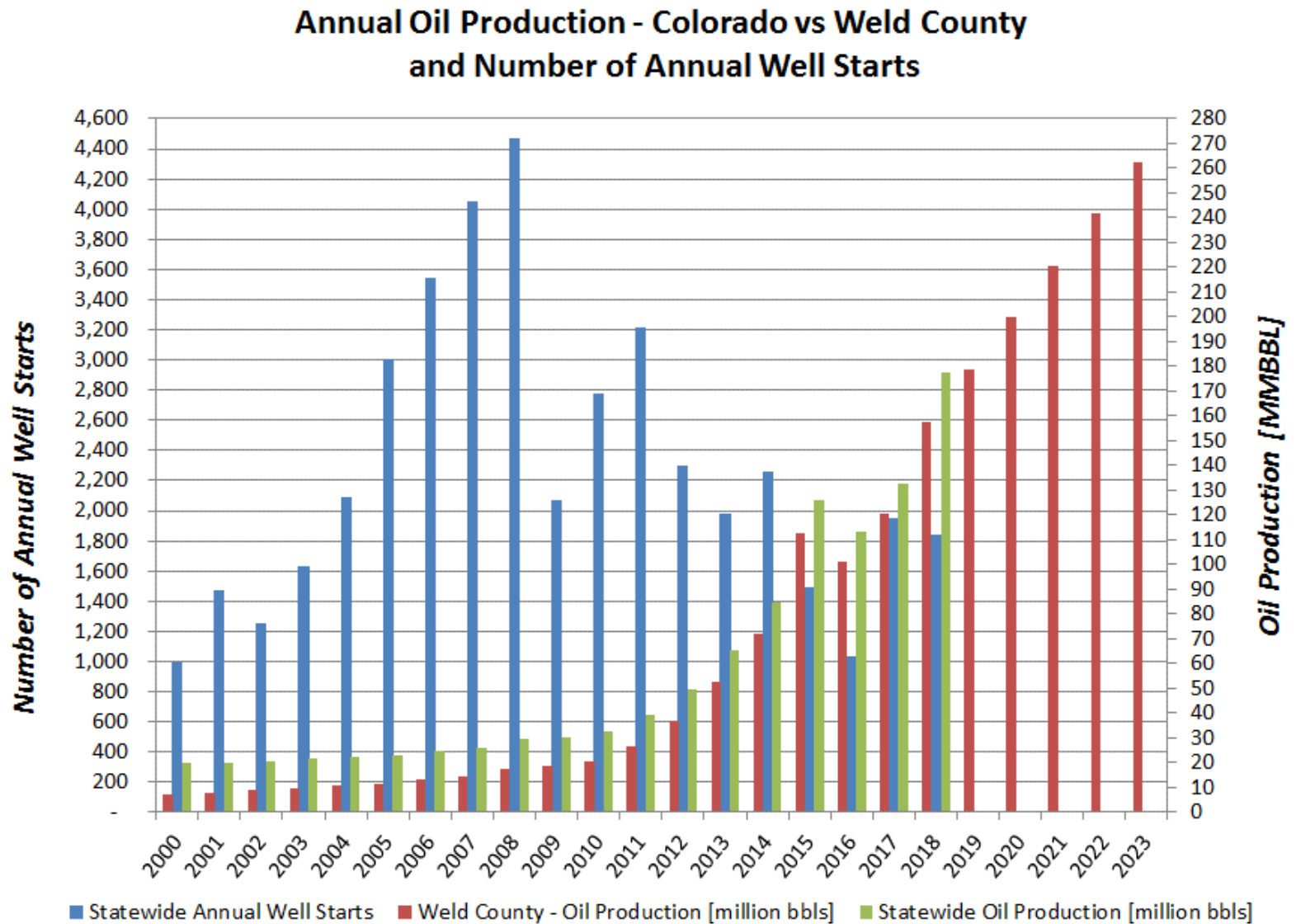




EXTRA SLIDES

O&G INVENTORY DEVELOPMENT – CONDENSATE TANKS

- Emissions calculated at facility level based on operator provided data
 - 90% systemwide control adjustment not needed
- Control factors (CE*RE)
 - Based facility level tank emission factor (lbs/bbl)
 - ≥ 9.0 lbs/bbl = 60.0% (0.75*0.80)
 - ≥ 1.0 lbs/bbl = 78.9% (0.95*0.83)
 - < 1.0 lbs/bbl = 86.0% (1.0*0.86)



Adams County Planning Commission
HEARING DATE: 7/8/21

(Please print)

NAME	ADDRESS (include city, state and zip code)	PHONE #	TOPIC	DO YOU WISH TO SPEAK		
				For	Against	Information
STEW Nyholm	13789 Franklin St	3-781-0642	O + G			
Christine Nyholm	"	981-0706	"			
Maras Daniel	9850 E. Castle Ave Greenwood Village CO 80112	31783-4800	Mile High Outdoor			
Chad Kochenberger	"	"	"			
Parchie Domant	451 Rio Ponds Driller	303-835-2127	Oil			
Randy Sprouse	15249 Xenia St. Thornton	3-514-3235	Oil & Gas	X		
Steve Yaussy	1337 W. 111th Ave Northglenn, CO 80234	(720)224-7516	Oil & Gas			
Amy Gallagher	50950 E 32nd Ave Broomfield CO 80022	303-5788	A + O	Y		
Frank Gallagher	"	303-8100584	G + O	X		
Lynn Eranger	6739 S Vandewater Way Aurora, CO 80016	303-916-6622	Oil & Gas Amendments			
Sj. Fredo Chaparro	15440 Edna Drive Brighton, CO 80603	720-951-8888	Oil & Gas	X		
Raymond A. Melix	8845 E. 150th Ct Thornton, CO 80602	303-523192	Oil & Gas			
Charles Lauthman	432 S. 14th Ave	303-258-7854	Oil & Gas			

not speak

Adams County Planning Commission
HEARING DATE: _____

(Please print)

NAME	ADDRESS (include city, state and zip code)	PHONE #	TOPIC	DO YOU WISH TO SPEAK		
				For	Against	Information
<i>Did not speak</i> Jeremy Raney	1014 McKenley Fort Lupton 80621	303-775-3642	Oil & gas			
<i>Did not speak</i> Roger Mann	145. 8th Ave Brighton 80601	720-342-5550	Oil & gas	X		
KNEE Harcourt MARIO BERTHIAUX	2770 W 68th NE 11	303-257-4803 11	Pomponio 11			
Christina Perry	4852 Canby St	812-240-2091	Pomponio			
JEN NEWMAN			Pomponio			
Emily & Jack Kelly	4801 Pecatur St		Pomponio			
Mariana Paim	2790 Westh Ave	646 430-4749	Pomponio			
Christopher Rees	11	214-404-6215	Pomponio		X	
Lyle Sharp	12361 E 136th Ave		Oil & Gas	X		

Adams County Planning Commission

(Please print)

[illegible]

Oil and Gas Regulation Amendments

PLN2021-00004

July 27, 2021

Board of County Commissions Public Hearing

Community and Economic Development Department

Case Manager: Greg Dean

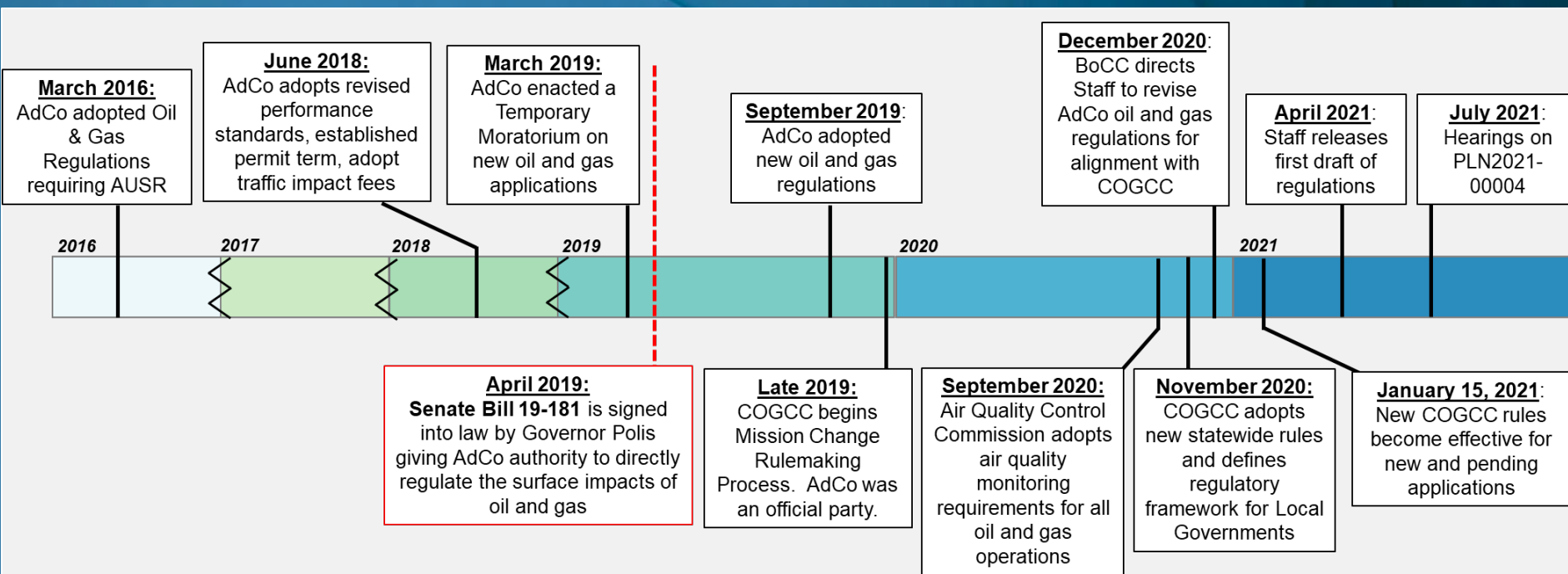


Request

- Amendments to the County's Development Standards and Regulations:
 - Chapter 2: Oil and Gas Facility (OGF) Permit Requirements & Process;
 - Chapter 4: Design Requirements & Performance Standards for OGF;
 - Chapter 11: Text to amend the definition of Environmentally Sensitive Areas; and
 - Appendix A: OGF Application and creation of a Development Application Guide

Background

- AdCo first adopted oil and gas regulations in 2016 and amended in 2018
- AdCo one of the first to adopt local regulations after passage of SB19-181, creating the Oil and Gas Facility (OGF) permit
- SB19-181 required the Colorado Oil and Gas Conservation Commission (COGCC) to revise their mission from fostering development to regulating in a protective manner



Background

Regulatory Framework Revisions of SB19-181

- Allows AdCo to regulate surface impacts of oil and gas development
 - ‘Necessary and reasonable’ regulations to protect public health, safety, welfare, the environment and wildlife resources
 - Land use, location, siting, nuisance-type impacts, cumulative impacts, inspections, etc.
- Enacted a co-equal regulatory regime between the COGCC and local governments
 - Requires Operators to obtain applicable local permits AND state permits
- Local governments can adopt regulations more protective than state standards
 - If there is a conflict between COGCC and local government rules the Operator must comply with the more protective standard
- Expanded consultation between local governments and COGCC during permitting

Criteria

(Section 2-02-15-06-01)

1. The text amendment is consistent with the Adams County Comprehensive Plan.
2. The text amendment is consistent with the purposes of these standards and regulations.
3. The text amendment will not be detrimental to the majority of persons or property in the surrounding areas nor to the community in general.

OGF Permit Requirements & Process – Chapter 2

Proposed Text Amendments:

Alternative Site Analysis (ALA):

- Maintain the provision in the current rules requiring an ALA for all applications
- Each site must be 500-feet apart and determined uniquely distinct from one another by the Director of CED.
- Staff consultation with COGCC during the pre-application phase.

Disproportionately Impacted Communities:

- Require Operators to identify these communities within one (1) mile of the proposed OGF and present plans for adequate and equitable engagement
 - Based on primary/secondary languages, culturally appropriate communication and socio-economic factors that could impact availability/access to information and community participation

Landowner/resident notice:

- Expand the notice to property owners and residents around an OGF application from one-half mile (1/2) to one (1) mile.

OGF Permit Requirements & Process – Chapter 2

Proposed Text Amendments (cont'd):

Permit Expirations:

- Maintain the three (3) year expiration term for OGFs.
- At the end of the term the approval will lapse for any wells that have not been completed; requiring a new OGF permit in order for the Operator to return to the facility. Remove provisions that permanently vests an OGF approval with the drilling of only one well.

Maintain two permit pathways and waiver process:

- 1) *Administrative Process* – all criteria and required standards met
- 2) *Public Hearing Process* – non-administrative waivers requested from DSR

Setback Waiver Criteria:

- Define approval criteria for non-administrative waivers requiring substantially equivalent protections, to be made by the BoCC.
 - Criteria for evaluating such can include: compatibility with surrounding land uses, location and number of receptors, size, duration, and intensity of proposal, residential waivers obtained, and cumulative impacts.
 - Mitigation measures must be as equally protective as setback distance in the form of: facility design, best management practices, control measures and technologies
 - Maintain provision for administrative waivers for setbacks

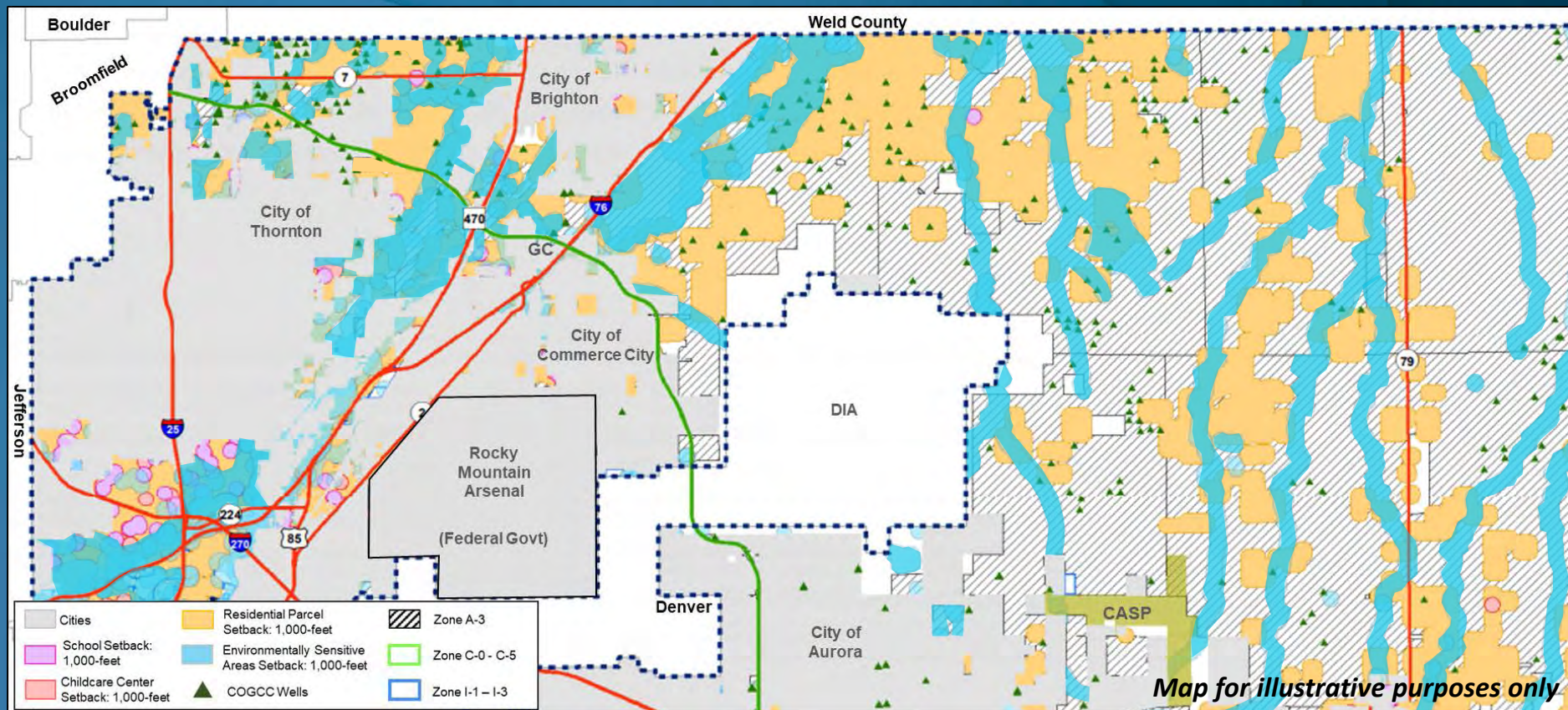
OGF DS&R – Chapter 4

Proposed Text Amendments:

Setbacks:

- Increase setbacks from 1,000-feet to 2,000-feet to existing residences, platted residential lots, school facilities, daycares, high occupancy buildings, environmentally sensitive areas, and parks and open spaces.
- New conforming setback of 1,000-feet from certain groundwater and aquifer wells.
- Clarify the measurement of setbacks from the edge of the OGF to the property line, not the access road.

Current AdCo Setback Map:



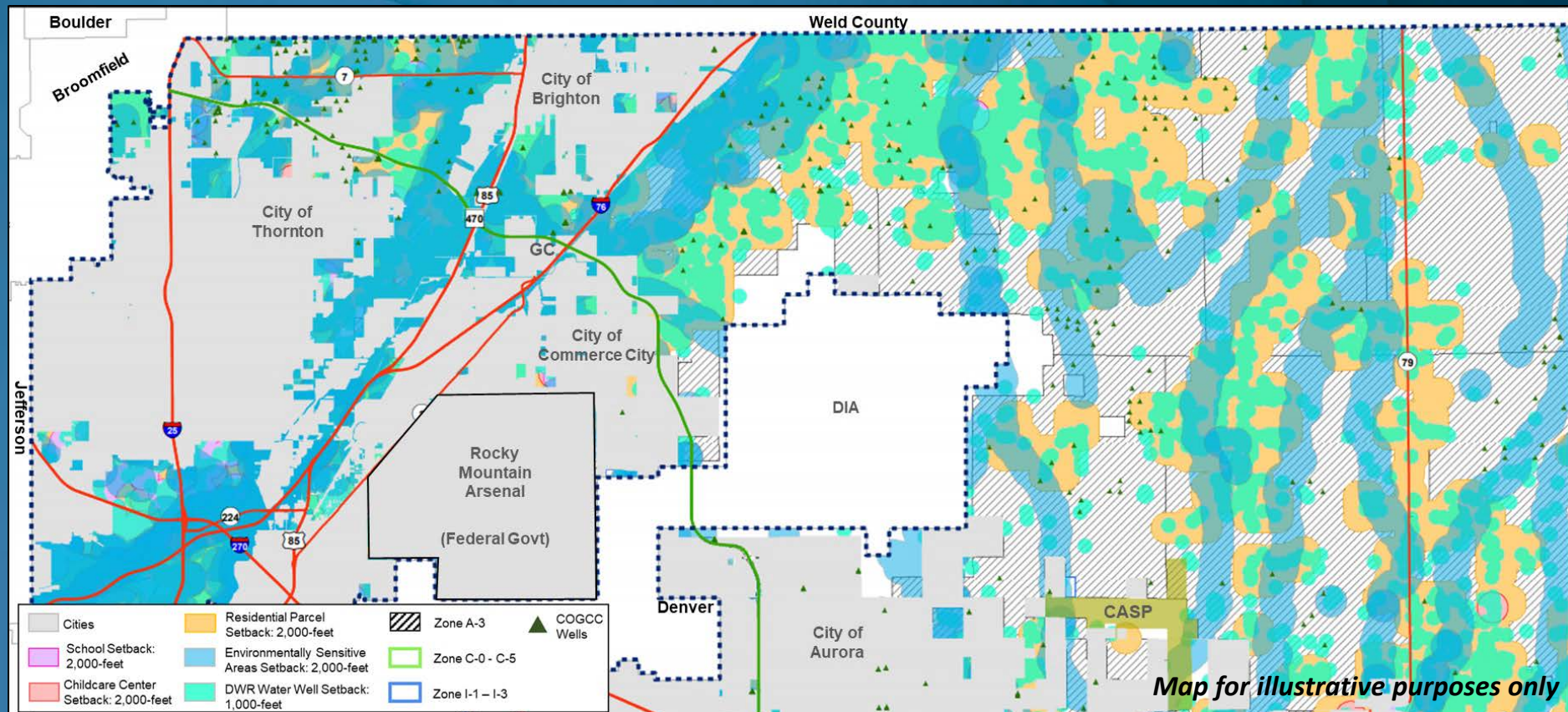
OGF DS&R – Chapter 4

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- New conforming setback of 1,000-feet from certain groundwater and aquifer wells.
- Clarify the measurement of setbacks from the edge of the OGF to the property line, not the access road.

Staff Proposed Setback Map:

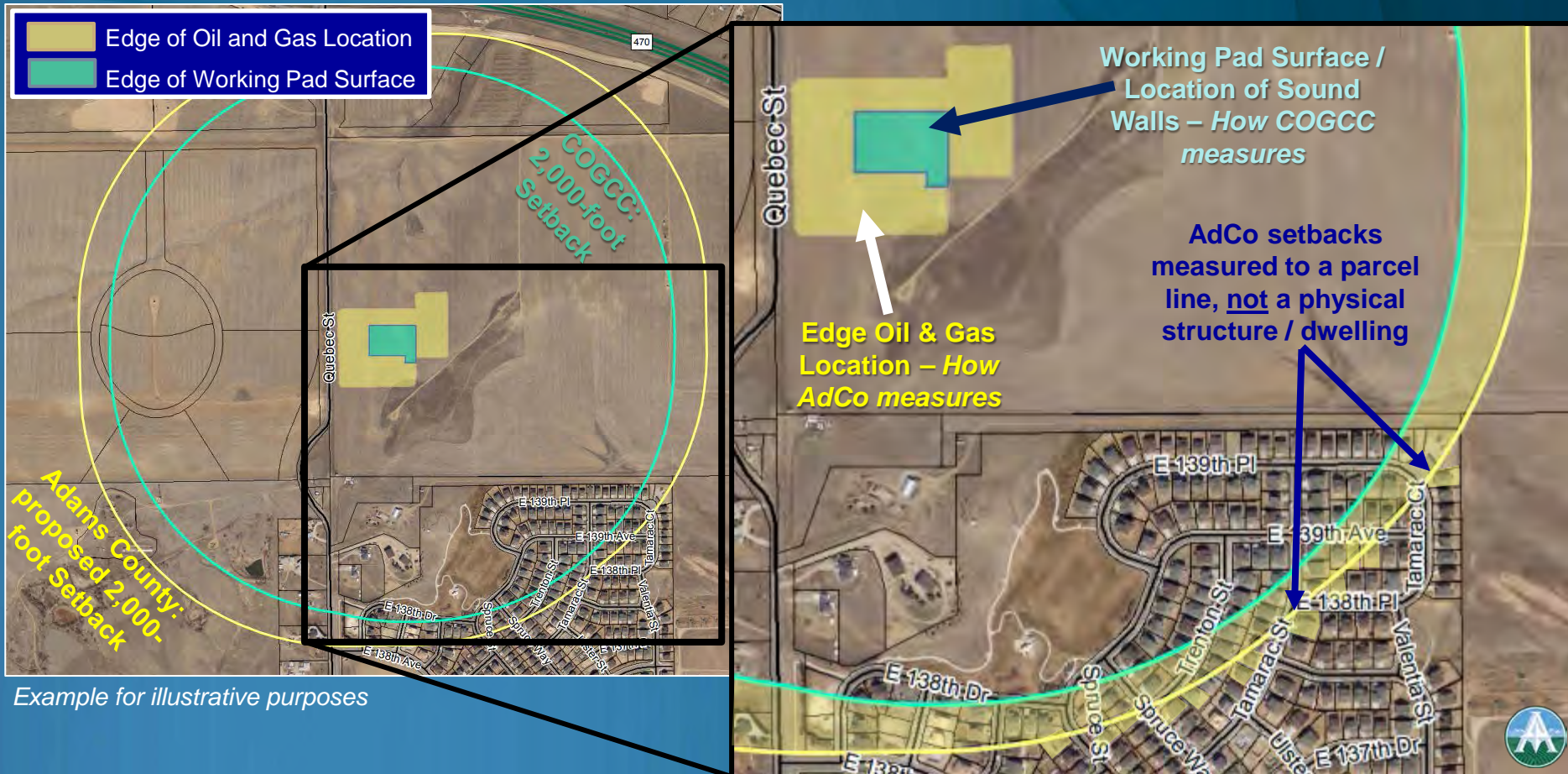


OGF DS&R – Chapter 4

Proposed Text Amendments:

Setbacks Measurements:

- From the edge of the Oil and Gas Location to the parcel or property lines of an existing residence, platted residential lot, school or daycare facility rather than to a physical dwelling / building
- Setback measurement does not include the access road



OGF DS&R – Chapter 4

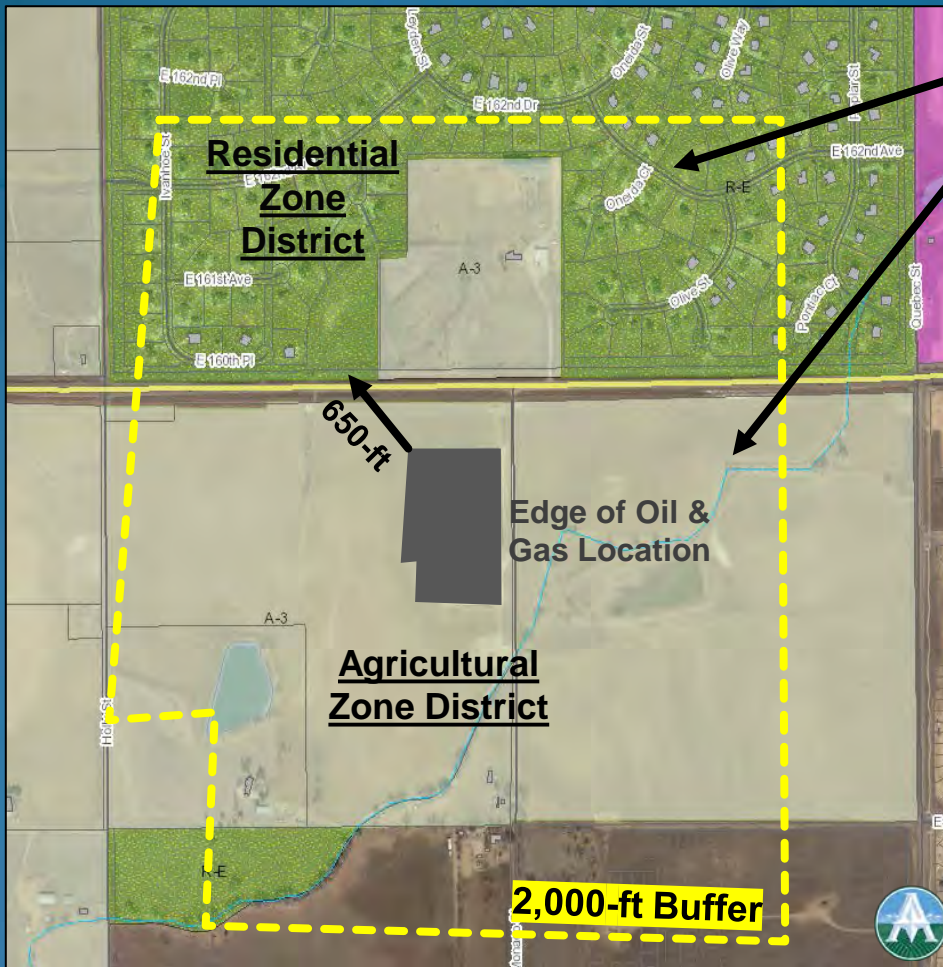
Proposed Text Amendments:

COGCC Table 423-1: Maximum Permissible Noise Levels

LAND USE DESIGNATION	7:00 am to next 7:00 pm	7:00 pm to next 7:00 am
Residential/ Rural/State Parks & State Wildlife Areas	55 db(A)	50 db(A)
Commercial/Agricultural	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)
All Zones	60 db(C)	60 db(C)

Noise Impacts:

- Require an Operator to conduct continuous noise monitoring for OGFs within one-half (1/2) mile of any existing residences, schools, or daycares.
- Require an Operator to attenuate noise from an OGF to the max allowable sound level in COGCC rules for adjacent land uses within 2,000-feet at the zone boundary.
- Require the Operator to utilize County approved sound professionals to comply with all noise impact requirements.



Example for illustrative purposes

OGF DS&R – Chapter 4

Proposed Text Amendments:

Other Nuisance-Type Impacts:

- Can require an Operator collect and analyze a speciated air sample.
- Can require other best management practices on a site-specific basis to avoid and mitigate impacts.

Cumulative Impacts:

- Require Operators to evaluate and address potential immediate and long-term cumulative impacts from the proposed OGF and all reasonably foreseeable development of other oil and gas activity and existing heavy industrial operations within one (1) mile radius.
- Can require the submission of quantitative and qualitative data and analysis for:
 - Air Quality, Public Health and welfare, Traffic, and Environmental Resources

Community Outreach:

- Require Operators to conduct quarterly neighborhood meetings for all OGFs within one (1) mile of residences, schools or daycares from permit approval.
- Can require an Operator provide notices and materials in languages other than English and provide interpretation services at neighborhood meetings.

Chapter 11 Definitions

Proposed Text Amendments

- Environmentally Sensitive Areas
 - Environmentally sensitive areas include, but are not limited to, wetlands, biological resources, habitats, streams, including ephemeral and intermittent, lakes, rivers, springs, national parks, archaeological/historic sites, natural heritage areas, tribal lands, drinking water sources, intakes, marinas/boat ramps, and wildlife areas.

OGF Application and Development Application Guide – Appendix A Proposed Amendments:

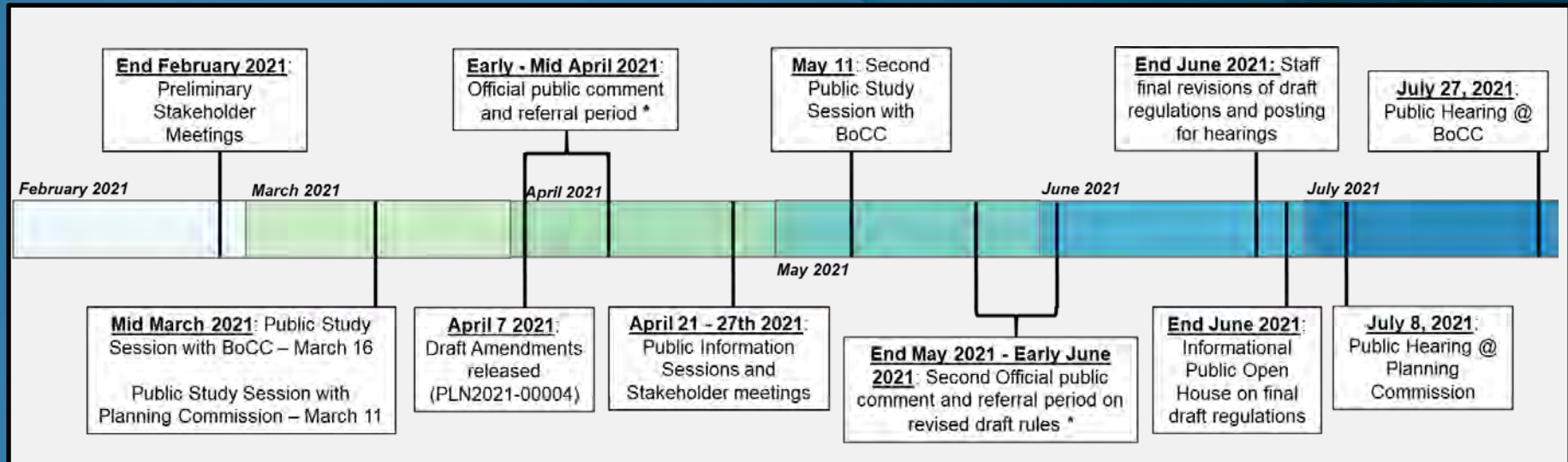
Development Application Guide (Guide):

- Relocate all application submittal requirements from Chapter 2 and Chapter 4 of Adams County Development Standards and Regulations into the new Guide.
- Guide provides specific details on all OGF application submission requirements for the determination of completeness and subsequent review by Staff.
- Guide will allow Director of CED to make periodic changes to the application submission requirements without initiating a formal text amendment process.
- Details all impact plan submission requirements including:
 - Operations Plan
 - Emergency Preparedness / Response Plan
 - Transportation Plan
 - Noise Mitigation Plan
 - Lighting Mitigation Plan
 - Odor Mitigation Plan
 - Dust Mitigation Plan
 - Visual Aesthetics Plan
 - Community Outreach Plan
 - Cumulative Impacts Plan
 - Water and Wildlife Protection Plan
 - Worker Safety Compliance Statement
- The Guide is consistent with other land use application processes

Public & Stakeholder Outreach

Date	Stakeholder / Group
February 18, 2021	Emergency Management and Response
February 18, 2021	Residents / Neighborhood Groups / Environmental Groups
February 22, 2021	Industry Groups / Operators / Trade Organizations
February 22, 2021	State Agencies / Local Governments / Fire Districts / Water Districts
February 23, 2021	Residents / Neighborhood Groups / Environmental Groups
April 6, 2021	1 st Draft Referral
April 21, 2021	Residents / Neighborhood Groups / Environmental Groups

Date	Stakeholder / Group
April 22, 2021	State Agencies / Local Governments / Fire Districts / Emergency Response / Water Districts
April 26, 2021	Industry Groups / Operators / Trade Organizations
April 27, 2021	Residents / Neighborhood Groups / Environmental Groups
May 18, 2021	2 nd Draft Referral
June 8, 2021	Neighborhood Group
June 16, 2021	Industry Groups / Operators
June 17, 2021	Operator
June 29, 2021	Public Open House Event – Residents



Referral Comments

- 272 Request for Comments Issued:

Initial Draft Referral	April 6, 2021 – April 28, 2021
Revised Draft Referral	May 19, 2021 – June 9, 2021
Website Posting	April 6, 2021; May 19, 2021 & June 28, 2021
Public Notice Published	June 25, 2021
- 98 Individual and Organized Group comment submissions:
 - TCHD, State agencies, other local governments, Water Districts, and School Districts
 - Resident / Neighborhood Groups / Environmental Groups
 - Individual residents and property owners
 - Oil and Gas Operators
 - Industry Organizations
- Final draft posted for Planning Commission Public Hearing
June 28, 2021

Summary of Comments

- Concerns over scope, application, and technical aspects of performance standards;
- Comments regarding the alignment of performance standards with state regulations and that proposed regulations are either too prescriptive and burdensome or not protective enough; and
- Requests to include performance standards for operations not under authority of AdCo; and to address topics not within the scope of this phase of amendments

Referral Comments

- Majority of substantive concerns have been addressed by modifications to the proposed regulations
- Revisions resulted in:
 - Technical, legal, and administrative clarifications
 - Additional, Modified or Removed Requirements

Planning Commission Update

- The Planning Commission considered this case on July 8, 2021 and voted (4-3) to recommend approval of the request
 - 13 members of the public spoke
 - Planning Commission asked Staff questions regarding the application and measurement of setbacks, the scientific justification of Staff's proposals, enforceability and compliance mechanisms of County rules, and technical questions regarding proposed noise provisions.

Recommendations

- Staff recommends **Approval** (PLN2021-00004) based on 3 Findings-of-Fact and 1 Condition.
 1. The text amendment is consistent with the Adams County Comprehensive Plan.
 2. The text amendment is consistent with the purposes of these standards and regulations.
 3. The text amendment will not be detrimental to the majority of persons or property in the surrounding areas nor to the community in general.

Condition:

1. Community and Economic Development Department Staff may make minor corrections to these text amendments until August 10, 2021 including but not limited to, typographical errors, to ensure consistency and accuracy throughout the regulations.



**COMMUNITY AND ECONOMIC DEVELOPMENT
DEPARTMENT**

CASE NO.: RCU2021-00004

CASE NAME: Mile High Outdoor 7850 Federal Blvd. Billboard Conversion

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- 2.4 Future Land Use Map

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- 3.1 Written Narrative
- 3.2 Site Plan and Supplemental Information

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- 4.1 Adams County - Development Review Team Comments
- 4.2 Adams County Fire Rescue
- 4.3 Adams County Sheriff's Office
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- 4.5 Colorado Department of Public Health and Environment
- 4.6 Colorado Department of Transportation
- 4.7 Regional Transportation District
- 4.8 Tri-County Health Department
- 4.9 Xcel Energy
- 4.10 Public Comment - Gantos
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- 5.1 Request for Comments
- 5.2 Public Hearing Notice
- 5.3 Newspaper Publication
- 5.4 Referral Agency Labels
- 5.5 Property Owner and Resident Labels
- 5.6 Certificate of Posting



**COMMUNITY AND ECONOMIC DEVELOPMENT
DEPARTMENT
STAFF REPORT**

Board of County Commissioners

July 27, 2021

Case Number:	RCU2021-00004
Case Name:	Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
Property Owner's Name:	Fairview Co.
Applicant's Name:	Chad Kochenberger, Mile High Outdoor
Applicant's Address:	9250 E. Costilla Ave. Ste. 500, Greenwood Village, CO 80112
Location of Request:	7850 Federal Blvd., Westminster, CO
Nature of Request:	Conditional Use Permit for existing billboard. Applicant would also like to convert from a static sign to a two-sided digital LED sign with the same dimensions.
Zone District:	Commercial-5 (C-5)
Future Land Use:	Urban Residential
Site Area:	0.3111 Acres (13,552 sq. ft.)
Existing Use:	Commercial/ Electronic Billboard
Proposed Use:	Commercial/ Electronic Billboard
Hearing Date(s):	PC: July 8, 2021 / 6:00 pm BoCC: July 27, 2021 / 9:30 am
Report Date:	June 24, 2021
Case Manager:	Alan Sielaff
Staff Recommendation:	APPROVAL with 8 Findings-of-Fact, 4 Conditions, and 2 Notes to the applicant.

SUMMARY OF APPLICATION

Background:

The applicant, Chad Kochenberger of Mile High Outdoor sign company, is requesting a conditional use permit to continue use of an existing off-premise sign (billboard) in the Commercial-5 (C-5) zone district at 7850 Federal Blvd. This sign was originally approved and constructed in 2011 as a 35-foot tall, 300 square-foot two-sided off-premise sign, which included a variation to the required setback distance to allow 7.5 feet from the north property line and an operational condition that limited use of lighting during overnight hours from 10 pm to 6 am. With this new request, the applicant is proposing to preserve the existing sign structure and convert the two-side sign face to an electronic sign and is also requesting removal of the limitation in overnight lighting.

Site Characteristics:

The subject property is approximately 13,500 sq. ft. in size and is currently developed with an automotive service garage. The parcel is adjacent to an alley and residential uses to the east, commercial uses to the north and south, and Federal Blvd. and a Highway 36 on-ramp to the west, with residential uses farther west. The billboard is located in the northwestern portion of the parcel, roughly 39 feet from the western property line, 7.5 feet from the northern property line, 109 feet from the eastern property line, and 60 feet to the southern property line. All setbacks listed above are measured from the leading edge of the sign. The measurements on the site plan are slightly greater, as the provided measurements to the north and south are taken from the sign pole.

Development Standards and Regulations:

The property is zoned Commercial-5 (C-5). Section 3-23-01 of the County's Development Standards and Regulations (DSR) states the purpose of the C-5 district is to serve as a general retail and service district designed to provide the broadest scope of services and products for both the general and traveling public in an interstate and regional context. In certain situations, it may be appropriate through a conditional use permit to allow a mix of uses in this zone district – allowing both residential and commercial uses within one building. Off-premise advertising devices are permitted with an approved Conditional Use Permit in the C-5 district.

Section 4-16 of the DSR outlines the required design and performance standards for billboards, which includes standards for electronic signs. These standards ensure outdoor advertising devices are properly located to minimize visual and physical impacts to surrounding properties. Required design standards include maximum height, maximum sign area, number of billboards allowed per lot, minimum setbacks from property lines, and minimum spacing from other off-premise signs.

The applicant has provided a site plan and elevation renderings with the subject request. Although the C-5 zone district allows structures up to 40 feet in height, the billboard is currently 35 feet in height; this was a condition of approval of the previous permit. The sign has two faces, with each being three hundred (300) square feet per sign face (10 feet high and 30 feet wide) and conforms to the maximum sign area of 300 square feet for each single sign face.

Section 4-16-07 of the DSR outlines other limitations for off-premise signs. The minimum right-of-way and property line setback requirements shall be equal to the height of the billboard, as measured from the leading edge of the sign face. Variations in the setback requirement may be granted with the issuance of a Conditional Use Permit. The existing billboard is 35 feet in height and so the setback distance from the adjacent right-of-way and property lines would be required to be a minimum of 35 feet. A waiver was granted with the initial approval to allow the 7.5-foot setback to the north property line, and with the structure not proposed to be relocated a similar variation is included with this request. The sign is approximately 45 feet from the structure on the neighboring property to the north.

Section 4-16-03 of the DSR allows only one off-premise sign is permitted per lot. In addition, all off-premise signs located on the same side of a road or highway shall be separated by a minimum of 2,000 linear feet. The existing billboard is the only billboard permitted on the property and the applicant has provided a map demonstrating that no billboards are within 2,000 linear feet of the subject site, with the nearest more than one mile to the south.

Section 4-16-06-02 of the DSR allows electronic sign as part of a billboard. Performance standards for electronic signs include duration of message, transition of message, prohibited electronic devices, and maximum brightness. Each message displayed shall remain static for a minimum of four seconds, with 10 seconds being optimal, and must transition immediately to the next message displayed. All such signs shall have a default mode to prevent the display from malfunctioning in a flashing or intermittent fashion. Electronic devices shall not display animated images or graphics, scrolling messages, videos, or emit audible sounds. In addition, each sign shall be equipped with light monitors and controls that automatically adjust to environmental/outside conditions. According to the applicant, the proposed billboard will conform to all electronic sign performance standards, and the applicant is proposing a longer duration of message time of eight (8) seconds. The sign will display only static messages and shall not exceed the maximum brightness of 0.3 footcandles during nighttime hours from sunset to sunrise. A lighting diagram of anticipated areas impacted has been provided in Exhibit 3.2

The applicant is requesting the previous restriction on overnight lighting be removed with the proposed conversion to an electronic sign. The applicant states the sign will be equipped with automated light dimming technology that adjusts brightness to the ambient light conditions in the area and will keep the sign in full compliance with brightness standards required by the County and the State. Further, the applicant states the current upward facing halogen bulbs on the current static billboard actually creates greater light spillage than the digital screens during the hours in which lighting is allowed. The sign will be equipped with light blocking louvers and down angled LEDs to focus the light and image at the intended viewing audience. For areas outside of the viewing area, the applicant states sign images will not be visible and will be prepared to discuss the technology in greater detail if requested during the applicant presentation.

In addition to the Adams County Development Standards and Regulations, the proposed billboard must also show compliance will all the requirements of the Colorado Outdoor Advertising Act, C.R.S. 43-1-401 et. Seq. and the Colorado rules and regulations promulgated thereunder by the Colorado Department of Transportation.

Future Land Use Designation/Comprehensive Plan:

The future land use designation on the property is Urban Residential. Per Chapter 5 of the Adams County Comprehensive Plan, Urban Residential areas are designated for single and multiple family housing, typically at urban densities of one dwelling per acre or greater. These areas are intended to provide for development of residential neighborhoods with a variety of housing types, with adequate urban services and transportation facilities. Urban residential areas may include supporting neighborhood commercial uses designed to serve the needs of nearby residents.

The recommendation of approval for the subject billboard is based strictly on the criteria of approval for a Conditional Use Permit; however, it is important to discuss the project's compliance with the applicable subarea plans. The Comprehensive Plan and its adopted subarea plans are intended to provide guidance for future development within the County. The subject parcel is located within the Southwest Area Framework Plan. The Southwest Area Framework Plan is an adopted plan in the Comprehensive Plan. The plan includes a Policy 14.7 to *Enhance the area's role as an important County Gateway*. Strategies in completing the goals include:

1. 14.7.a. *Entryway Image* – Initiate landscaping, streetscaping, and buffering programs to improve the entryway image of the County as viewed from I-70, I-25, and I-76 and key highway exits into the County;
2. 14.7.b. *Screening and Buffering* – Require improved buffering for new development along the I-70, I-25, and I-76 corridors, and require screening for new outdoor storage and activities visible from I-70, I-25, and I-76; and
3. 14.7.c *Signs* – Review and update the sign regulation provisions, including control of off-premise signs, applicable to private lands visible from I-70, I-25, and I-76 and key highway exits into the County.

Strategy 14.7.c suggests that the County should update the sign code to potentially control the number of off-premise signs permitted along gateways into Adams County. The plan also suggests that setbacks and buffers from I-25 and I-76 should be greater than in other areas of the County.

Surrounding Zoning Designations and Existing Use Activity:

Northwest Federal Blvd./ City of Westminster	North C-5 Car Wash	Northeast R-1-C Single Family Dwelling
West Federal Blvd./ City of Westminster	Subject Property C-5 Auto Repair	East R-1-C Single Family Dwelling
Federal Blvd./ City of Westminster HW-36 On-Ramp	South C-5 Auto Repair	Southeast R-1-C Single Family Dwelling

Compatibility with the Surrounding Area:

The subject parcel is located east of Federal Blvd. and just north of Cottonwood Dr., and further north of the on- and off-ramps onto Highway 36. The properties to the east of the subject parcel

are zoned for residential uses. The properties to the south and north are zoned commercial, and to the west across Federal Blvd. and the west-bound onramp onto Highway 36 are single-family residential uses within the City of Westminster.

Planning Commission Update:

The case was heard by the Adams County Planning Commission on July 8, 2021. Members of the Commission had questions regarding the existing lighting of the sign, the brightness of the proposed electronic sign at night, the previous limitation on overnight lighting, and whether the sign faces will be back-to-back or V-shaped. No members of the public spoke at the hearing.

Staff Recommendation:

Based upon the application, the criteria for approval of a Conditional Use Permit, Staff recommends APPROVAL of the subject request with 8 Findings-of-Fact, 4 Conditions, and 2 Notes to the applicant.

Recommended Findings-of-Fact:

1. The conditional use is permitted in the applicable zone district.
2. The conditional use is consistent with the purposes of these standards and regulations.
3. The conditional use will comply with the requirements of these standards and regulations, including but not limited to, all applicable performance standards.
4. The conditional use is compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County.
5. The conditional use permit has addressed all off-site impacts.
6. The site is suitable for the proposed conditional use including adequate usable space, adequate access, and absence of environmental constraints.
7. The site plan for the proposed conditional use will provide the most convenient and functional use of the lot including the parking scheme, traffic circulation, open space, fencing, screening, landscaping, signage, and lighting.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are available and adequate to serve the needs of the conditional use as designed and proposed.

Recommended Conditions of Approval:

1. The applicant shall obtain a building permit from Adams County for the billboard, including all required building permit inspections.
2. The maximum height of the sign is to remain at 35 ft. in compliance with the Commercial-5 zone district maximum height.
3. Each message displayed on the billboard shall remain static for a minimum of eight (8) seconds and must transition immediately to the next message displayed.
4. The approval of the off-premise sign shall expire July 27, 2031.

Recommended Notes to the Applicant:

1. All applicable building, zoning, health, fire, and engineering requirements and codes shall be adhered to with this request. The applicant may submit an alternative design that

can be approved through a Minor Amendment to this Conditional Use Permit by staff, as long as the design complies with the Adams County Development Standards and Regulations at the time of building permit application.

2. The conditional use permit shall expire on July 27, 2022 if building permits are not obtained from Adams County for the digital sign conversion.

PUBLIC COMMENTS

Notifications Sent	Comments Received
199	1

All property owners and occupants within 800 feet of the subject property were notified of the request. As of writing this report, staff has received one public comment in opposition to conversion of billboard to an electronic sign out of concern of the brightness during nighttime hours.

REFERRAL AGENCY COMMENTS

Staff notified several Referral Agencies throughout this process and no concerns were identified.

Responding with Concerns:

None

Responding without Concerns:

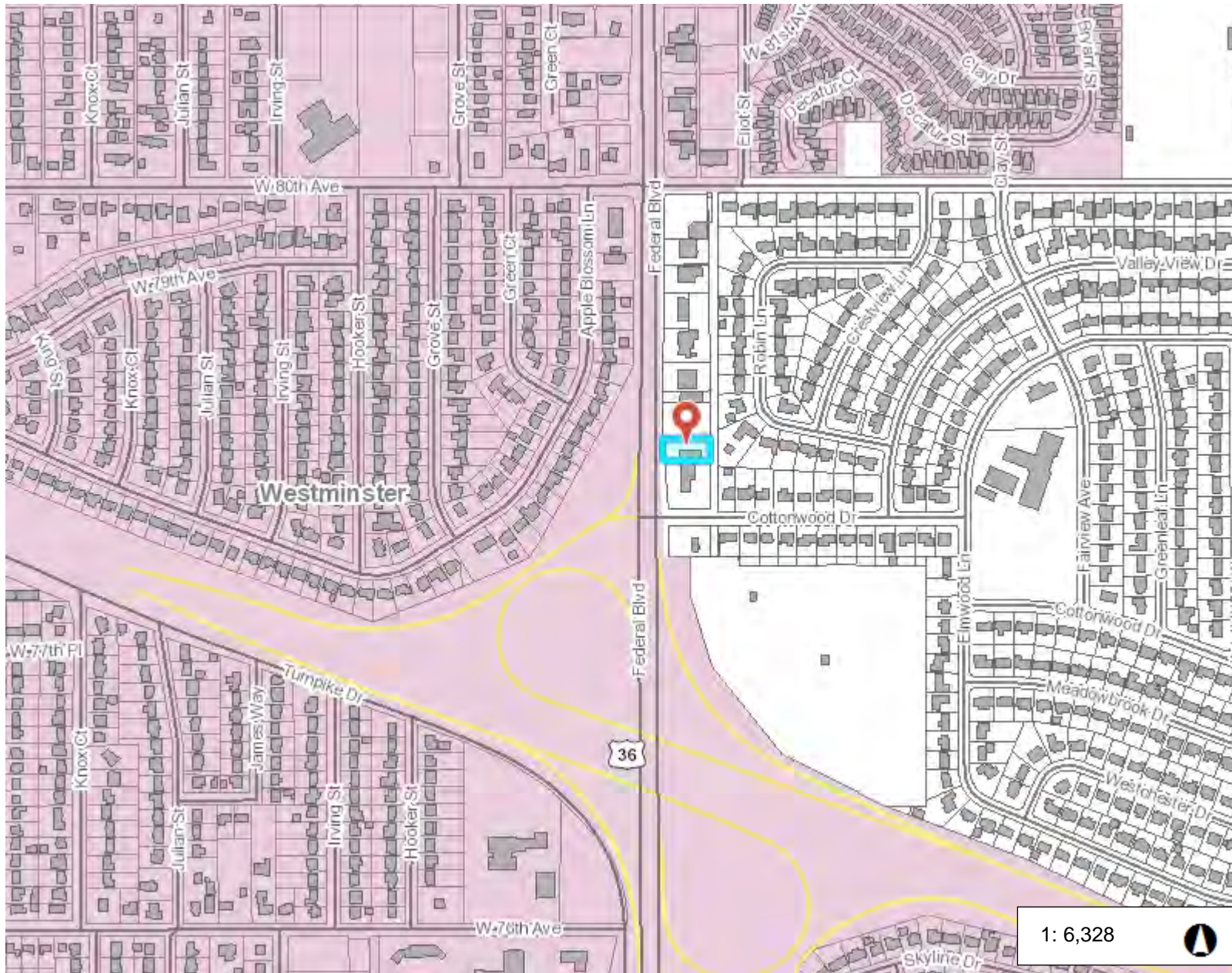
Adams County Fire Rescue
Adams County Sheriff's Office
City of Westminster
Colorado Department of Public Health and Environment
Colorado Department of Transportation
Regional Transportation District
Tri-County Health Department
Xcel Energy

Notified but not Responding / Considered a Favorable Response:

Century Link, Inc.
Colorado Division of Wildlife
Comcast
Crestview Water and Sanitation District
Metro Wastewater Reclamation
Perl Mack Neighborhood Group
Westminster Fire Department



RCU2021-00004 Vicinity Map



Legend

- Address
- Highways
 - Interstate
 - Highway
 - Tollway
- Streets
 - Streets
 - Ramp
- Building
- Cities
 - Arvada
 - Aurora
 - Bennett
 - Brighton
 - Commerce City
 - Federal Heights
 - Lochbuie
 - Northglenn
 - Thornton
 - Westminster
- Parcels
- County Boundary

0.2 0 0.10 0.2 Miles

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Site: 7850 Federal Blvd.



Legend

Address

Highways

- Interstate
- Highway
- Tollway

Streets

- Streets
- Ramp

Building

Cities

- Arvada
- Aurora
- Bennett
- Brighton
- Commerce City
- Federal Heights
- Lochbuie
- Northglenn
- Thornton
- Westminister

Parcels

County Boundary

0.1 0 0.05 0.1 Miles

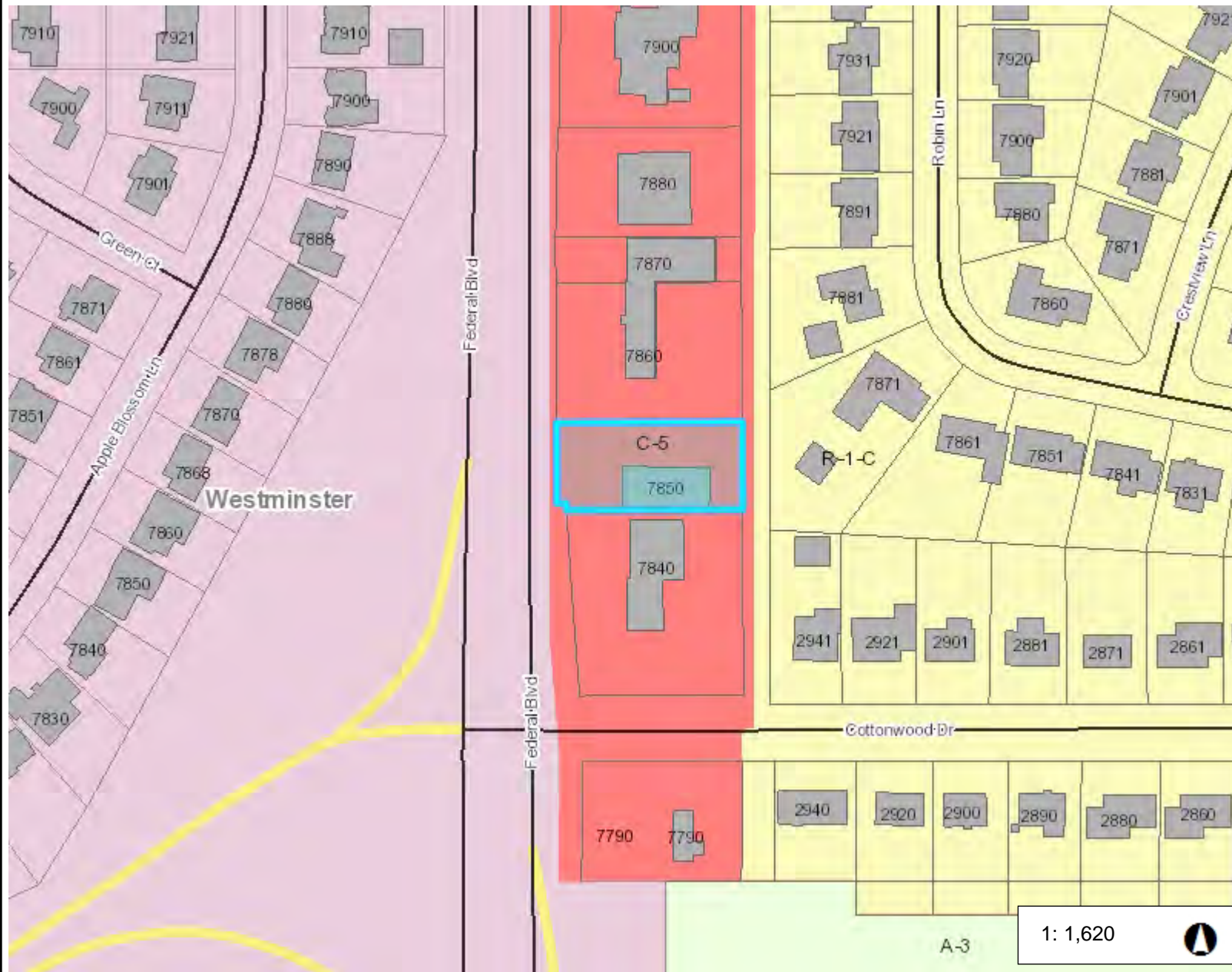
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Site: 7850 Federal Blvd.



RCU2021-00004 Zoning Map



Legend

Address

Highways

- Interstate
- Highway
- Tollway

Streets

- Streets
- Ramp

Building

Cities

- Arvada
- Aurora
- Bennett
- Brighton
- Commerce City
- Federal Heights
- Lochbuie
- Northglenn
- Thornton
- Westminster

Parcels

Zoning

- A-1
- A-2
- A-3
- Conditions
- TOD
- R-E
- R-1-A
- R-1-C

1: 1,620



0.1 0 0.03 0.1 Miles

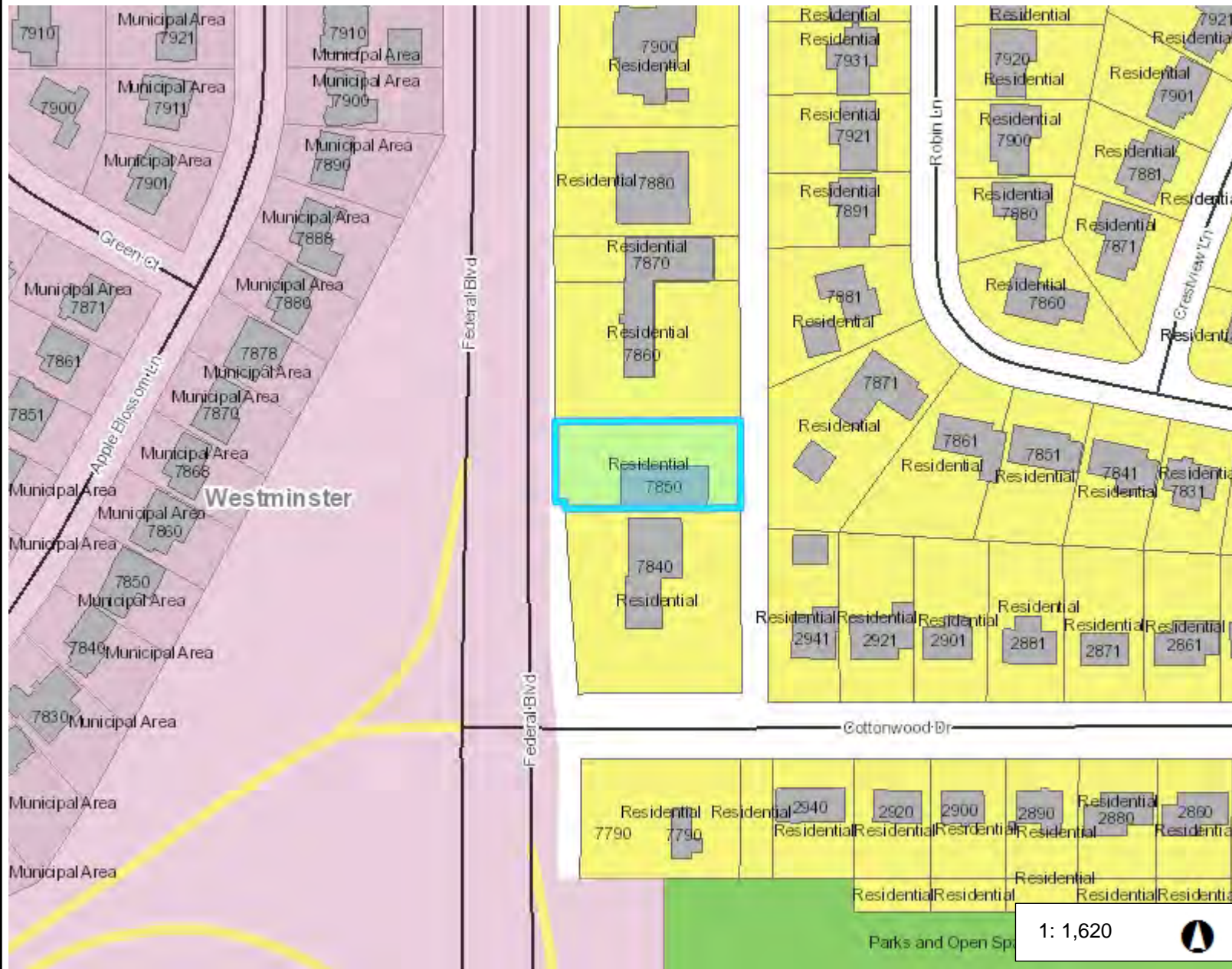
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Site: 7850 Federal Blvd.
Zoning: Commercial-5 (C-5)



RCU2021-00004 Future Land Use Map



Legend

Address

Highways

- Interstate
- Highway
- Tollway

Streets

- Streets
- Ramp

Building

Cities

- Arvada
- Aurora
- Bennett
- Brighton
- Commerce City
- Federal Heights
- Lochbuie
- Northglenn
- Thornton
- Westminster

Parcels

Comprehensive Plan

- Urban Residential
- Estate Residential
- Local District Mixed Use
- Mixed Use Neighborhood
- Activity Center
- Mixed Use Employment
- Commercial
- Industrial

0.1 0 0.03 0.1 Miles

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Site: 7850 Federal Blvd.
Future Land Use: Urban Residential



Explanation-Mile High Outdoor 7850 Federal Blvd. Off-Premise Sign

Mile High Outdoor Advertising is applying for the renewal of a Conditional Use Permit that expires 7/27/21 for its existing off-premise sign located at 7850-7854 Federal Blvd. In addition to renewing the Conditional Use Permit, Mile High Outdoor would like to convert the existing two-sided 10'x30' (300 sq. ft.) static off-premise sign to a two-sided digital LED off-premise sign. The property is zoned C-5 and is on the east side of Federal Blvd. approximately 900' south of 80th Ave. and approximately 230' north of Cottonwood Blvd. For reference, this is parcel #0171932106039, and is owned by Fairview Co, as are all of the parcels between 80th Ave. and Cottonwood Blvd., except the car wash parcel that is owned by Majestic Co. However, Majestic Co. is also owned by the same principle as those of the Fairview Co. We are asking for approval on a new conditional use permit and the LED digital conversion prior to the expiration date. Details of the proposed off-premise sign are as follows:

The location and size of the current sign is not being altered. Simply the displays are changing from static to digital LED on both sides. The current structure is capable of holding digital faces and does not need to be removed or changed.

- | | |
|--------------|---|
| SETBACK- | Pole support shall be a minimum of 50' from Federal Blvd. The existing sign structure is not changing; thus, location and setback are not changing. |
| SIZE- | Each side would be 300 sq. ft. 10' high x 30' long. Same size as the current static sign. |
| ORIENTATION- | Sign faces would be oriented toward northbound and southbound Federal Blvd. Same as the current static sign. |
| LIGHTING- | Two (2) LED 16-millimeter screens, equipped with auto-dimmers and wireless communications. The digital LED screens will meet all sign regulations required by Adam's County, and will employ a new light mitigating technology that will decrease light exposure to any potential neighboring properties. |

This sign conforms with County regulations **SECTION 4-15 OFF-PREMISE SIGN (BILLBOARD)** as follows:

1. Off-Premise Signs Allowed/Property- *There is no existing off-premise sign on this parcel, and this will be the only off-premise sign on this parcel.*
2. Maximum Off-Premise Size- 300 sq. ft. per side. *The proposed sign is 10' high x 30' long, or 300 sq. ft. per side.*
3. Maximum Height and Grade Clearance- 40' Height and 8' Ground Clearance if located within 1,000' of major intersection. *The top of the proposed sign will be 40', and the bottom of the sign will be 30' from ground level with the support of the sign faces being 27' from the ground level.*
4. Minimum Distance from the Other Off-premise signs on the same side of the roadway- 2,000 lineal feet. *The faces of the proposed sign will be oriented toward north-south traffic along*



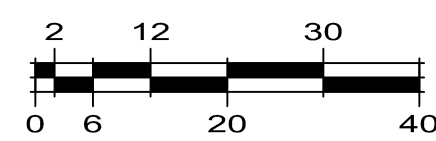
Federal Blvd., and no other off-premise is located within 2,000 either north or south on this side of Federal Blvd.

5. Minimum setback from the Right-of-Way of Support Pole-Equal to Height of the Sign. *The pole support shall be setback a minimum of 50' from the right-of-way of Federal Blvd. which exceeds 40' (height) setback requirement.*

The proposed sign conversion meets or exceeds all requirements for an Off-Premise sign based on Adams County sign code. The sign will not change the character of intent of use on the property, and will not have adverse effect on the property, the area, or citizens of Adams County.


Based on these facts, the property owner (Fairview Co) and the applicant lessee-owner of the sign (Mile High Outdoor, Inc.) requests a favorable recommendation from the Planning Staff and Planning Commission, and a favorable decision from the Board of County Commissioners on this Conditional Use request and sign conversion.





Scale: 1" = 20'

LEGEND

 SECTION LINE
 BOUNDARY LINE

R.O.W. RIGHT-OF-WAY

REC. NO. RECEPTION NUMBER

ALIUQUOT CORNER

● FOUND MONUMENT AS DESCRIBED

LOT 8,
FAIRVIEW COMMERCIAL
PROPERTY CORRECTION PLAT

LOT 9,
FAIRVIEW COMMERCIAL
PROPERTY CORRECTION PLAT
FAIRVIEW CO
(REC. NO. 2011000056417)

LOT 10,
FAIRVIEW COMMERCIAL
PROPERTY CORRECTION PLAT

FOUND REBAR & 1" YELLOW
PLASTIC CAP ILLEGIBLE

FOUND REBAR & 1" YELLOW-
PLASTIC CAP ILLEGIBLE

Diagram showing a billboard sign on a vertical pole. The sign is labeled "BILLBOARD SIGN".

9.3'

FEDERAL BOULEVARD
(U.S. HIGHWAY 287)
(PUBLIC R.O.W. WIDTH VARIES)

WEST LINE OF THE NE 1/4 OF SECTION 32,
T.2S., R.68W., OF THE 6TH P.M.
N00°06'10"W 2634.24'

NORTH 1/4 CORNER OF SECTION
32, T.2S., R.68W., OF THE 6TH P.M.
(FOUND 3 1/4" ALUMINUM CAP
ILLEGIBLE) IN RANGE BOX

CENTER 1/4 CORNER OF SECTION
32, T.2S., R.68W., OF THE 6TH P.M.
(FOUND 3 1/4" ALUMINUM CAP)
STAMPED AS SHOWN IN RANGE BOX

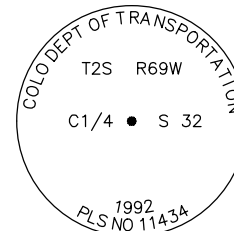
GENERAL NOTES:

- THIS EXHIBIT WAS BASED ON INFORMATION SHOWN ON THE ADAMS COUNTY ASSESSORS MAPS AND THE PLAN OF FAIRVIEW COMMERCIAL PROPERTY CORRECTION PLAT AND WAS FORMED WITHOUT REFERENCE TO A TITLE COMMITMENT OR A TITLE INSURANCE POLICY. A TITLE INSURANCE COMMITMENT OR A TITLE INSURANCE POLICY MAY DISCLOSE FACTS NOT REFLECTED ON THIS SURVEY.
- THIS EXHIBIT DOES NOT CONSTITUTE A TITLE DESCRIPTION BY THE SURVEYOR OR ENGINEERING SERVICE COMPANY. THE PROPERTY SHOWN IS DESCRIBED HEREIN TO DETERMINE OWNERSHIP OF THIS TRACT OF LAND RIGHTS OF EASEMENTS AND ENCUMBRANCES RECORDED OR UNRECORDED AFFECTING THIS TRACT OF LAND.
- THE PURPOSE OF THIS EXHIBIT IS TO LOCATE THE WEST FACE OF THE BILLBOARD SIGN RELATIVE TO THE EAST R.O.W. LINE OF FEDERAL BOULEVARD.
- THIS EXHIBIT IS NOT A LAND SURVEY PLAT, BOUNDARY SURVEY, OR AN IMPROVEMENT SURVEY PLAT. PRODUCTIONS SHOWN PER THE ADAMS COUNTY ASSESSORS MAPS.

NOTICE:

ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

ANY PERSON WHO KNOWINGLY REMOVES, ALTERS, OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT, LAND BOUNDARY MONUMENT, OR ACCESSORY COMMITS A CLASS TWO (2) MISDEMEANOR, PURSUANT TO STATE STATUTE 18-4-508 OF THE COLORADO REVISED STATUTES



BILLBOARD SIGN EXHIBIT

BILLBOARD SIGN EXHIBIT

LOT 9, FAIRVIEW COMMERCIAL PROPERTY CORRECTION PLAT
SITUATED IN THE NE 1/4 OF SECTION 32, T.2S., R.68W., OF THE 6TH P.M.
CITY OF WESTMINSTER, COUNTY OF ADAMS, STATE OF COLORADO

7850 FEDERAL BOULEVARD

Designed By: CNB	Date: 05/04/2021
Drawn By: SLH	Survey No.: 21-050-S
Checked By: CNB	Project No.: 572.014
Field Book No.: -	Scale: 1"=20'
Sheet No.: 1 OF 1	

Prepared For:

MILE HIGH OUTDOOR

WILEY-HIGHT OUTDOOR
99250 EAST COSTILLA AVENUE, SUITE 500
GREENWOOD VILLAGE, COLORADO 80112

Revisions:

[illegible]

**ENGINEERING
SERVICE
COMPANY**

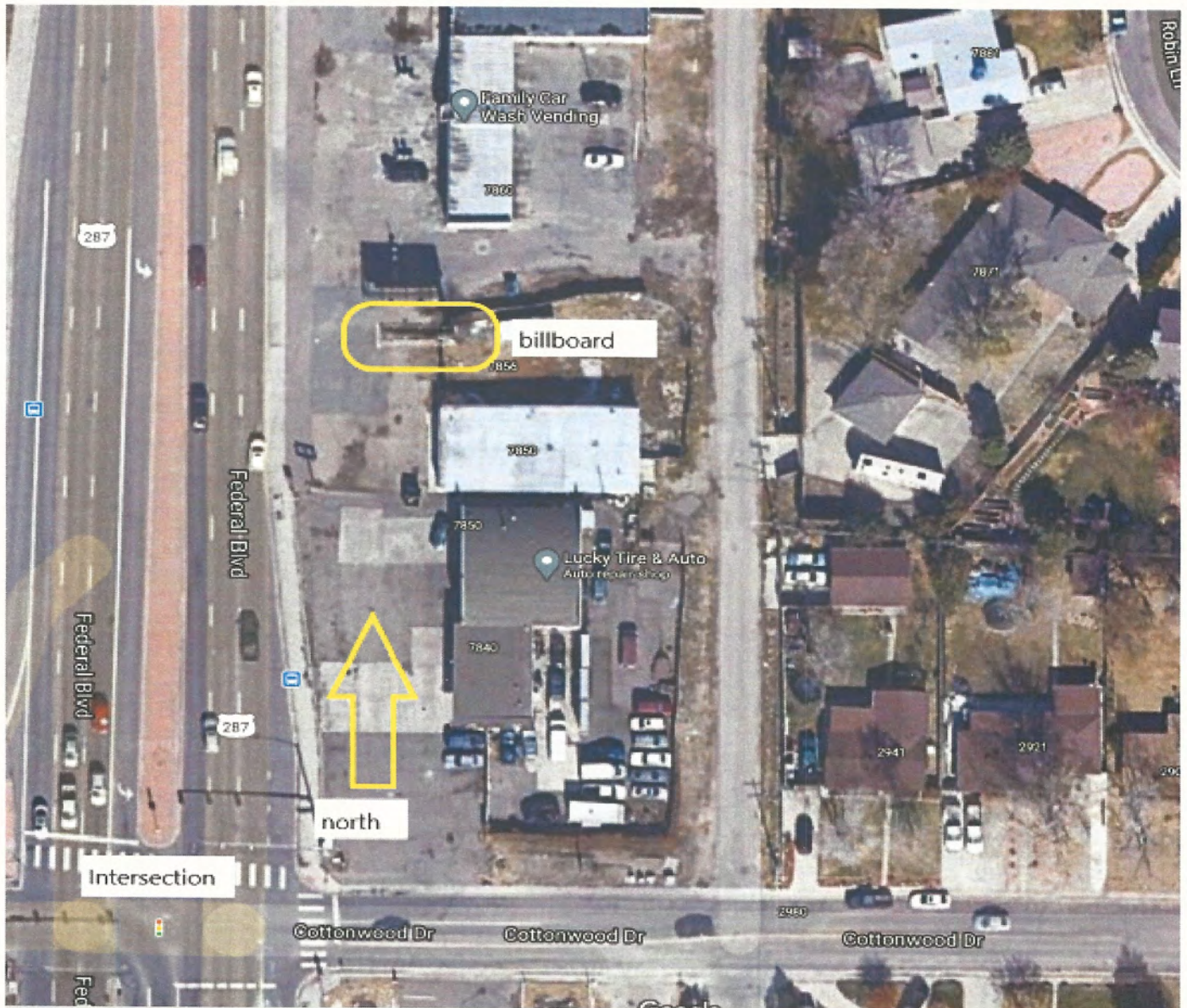
Creative Solutions Since 1954
CIVIL ENGINEERS | LAND SURVEYORS

14190 East Evans Avenue
Aurora, Colorado 80014
engineering@serviceco.com
P 303.337.1393
F 303.337.7481
T/F 1.877.273.0659



Federal north of Hwy. 36 Site Plan (2/8/2021)

Ariel Overview . Billboard current location in yellow. Reading to Federal with closest cross street being Cottonwood Dr.





Current Sign Dimensions

North Facing

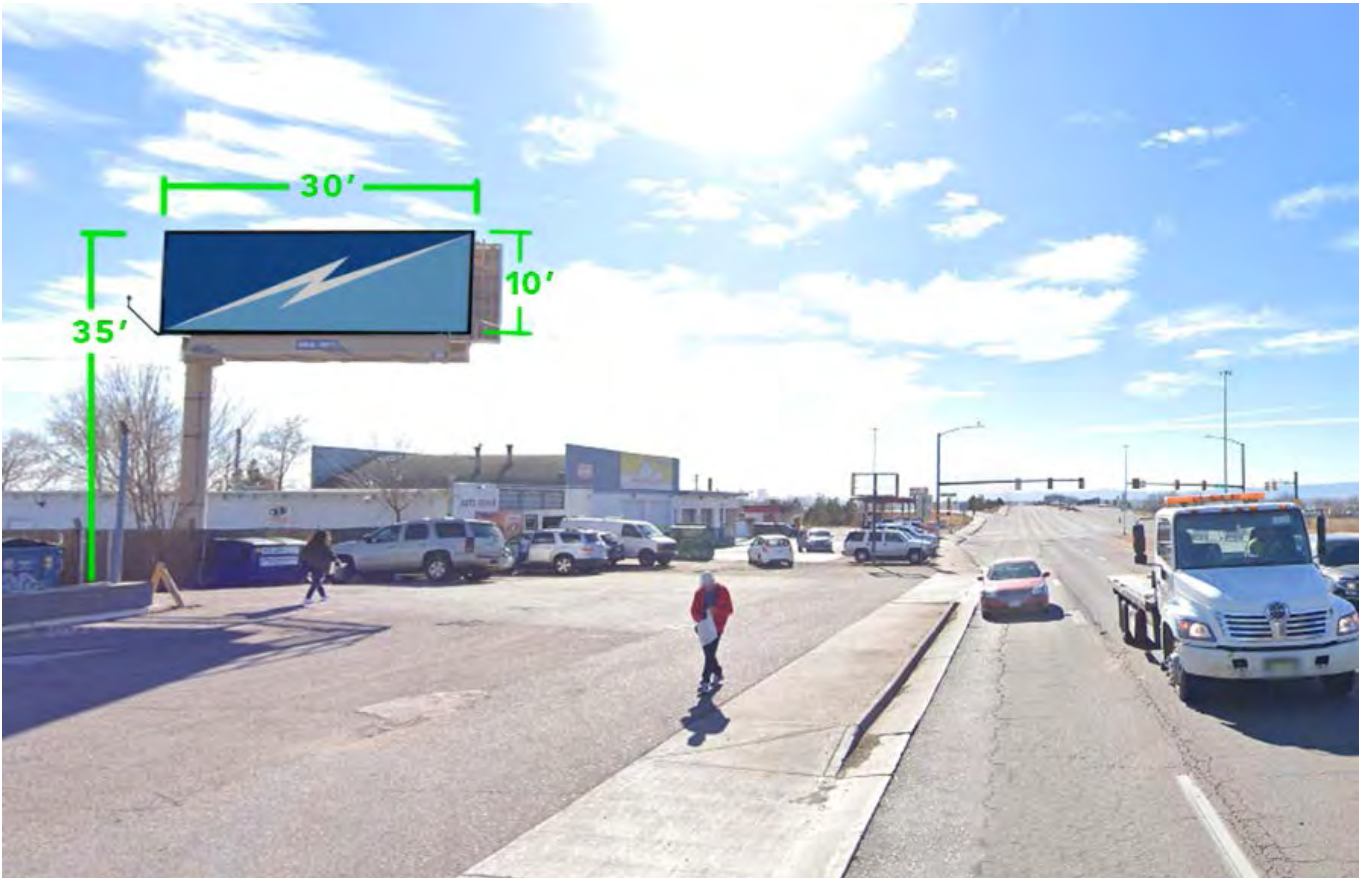


South Facing



New Proposed Digital Sign Dimensions (Same as the current sign)

North Facing



South Facing



Light Study

Adams County allows up to a maximum of 0.3 foot-candles during the nighttime hours from sunset to sunrise. In the below light study at different viewpoints, the foot-candles range from 0.083fc-0.0008fc. This range is well below the maximum allowed by Adams County at the various viewpoints.



Street View of the Surrounding Neighborhood

Alley East of Federal and North of Cottowood Drive

South Facing Billboard Face

- This viewpoint is at the most southern part of the alley at Cottonwood Drive. The commercial building to the west is adding additional light blocking for the properties to the east of the alley and sign.



Alley East of Federal and North of Cottowood Drive

North Facing Billboard Face

-Tree foliage of the properties to the northeast of the sign provide additional light blockage to the neighboring properties.



Robin Lane Street View #1

North Facing Billboard Face

- This street view is from the southern part of Robin Lane to the east of the billboard. Tree folage from the alley to the west of Robin Lane will provide additional light mitigation. Based on the angle of billboard and light study, this area would have a foot-candle of 0.0009fc.



Robin Lane Street View #2

North Facing Billboard Face

- This is northern street view looking south at the billboard. The trees in the alley to the west mitigate light illumination to these properties. This area also has a foot-candle of 0.0009fc.



Cottonwood Drive

South Facing Billboard Face

- The commercial building to the east of the billboard blocks the properties on Cottonwood Drive to the southeast.



Appleblossum Lane

North Facing Billboard Face

- Light mitigation technology and tree foliage to the east help decrease light exposure.



Federal Blvd Driving South

North Facing Billboard Face

- Additional tree foliage blocking the residential properties to the west of the sign.





Development Team Review Comments

The following comments have been provided by reviewers of your land use application. At this time, a resubmittal of your application is required before this case is ready to be scheduled for public hearing.

To prepare your resubmittal, you will be expected to provide:

- A response to each comment with a description of the revisions and the page of the response on the site plan;
- Any revised plans or renderings; and
- A list identifying any additional changes made to the original submission other than those required by staff.

Resubmittal documents must be provided electronically through e-mail or a flash drive delivered to the One-Stop Customer Service Center. The following items will be expected by our One-Stop Customer Service Center:

- One digital copy of all new materials
 - All digital materials shall be in a single PDF document
 - The single PDF document shall be bookmarked
 - If a Subdivision Improvements Agreement, Legal Description, or Development Agreement is required, then an additional Microsoft Word version of these documents shall also be provided
 - Electronic copies can be emailed to epermitcenter@adgov.org as a PDF attachment. If the files are too large to attach, the email should include an unlocked Microsoft OneDrive link. Alternatively, the resubmittal can be delivered to the One-Stop counter on a flash drive.



Re-submittal Form

Case Name/ Number: _____

Case Manager: _____

Re-submitted Items:

- ☐ Development Plan/ Site Plan
- ☐ Plat
- ☐ Parking/ Landscape Plan
- ☐ Engineering Documents
- ☐ Subdivision Improvements Agreement
- ☐ Other: _____

*** All re-submittals must have this cover sheet and a cover letter addressing review comments.**

Please note the re-submittal review period is 21 days.

The cover letter must include the following information:

- Restate each comment that requires a response
- Provide a response below the comment with a description of the revisions
- Identify any additional changes made to the original document

For County Use Only:

Date Accepted:

Staff (accepting intake):

Resubmittal Active: ~~Addressing, Building Safety, Neighborhood Services,~~

~~Engineering, Environmental, Parks, Planner, ROW, SIA - Finance, SIA - Attorney~~



Development Review Team Comments

Date: March 26, 2021

Project Number: RCU2021-00004

Project Name: Mile High Outdoor 7850 Federal Blvd. Billboard Conversion

Due to the ongoing COVID-19 pandemic, all land use applications and resubmittals are to be delivered electronically to epermitcenter@adcogov.org. For additional information on department operations, please visit <http://www.adcogov.org/CED>.

Please note where "Section" or "DSR" is referenced, please refer to the appropriate section of the Adams County Development Standards and Regulations. These can be viewed online here: <http://www.adcogov.org/development-standards-regulations>.

Land Use and Development Applications can be accessed here: <http://www.adcogov.org/current-planning-application-packets>

BOARD OF COUNTY COMMISSIONERS

Eva J. Henry
DISTRICT 1

Charles "Chaz" Tedesco
DISTRICT 2

Emma Pinter
DISTRICT 3

Steve O'Dorisio
DISTRICT 4

Lynn Baca
DISTRICT 5

Commenting Division: Planning Review
Name of Reviewer: Alan Sielaff, Planner II
Email: ASielaff@adcogov.org / 720-523-6817
Review Status: Resubmittal Required

PLN01: Conditional Use Request summary - Renewal of permit that expires 7/27/21. Convert to a two-sided LED digital sign. Existing sign is 10 ft. x 30 ft. (300 sq. ft.).

PLN02: Existing site information:

1. Location: 7850 Federal Blvd., parcel # 0171932106039
2. Subdivision: FAIRVIEW COMMERCIAL PROPERTY CORRECTION PLAT LOT 9
3. Size: 0.3111 acres, 13,550 SF
4. Zoning: C-5 Commercial
5. FULU: Urban Residential
6. Existing use: service garage (County Assessor's records for building type)
7. Existing billboard approved with RCU2011-0007 with 4 conditions of approval summarized as follows;
 - 1) Meet requirements of Section 4-15 (Off-Premise Advertising Devices – now located in Section 4-16).
 - 2) The billboard shall have static messages only. Conversion to digital sign requires a major amendment.
 - 3) Sign lighting not permitted between 10 pm and 6 am.
 - 4) Maximum height of 35 ft.

PLN03: Sign setbacks - Please provide an updated site plan that includes all setback measurements to confirm sign location meets standards from all property lines.

1. Minimum setbacks from property lines and right-of-way shall be equal to the height of the billboard as measured from the leading edge of the sign face, see Section 4-16-07 #1.
2. This standard has changed since this billboard was originally approved 10 years ago. Chiefly, that the required setback is now measured from the leading edge of the sign, not the sign pole. See Section 4-16-07 #2.
3. Upon review of the previous approval, a variation to the setback requirements at the time was granted for the setback from the north property line, and was not required from Federal Blvd. In order for the sign to remain in its existing location, variations may need to be granted from both if the western edge of the sign is unable to meet the matching height setback from Federal.

PLN04: Sign height - Please provide detailed elevations of the sign structure detailing the height and dimensions and update application materials as necessary.

1. There appears to be a discrepancy in the requested height in the application materials of 40 ft., and the approved height as part of the original approval of 35 ft. Review of previous approval indicate the approved height was lowered to 35 ft. in order to conform to the maximum height of the C-5 Commercial zone district. Building permit records indicate the sign was approved for this height as well (SGN2011-00056 and BDP11-2459).
2. Sign will meet 8 ft. minimum ground clearance. Please verify 27 ft. clearance provided upon confirmation of total structure height above.

3. Maximum height of a billboard is 40 ft., but we recommend request to remain at 35 ft. for conformance with C-5 zoning.
4. Please provide measurement of distance between sign faces to ensure adherence with 3.5 ft. maximum for back-to-back signs, see Section 4-16-07 #6.

PLN05: Conversion to electronic sign – Applicant has provided the following information: Signs will consist of two LED 16 millimeter screens equipped with auto-dimmers and wireless communications. LED screens to meet all sign regulations required by Adams County and will employ light mitigating technology that will decrease light exposure to neighboring properties.

1. Previous approval included a condition that lighting was not permitted between 10pm and 6am due to heightened concern about impacts to neighboring residences to the east.
2. Please provide additional detail how proposed electronic conversion will not impact these neighbors. Providing a photometric plan is recommended to illustrate this.
3. Please review and affirm adherence to all lighting standards in Section 4-16-06-02, specifically #4 of a maximum of .03 foot-candles emitted by the source. Further describe use of light monitoring and control, and state if any of these standards can be exceeded to further minimize neighboring impacts (such as agreeing to meet the optimal 10 second message duration, providing a dimmer light source than required).

PLN06: Maximum size of a billboard is 300 sq. ft. Existing sign and proposed electronic conversion will remain at 300 sq. ft.

PLN07: Comprehensive Plan Review

1. Future land use designation for site is Urban Residential. Urban residential areas are designated for single and multiple family housing, typically at urban densities of one dwelling per acre or greater. These areas are intended to provide for development of residential neighborhoods with a variety of housing types, with adequate urban services and transportation facilities. Urban residential areas may include supporting neighborhood commercial uses designed to serve the needs of nearby residents.
 - a. Review - Only supporting neighborhood commercial uses are considered compatible. Proposed billboard for off-premise advertising is generally not considered a compatible use, but use is permitted conditionally in the C-5 district with a limited approval duration. Staff will likely recommend 10 years for
 - b. The Comprehensive Plan includes area-specific policies and strategies regarding gateway corridors that supports reviewing and updating sign ordinance provisions to control off-premise signs. Abundance of recent billboard requests may be a topic of concern for the Planning Commission and Board of County Commissioners.
2. Federal Blvd. Framework Plan does not address Off-Premise Signs directly, but suggests possible blight conditions be addressed as part of further corridor planning with coordinated signage standards.
3. The County is currently undertaking additional corridor planning efforts as part of the Comprehensive Plan update and associated Transportation Plan updates. Please visit <https://www.adcogov.org/advancing-adams> for more information.

PLN08: Conditional Use Permit approval criteria – Please review and acknowledge. These will be the approving criteria utilized by the Planning Commission and Board of County Commissioners.

2-02-09-06 CRITERIA FOR APPROVAL - The Planning Commission, in making their recommendation, and the Board of County Commissioners, in approving a conditional use permit, shall find:

1. The conditional use is permitted in the applicable zone district.
2. The conditional use is consistent with the purposes of these standards and regulations.
3. The conditional use will comply with the requirements of these standards and regulations including, but not limited to, all applicable performance standards.
4. The conditional use is compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County. In making this determination, the Planning Commission and the Board of County Commissioners shall find, at a minimum, that the conditional use will not result in excessive traffic generation, noise, vibration, dust, glare, heat, smoke, fumes, gas, odors, or inappropriate hours of operation.
5. The conditional use permit has addressed all off-site impacts.
6. The site is suitable for the conditional use including adequate usable space, adequate access, and absence of environmental constraints.
7. The site plan for the proposed conditional use will provide the most convenient and functional use of the lot including the parking scheme, traffic circulation, open space, fencing, screening, landscaping, signage, and lighting.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are to be available and adequate to serve the needs of the conditional use as designed and proposed.

Commenting Division: External Agency (EA) Referral Review

Review Status: Resubmittal Required

EA1: The following external agencies responded with a separate comment letter or email which will be provided in the following pages: Adams County Fire Rescue (ACFR), Adams County Sheriff's Office, City of Westminster, Colorado Department of Health and Environment (CDPHE), Colorado Department of Transportation (CDOT), Regional Transportation District (RTD), Tri-County Health Department (TCHD), and Xcel Energy.

Only CDOT has requested further action related to a new application for a state permit due to the change to an electronic sign. This can be done concurrently or following County review.

EA2: Referral agency comments generally are described in the staff report and may be recommended conditions or notes of approval for the applicant to adhere to if the development application is approved. If additional referral agency comments are received following this letter staff will forward to the applicant to respond in next submittal.

Commenting Division: Public Comment

Review Status: Ongoing

PC1: As of the date of this comment letter, 0 public comments have been received. Public comment will continue to be accepted moving forward and all comments will be included in appendices to the staff report provided to the Planning Commission and Board of County Commissioners once public hearings are scheduled. It is recommended to provide a response to individual public comments or evidence of direct outreach if any public comment is received.



Development Review Team Comments

Date: 3/26/2021

Project Number: RCU2021-00004

Project Name: Mile High Outdoor 7850 Federal Blvd. Billboard Conversion

Commenting Division: CDOT Review

Name of Reviewer: Alan Sielaff

Date: 03/26/2021

Email:

Comment

See separate email comments.

Commenting Division: Planner Review

Name of Reviewer: Alan Sielaff

Date: 03/26/2021

Email:

Resubmittal Required

Separate comment letter provided

Commenting Division: Addressing Review

Name of Reviewer: David Dittmer

Date: 03/25/2021

Email:

Complete

Commenting Division: CDPHE Review

Name of Reviewer: Alan Sielaff

Date: 03/25/2021

Email:

Comment

Thank you for contacting the Colorado Department of Public Health and Environment (CDPHE). CDPHE's general comments are available here. We will continue to review this referral to determine whether additional comments are necessary. If additional comments are necessary, we will submit them by the referral deadline.

Commenting Division: Xcel Energy Review

Name of Reviewer: Alan Sielaff

Date: 03/25/2021

Email:

Comment

No conflict letter provided.

Commenting Division: Xcel Energy Review

Name of Reviewer: Alan Sielaff

Date: 03/25/2021

Email:

Complete

No conflict letter provided.

Commenting Division: Building Safety Review

Name of Reviewer: Justin Blair

Date: 03/02/2021

Email: jblair@adcogov.org

Complete

Commenting Division: ROW Review

Name of Reviewer: David Dittmer

Date: 02/24/2021

Email:

Complete

From: [Eden Steele](#)
To: [Alan Sielaff](#)
Subject: FW: Billboard Renewal off of Federal Blvd
Date: Wednesday, March 31, 2021 10:05:18 AM

See the response from Chris below.

Thanks,

Eden Steele

Civil Engineer I, *Community and Economic Development*

ADAMS COUNTY, COLORADO

4430 S Adams County Pkwy, 1st Floor, Suite W2000B

Brighton, CO 80601

O: 720.523.6897 | ESTeele@adcogov.org

www.adcogov.org

From: Chris Chovan <CChovan@adcogov.org>
Sent: Wednesday, March 31, 2021 9:53 AM
To: Eden Steele <ESTeele@adcogov.org>
Subject: RE: Billboard Renewal off of Federal Blvd

Good morning Eden,

Thank you for allowing me to review this application. The Federal Boulevard Study is focusing our efforts within or immediately adjacent to the existing ROW of Federal itself. Given this billboard is well off the back of curb, I see no impact – direct or indirect – to the improvements we are considering as part of the Study.

I will note that we are considering robust landscaping along the Federal corridor (again, adjacent to ROW) and that may create future visibility issues when the landscaping (e.g. trees) begins to mature.

If you and/or the reviewing planner need additional input from me, please reach out.
Chris

Chris W. Chovan

Senior Transportation and Mobility Planner, *Public Works*

Preferred Pronouns: he/him/his

(O) 720.523.6851 (M) 720.930.9284

NOTE: The best way to reach me directly is with the Mobile number above or by E-mail.

From: Eden Steele <ESTeele@adcogov.org>
Sent: Tuesday, March 30, 2021 5:24 PM
To: Chris Chovan <CChovan@adcogov.org>
Subject: Billboard Renewal off of Federal Blvd

Hi Chris,

There is a conditional use application under review by CEDD to renew the use of an existing billboard off of Federal Blvd. There is a site plan in the attached application. The new conditional use application is also requesting to replace the existing stagnate sign with a digital face. The planner is likely going to recommend approval for an additional 10 years, as there has been no opposition from the public or any referral agencies, including CDOT. Are there any concerns or comments you would like me to convey to the applicant, as it pertains to the Federal Blvd portion of the transportation plan that is currently underway? We can also discuss this further at our Thursday meeting if you would like.

Thank you,

Eden Steele

Civil Engineer I, *Community and Economic Development*

ADAMS COUNTY, COLORADO

4430 S Adams County Pkwy, 1st Floor, Suite W2000B

Brighton, CO 80601

o: 720.523.6897 | ESTeele@adcogov.org

www.adcogov.org

From: [Carla Gutierrez](#)
To: [Alan Sielaff](#)
Subject: Re: Request for Comments: RCU2021-00004 - Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
Date: Tuesday, March 16, 2021 9:19:58 AM

Please be cautious: This email was sent from outside Adams County

Good morning Alan,

At this time, the Fire District has no questions or concerns.

Thanks!

Carla Gutierrez

Adams County Fire Rescue
7980 Elmwood Lane
Denver, CO 80221
O: 303-539-6862

From: Alan Sielaff <ASielaff@adcogov.org>
Date: Thursday, March 4, 2021 at 4:15 PM
To: Alan Sielaff <ASielaff@adcogov.org>
Subject: Request for Comments: RCU2021-00004 - Mile High Outdoor 7850 Federal Blvd. Billboard Conversion

Greetings,

The Adams County Planning Commission is requesting comments on the following application: **Renewal of a Conditional Use Permit for an existing off-premise advertising device located at 7850-7854 Federal Blvd. The existing two-sided static sign will be replaced by a two-sided digital LED sign.** This request is located at 7850 Federal Blvd. The Assessor's Parcel Number is 0171932106039.

Applicant Information: MILE HIGH OUTDOOR
CHAD KOCHENBERGER
9250 E COSTILLA AVE. STE 500
GREENWOOD VILLAGE, CO 80112

Please forward any written comments on this application to me at to ASielaff@adcogov.org by **March 25, 2021**, in order that your comments may be taken into consideration in the review of this case. The full text of the proposed request can be obtained by contacting this office or by accessing the Adams County web site at www.adcogov.org/planning/currentcases.

From: [Rick Reigenborn](#)
To: [Alan Sielaff](#)
Subject: RE: Request for Comments: RCU2021-00004 - Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
Date: Monday, March 8, 2021 2:23:05 PM
Attachments: [image002.wmz](#)
[image001.png](#)

The sheriff's office has no opposition to this request.

Richard A. Reigenborn
Sheriff
Adams County Sheriff's Office
4430 S. Adams County Parkway,
1st Floor, Suite W5400
Brighton, CO 80601
303-655-3218 | RReigenborn@adcogov.org

Character • Integrity • Transparency

From: Alan Sielaff
Sent: Thursday, March 4, 2021 4:16 PM
To: Alan Sielaff <ASielaff@adcogov.org>
Subject: Request for Comments: RCU2021-00004 - Mile High Outdoor 7850 Federal Blvd. Billboard Conversion

Greetings,

The Adams County Planning Commission is requesting comments on the following application: **Renewal of a Conditional Use Permit for an existing off-premise advertising device located at 7850-7854 Federal Blvd. The existing two-sided static sign will be replaced by a two-sided digital LED sign.** This request is located at 7850 Federal Blvd. The Assessor's Parcel Number is 0171932106039.

Applicant Information: MILE HIGH OUTDOOR
CHAD KOCHENBERGER
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Please forward any written comments on this application to me at to ASielaff@adcogov.org by **March 25, 2021**, in order that your comments may be taken into consideration in the review of this case. The full text of the proposed request can be obtained by contacting this office or by accessing the Adams County web site at www.adcogov.org/planning/currentcases.

Thank you for your review of this case.

Alan Sielaff, AICP

From: [McConnell, John](#)
To: [Alan Sielaff](#)
Subject: RE: RCU2021-00004 - Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
Date: Tuesday, March 9, 2021 4:25:12 PM

Please be cautious: This email was sent from outside Adams County

Hello Alan,

Thanks for allowing us to review this referral. The Community Development Department has no comments on this application. It looks like the sign is fairly close to some adjacent Adams County homes; I imagine you may hear some concerns from them.

Thanks again,
John

John McConnell, AICP | Principal Planner
City of Westminster Community Development
V: 303.658.2474



4800 West 92nd Avenue, Westminster, CO 80031
Monday – Thursday, 7am to 6pm (Closed Friday)

Visit [eTRAKit](#) online to apply for projects and permits,
submit plans, make payments and schedule inspections

PLEASE NOTE: City Hall remains closed to the public as the City of Westminster continues to support efforts to lessen the spread of COVID-19 (coronavirus). No reopening date has been established at this time. City Hall Staff members are available to serve you in a remote capacity and will interact with you via email during the closure. Thank you for your understanding and patience. We look forward to serving you.

From: [Localreferral - CDPHE, CDPHE](#)
To: [Alan Sielaff](#)
Subject: Re: Request for Comments: RCU2021-00004 - Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
Date: Thursday, March 4, 2021 4:18:13 PM

Please be cautious: This email was sent from outside Adams County

Thank you for contacting the Colorado Department of Public Health and Environment (CDPHE). CDPHE's general comments are available [here](#). We will continue to review this referral to determine whether additional comments are necessary. If additional comments are necessary, we will submit them by the referral deadline.

--



cdphe_localreferral@state.co.us | colorado.gov/cdphe

Thank you for contacting the Colorado Department of Public Health and Environment (CDPHE). Please note that the following requirements and recommendations apply to many but not all projects referred by local governments. Also, they are not intended to be an exhaustive list and it is ultimately the responsibility of the applicant to comply with all applicable rules and regulations. CDPHE's failure to respond to a referral should not be construed as a favorable response.

Hazardous and Solid Waste

The applicant must comply with all applicable hazardous and solid waste rules and regulations.

Hazardous waste regulations are available here:

<https://www.colorado.gov/pacific/cdphe/hwregs>.

Solid waste regulations are available here:

<https://www.colorado.gov/pacific/cdphe/swregs>.

Applicable requirements may include, but are not limited to, properly characterizing all wastes generated from this project and ensuring they are properly managed and disposed of in accordance with Colorado's solid and hazardous waste regulations.

If this proposed project processes, reclaims, sorts, or recycles recyclable materials generated from industrial operations (including, but not limited to construction and demolition debris and other recyclable materials), then it must register as an industrial recycling facility in accordance with Section 8 of the Colorado Solid Waste Regulations. The industrial recycling registration form is available here:

<https://www.colorado.gov/pacific/cdphe/sw-recycling-forms-apps>.

If you have any questions regarding hazardous and/or solid waste, please contact CDPHE's Hazardous Materials and Waste Management Division (HMWMD) by emailing comments.hmwmd@state.co.us or calling 303-692-3320.

Water Quality

The applicant must comply with all applicable water quality rules and regulations.

The Water Quality Control Division (WQCD) administers regulatory programs that are generally designed to help protect both Colorado's natural water bodies (the clean water program) and built drinking water systems. Applicants must comply with all applicable water quality rules and regulations relating to both clean water and drinking water. All water quality regulations are available here:

<https://cdphe.colorado.gov/water-quality-control-commission-regulations>.



Clean Water Requirements

Applicable clean water requirements may include, but are not limited to, obtaining a stormwater discharge permit if construction activities disturb one acre or more of land or if they are part of a larger common plan of development that will disturb one or more acres of land. In determining the area of construction disturbance, WQCD looks at the entire plan, including disturbances associated with utilities, pipelines or roads constructed to serve the facility.

Please use the Colorado Environmental Online Services (CEOS) to apply for new construction stormwater discharge permits, modify or terminate existing permits and change permit contacts.

For CEOS support please see the following WQCD website:

<https://cdphe.colorado.gov/cor400000-stormwater-discharge>

or contact:

Email: cdphe_ceos_support@state.co.us or cdphe_wqcd_permits@state.co.us

CEOS Phone: 303-691-7919

Permits Phone: 303-692-3517

Drinking Water Requirements

Some projects may also need to address drinking water regulations if the proposed project meets the definition of a “Public Water System” per the Colorado Primary Drinking Water Regulations (Regulation 11):

A Public Water System means a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least 25 individuals daily at least 60 days per year. A public water system is either a community water system or a non-community water system. Such term does not include any special irrigation district. Such term includes:

(a) Any collection, treatment, storage, and distribution facilities under control of the supplier of such system and used primarily in connection with such system.

(b) Any collection or pretreatment storage facilities not under such control, which are used primarily in connection with such system.

If applicable, the project would need to meet all applicable requirements of Regulation 11 including, but not limited to, design review and approval; technical, managerial and financial review and approval; having a certified operator; and routine monitoring and reporting. If it is determined that your facility meets the definition of a public water system please submit a drinking water inventory update form to the department. For questions regarding drinking water regulation applicability or other assistance and resources, visit these websites:



<https://cdphe.colorado.gov/drinking-water>

<https://cdphe.colorado.gov/dwtrain>

If you have any other questions regarding either clean or drinking water quality, please contact CDPHE's WQCD by emailing cdphe.commentswqcd@state.co.us or calling 303-692-3500.

Air Quality

The applicant must comply with all relevant state and federal air quality rules and regulations. Air quality regulations are available here:

<https://www.colorado.gov/pacific/cdphe/aqcc-regs>.

Air Pollutant Emissions Notices (APENs) and Permits

Applicable requirements may include, but are not limited to, reporting emissions to the Air Pollution Control Division (APCD) by completing an APEN. An APEN is a two in one form for reporting air emissions and obtaining an air permit, if a permit will be required. While only businesses that exceed the Air Quality Control Commission (AQCC) reporting thresholds are required to report their emissions, all businesses - regardless of emission amount - must always comply with applicable AQCC regulations.

In general, an APEN is required when uncontrolled actual emissions for an emission point or group of emission points exceed the following defined emission thresholds:

Table 1 APEN Thresholds		
Pollutant Category	UNCONTROLLED ACTUAL EMISSIONS	
	Attainment Area	Non-attainment Area
Criteria Pollutant	2 tons per year	1 ton per year
Lead	100 pounds per year	100 pounds per year
Non-Criteria Pollutant	250 pounds per year	250 pounds per year

Uncontrolled actual emissions do not take into account any pollution control equipment that may exist. A map of the Denver Metropolitan Ozone Non-attainment area can be found on the following website: http://www.colorado.gov/airquality/ss_map_wm.aspx.

In addition to these reporting thresholds, a Land Development APEN (Form APCD-223) may be required for land development. Under Colorado air quality regulations, land development refers to all land clearing activities, including but not limited to land preparation such as excavating or grading, for residential, commercial or industrial development. Land development activities release fugitive dust, a pollutant regulation by APCD. Small land development activities are not subject to the same reporting and permitting requirements as large land activities. Specifically, land development activities



that are less than 25 contiguous acres and less than 6 months in duration do not need to report air emissions to APCD.

It is important to note that even if a permit is not required, fugitive dust control measures included the Land Development APEN Form APCD-223 must be followed at the site. Fugitive dust control techniques commonly included in the plan are included in the table below.

Control Options for Unpaved Roadways	
Watering	Use of chemical stabilizer
Paving	Controlling vehicle speed
Graveling	
Control Options for Mud and Dirt Carry-Out Onto Paved Surfaces	
Gravel entry ways	Washing vehicle wheels
Covering the load	Not overfilling trucks
Control Options for Disturbed Areas	
Watering	Application of a chemical stabilizer
Revegetation	Controlling vehicle speed
Compaction	Furrowing the soil
Wind Breaks	Minimizing the areas of disturbance
	Synthetic or Natural Cover for Slopes

Additional information on APENs and air permits can be found on the following website: <https://www.colorado.gov/pacific/cdphe/air/do-you-need-an-apen>. This site explains the process to obtain APENs and air quality permits, as well as information on calculating emissions, exemptions, and additional requirements. You may also view AQCC Regulation Number 3 at <https://www.colorado.gov/pacific/cdphe/aqcc-regs> for the complete regulatory language.

If you have any questions regarding Colorado's APEN or air permitting requirements or are unsure whether your business operations emit air pollutants, please call the Small Business Assistance Program (SBAP) at 303- 692-3175 or 303-692-3148.

Asbestos and Lead-Based Paint

In Colorado there are regulations regarding the appropriate removal and handling of asbestos and lead-based paint as part of a demolition, renovation, or remodeling project. These regulations are presented in AQCC Number 8 (asbestos) and Number 19 (lead-based paint) which can be found on the following website: <https://www.colorado.gov/cdphe/aqcc-regs>.

These regulations may require the use of, or inspection by, companies or individuals that are certified to inspect or remove these hazards **prior to renovation or demolition**. APCD must also be notified of abatement or demolition activities prior to beginning any work in the case of asbestos. For additional guidance on these regulations and lists of certified companies and individuals please visit the following website for asbestos:

<https://www.colorado.gov/cdphe/categories/services-and-information/environment/asbesto>



[s](#) and the following website for lead-based paint:

<https://www.colorado.gov/pacific/cdphe/categories/services-and-information/lead>.

If you have any questions about Colorado's asbestos and lead-based paint regulations or are unsure whether you are subject to them please call the Indoor Environment Program at 303-692-3100.

If you have more general questions about air quality, please contact CDPHE's APCD by emailing cdphe.commentsapcd@state.co.us or calling 303-692-3100.

Health Equity and Environmental Justice

CDPHE notes that certain projects have potential to impact vulnerable minority and low-income communities. It is our strong recommendation that your organization consider the potential for disproportionate environmental and health impacts on specific communities within the project scope and if so, take action to mitigate and minimize those impacts. This includes interfacing directly with the communities in the project area to better understand community perspectives on the project and receive feedback on how it may impact them during development and construction as well as after completion. We have included some general resources for your reference.

Additional Resources:

[CDPHE's Health Equity Resources](#)

[CDPHE's Checking Assumptions to Advance Equity](#)

[EPA's Environmental Justice and NEPA Resources](#)



From: Jobe - CDOT, Jacquelyn <jacquelyn.jobe@state.co.us>
Sent: Thursday, March 25, 2021 2:56 PM
To: Alan Sielaff <ASielaff@adcogov.org>
Cc: Bradley Sheehan <bradley.sheehan@state.co.us>; Steven Loeffler - CDOT <steven.loeffler@state.co.us>
Subject: Request for Comments: RCU2021-0004 Mile High Outdoors Billboard Conversion

Please be cautious: This email was sent from outside Adams County

Mr. Sielaff,

We received your email regarding an application from Mile High Outdoor requesting comments concerning changes to the renewal of their sign located at 7850-7854 Federal Blvd., State Highway 287. My comments are as follows:

1. This proposed sign must meet all applicable rules and regulations governing Off-Premise Outdoor Advertising signs in Colorado per **2 CCR 603.1**.
2. Renewal application packet, when completed, should be sent to my attention at the address below.

Thank you for the opportunity to review this referral.

--

Jacquelyn Jobe
Permits/Outdoor Advertising Administrator
Permits/Utilities/Traffic

From: [Jobe - CDOT, Jacquelyn](#)
To: [Alan Sielaff](#)
Cc: [Bradley Sheehan](#); [Steven Loeffler - CDOT](#)
Subject: Re: Request for Comments: RCU2021-0004 Mile High Outdoors Billboard Conversion
Date: Thursday, March 25, 2021 4:02:46 PM

Please be cautious: This email was sent from outside Adams County

Hello Alan,

Since this is a different type of billboard, we will want a new application stating how the sign is changing to electronic. We would also like to see the specs to see if there are any changes other than the electronics. You can send the paperwork by email. If the county does approve the renewal application, we shouldn't have a problem with that.

Thanks for asking.

On Thu, Mar 25, 2021 at 3:09 PM Alan Sielaff <ASielaff@adcogov.org> wrote:

Hello Jacquelyn, thank you for your review and comment. I will pass this along to the applicant to acknowledge.

If this request ultimately is approved by the County, does the applicant need to secure a permit with CDOT prior to us issuing a building permit to install the new electronic signs, or is that what #2 is referring to? And Is electronic delivery of the application materials ok or do you need a hardcopy sent?

Thanks,



Alan Sielaff, AICP

Planner II, *Community & Economic Development Department*

ADAMS COUNTY, COLORADO

4430 S. Adams County Parkway, 1st Floor, Suite W2000A

Brighton, CO 80601

P: 720.523.6817 | Department: 720.523.6800

asielaff@adcogov.org | www.adcogov.org

Department operating are hours Tuesday through Friday, 7 a.m. to 5:30 p.m. [more information is available on our website.](#) [Access Adams Online](#) to take care of many services remotely, and find other [department schedules and information here.](#)

From: [Clayton Woodruff](#)
To: [Alan Sielaff](#)
Subject: RE-RCU2021-00004 - Mile High Outdoor 7850 Federal Blvd.
Date: Tuesday, March 16, 2021 8:40:51 AM

Please be cautious: This email was sent from outside Adams County

Alan,

This project does not impact any RTD operations, therefore RTD has no comments.

Thanks,



C. Scott Woodruff
Engineer III

Regional Transportation District
1560 Broadway, Suite 700, FAS-73 | Denver, CO 80202

o 303.299.2943 | m 303-720-2025
clayton.woodruff@rtd-denver.com



March 25, 2021

Alan Sielaff
Adams County Community and Economic Development
4430 South Adams County Parkway, Suite W2000A
Brighton, CO 80601

RE: Mile High Outdoor 7850 Federal, RCU2021-00004
TCHD Case No. 6812

Dear Mr. Sielaff,

Thank you for the opportunity to review and comment on the Conditional Use Permit for the replacement of a two-sided static sign with a two-sided digital LED sign located at 7850 Federal Boulevard. Tri-County Health Department (TCHD) staff has reviewed the application for compliance with applicable environmental and public health regulations and principles of healthy community design. After reviewing the application, TCHD has no comments.

Please feel free to contact me at 720-200-1537 or pmoua@tchd.org if you have any questions about TCHD's comments.

A handwritten signature in black ink, appearing to be "Pang Moua", with a stylized, flowing script.

Sincerely,

Pang Moua, MPP
Land Use and Built Environment Specialist

cc: Sheila Lynch, Monte Deatrich, TCHD



Right of Way & Permits
1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: **303.571.3306**
Facsimile: 303.571.3284
donna.l.george@xcelenergy.com

March 23, 2021

Adams County Community and Economic Development Department
4430 South Adams County Parkway, 3rd Floor, Suite W3000
Brighton, CO 80601

Attn: Alan Sielaff

**Re: Mile High Outdoor 7850 Federal Boulevard Billboard Conversion
Case # RCU2021-00004**

Public Service Company of Colorado's Right of Way & Permits Referral Desk has reviewed the documentation for the above captioned project and has **no apparent conflict** with the conditional use permit renewal or the conversion.

Donna George
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-571-3306 – Email: donna.l.george@xcelenergy.com

From: [Rosie Gantos](#)
To: [Alan Sielaff](#)
Subject: RCU2021-00004
Date: Tuesday, March 30, 2021 1:02:21 PM

Please be cautious: This email was sent from outside Adams County

Hello,

This note is to let you know that I OPPOSE the Static sign replacement with a two-sided digital LED sign. The brightness of the two-sided digital LED will be detrimental to my home environment from dusk to dawn.

Please do not permit this change.

Sincerely,
Rosalie M. Gantos

**Mile High Outdoors's Response to Adams County Development Team
For Conditional Use Permit Renewal and Modification to Existing Sign Structure**

Case Number: RCU2021-00004

Case Manager: Alan Sielaff

Mile High Outdoor's (MHO) response to the below comments will be in RED.

PLNO2: Existing site information

7. Existing billboard approved with RCU2011-ooo7 with 4 conditions of approval summarized as follows;
1. Meet requirements of Section 4-15 (Off-Premise Advertising Devices-now located in Section 4-16).

Response: The existing MHO billboard (off-premise advertising device) is in compliance with all CDOT and Adams County requirements.

2. The billboard will shall have static messages only. Conversions to digital sign requires a major amendment.

Response: MHO is requesting to convert the existing 2-sided static billboard, to a 2-sided digital billboard. It would remain in compliance with all Adams County and CDOT regulations. The images displayed will remain static for 8 seconds with no motion. Changes from one message to the next are instantaneous, with no fading to black or slideshow effect. MHO currently operates multiple digital billboards in Adams County complying with all current standards and regulations. This request would be no different.

3. Sign lighting not permitted between 10 pm and 6 am.

Response: MHO requests to allow 24-hour illumination based on the following:

- Our digital signs are equipped with automated light dimming technology that adjusts brightness to the ambient light conditions in the area. This feature also keeps the digital billboard in full compliance with the brightness standards required by Adams County and the state.
- MHO's digital sign will be equipped with light blocking louvers and down angled LEDs to focus the light and image at the intended viewing audience. If you are outside of the viewing area, you will not see anything. See the light study and video in Exhibit B for greater detail about this technology.
- The current upward facing halogen bulbs on the current static billboard actually creates greater light spillage than the digital screens discussed above and in Exhibit B.

4. Maximum height of 35 ft.

Response: The current height of the sign is 35 ft. and will remain at the current height of 35 ft.

PLNO3: Sign setback-Please provide an updated site plan that includes all setback measurements to confirm sign location meets standards from all property lines.

1. Minimum setbacks from property lines and right-of-way shall be equal to the height of billboard as measured from the leading edge of the sign face, see Section 4-16-07 #1.

The existing setback from the property line to the leading edge of the sign face is 39.3 feet. This will not change.

2. This standard has changed since this billboard was originally approved 10 years ago. Chiefly, that the required setback is now measured from the leading edge of the sign, not the sign pole. See Section 4-16-07 #2.

Response: MHO has provided a survey of the property showing the west side boundary property line to the edge of the billboard. This shows the set back being 39.3 feet from edge of western side of billboard to property line. See attached Exhibit A.

3. Upon review of the previous approval, a variation to the setback requirements at the time was granted for the setback from the north property line, and was not required from Federal Blvd. In order for the sign to remain in its existing location, variations may need to be granted from both if the western edge of the sign is unable to meet the matching height setback from Federal.

Response: Please see attached survey showing the western portion of the property with set back of 39.3 feet to eastern portion of the billboard face. See exhibit A.

PLNO4: Sign height - Please provide detailed elevations of the sign structure detailing the height and dimensions and update application materials as necessary.

1. There appears to be a discrepancy in the requested height in the application materials of 40 ft., and the approved height as part of the original approval of 35 ft. Review of previous approval indicate the approved height was lowered to 35 ft. in order to conform to the maximum height of the C-5 Commercial zone district. Building permit records indicate the sign was approved for this height as well (SGN2011-00056 and BDP11-2459).

Response: The sign will remain at the current height of 35 ft. and will stay in accordance with C-5 Commercial zone district.

2. Sign will meet 8 ft. minimum ground clearance. Please verify 27 ft. clearance provided upon confirmation of total structure height above.

Response: The current sign height from grade to the lowest clearance point is 22 feet. This is greater than the required clearance of 8 ft.

3. Maximum height of a billboard is 40 ft., but we recommend request to remain at 35 ft. for conformance with C-5 zoning.

Response: This was a mistake in the initial application materials provided. The current sign is 35 feet tall and remain at this height.

4. Please provide measurement of distance between sign faces to ensure adherence with 3.5 ft. maximum for back-to-back signs, see Section 4-16-07 #6.

Response: The current static sign is less than 3.5 ft. between each sign. The proposed digital billboard will remain at the same spacing of 3.5 ft. for back-to-back sign.

PLN05: Conversion to electronic sign – Applicant has provided the following information: Signs will consist of two LED 16-millimeter screens equipped with auto-dimmers and wireless communications. LED screens to meet all sign regulations required by Adams County and will employ light mitigating technology that will decrease light exposure to neighboring properties.

1. Previous approval included a condition that lighting was not permitted between 10pm and 6am due to heightened concern about impacts to neighboring residences to the east.

Response: MHO requests to allow 24 hour illumination based on the following:

- Our digital signs are equipped with automated light dimming technology that adjusts brightness to the ambient light conditions in the area. This feature also keeps the digital billboard in full compliance with the brightness standards required by Adams County and the state.

MHO's digital sign will be equipped with light blocking louvers and down angled LEDs to focus the light and image at the intended viewing audience. If you are outside of the viewing area, you will not see anything. See the light study and video in Exhibit B for greater detail about this technology. The current upward facing halogen bulbs on the static billboard actually create greater light spillage than the digital screens discussed above and in Exhibit B.

As shown in Exhibit B, light from the digital sign will not impact the commercial and residential properties.

2. Please provide additional detail how proposed electronic conversion will not impact these neighbors. Providing a photometric plan is recommended to illustrate this.

Response: Please reference Exhibit B, a light study showing the primary audience that will see the digital billboard, as well as the areas of no impact. It also contains a video of the light mitigating technology that will be employed by MHO at this location.

3. Please review and affirm adherence to all lighting standards in Section 4-16-06-02, specifically #4 of a maximum of .03 foot-candles emitted by the source. Further describe use of light monitoring and control, and state if any of these standards can be exceeded to further minimize neighboring impacts (such as agreeing to meet the optimal 10 second message duration, providing a dimmer light source than required).

Response: Please see Exhibit C. This is a letter recently written by MHO's digital sign manufacturer to the City of Lakewood resulting in the approval of a digital billboard with the city. It provides detail about automated light adjustments made by the billboard to ensure full compliance with the .03 foot-candle requirements. This is the same digital billboard manufacturer and technology that will be used of this proposed conversion.

MHO also requests to maintain the industry standard 8 second message duration to maintain consistency. This is what we use on all of our other Adams County digital billboards, and it is the common message duration for outdoor advertising all across the United States. Given that the message changes instantaneously, there is no distraction or additional light mitigation created when comparing an 8 second message to a 10 second message. An 8 second message duration is in full compliance with both CDOT and Adams County regulations.

PLN06: Maximum size of a billboard is 300 sq. ft. Existing sign and proposed electronic conversion will remain at 300 sq. ft.

Response: This is correct, the sign dimensions will stay exactly the same.

PLN07: Comprehensive Plan Review

1. Future land use designation for site is Urban Residential. Urban residential areas are designated for single and multiple family housing, typically at urban densities of one dwelling per acre or greater. These areas are intended to provide for development of residential neighborhoods with a variety of housing types, with adequate urban services and transportation facilities. Urban residential areas may include supporting neighborhood commercial uses designed to serve the needs of nearby residents.
 - a. Review - Only supporting neighborhood commercial uses are considered compatible. Proposed billboard for off-premise advertising is generally not considered a compatible use, but use is permitted conditionally in the C-5 district with a limited approval duration. Staff will likely recommend 10 years for
 - b. The Comprehensive Plan includes area-specific policies and strategies regarding gateway corridors that supports reviewing and updating sign ordinance provisions to control off-premise signs. Abundance of recent billboard requests may be a topic of concern for the Planning Commission and Board of County Commissioners.
2. Federal Blvd. Framework Plan does not address Off-Premise Signs directly, but suggests possible blight conditions be addressed as part of further corridor planning with coordinated signage standards.
3. The County is currently undertaking additional corridor planning efforts as part of the Comprehensive Plan update and associated Transportation Plan updates. Please visit <https://www.adcogov.org/advancing-adams> for more information.

PLN08: Conditional Use Permit approval criteria – Please review and acknowledge. These will be the approving criteria utilized by the Planning Commission and Board of County Commissioners.

2-2-9-6 CRITERIA FOR APPROVAL - The Planning Commission, in making their recommendation, and the Board of County Commissioners, in approving a conditional use permit, shall find:

1. The conditional use is permitted in the applicable zone district.

2. The conditional use is consistent with the purposes of these standards and regulations.
3. The conditional use will comply with the requirements of these standards and regulations including, but not limited to, all applicable performance standards.
4. The conditional use is compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County. In making this determination, the Planning Commission and the Board of County Commissioners shall find, at a minimum, that the conditional use will not result in excessive traffic generation, noise, vibration, dust, glare, heat, smoke, fumes, gas, odors, or inappropriate hours of operation.
5. The conditional use permit has addressed all off-site impacts.
6. The site is suitable for the conditional use including adequate usable space, adequate access, and absence of environmental constraints.
7. The site plan for the proposed conditional use will provide the most convenient and functional use of the lot including the parking scheme, traffic circulation, open space, fencing, screening, landscaping, signage, and lighting.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are to be available and adequate to serve the needs of the conditional use as designed and proposed.

Response: MHO acknowledges with all criteria for approval and will comply with all regulations for approval.

Commenting Division: External Agency (EA) Referral Review

Review Status: Resubmittal Required

EA1: The following external agencies responded with a separate comment letter or email which will be provided in the following pages: Adams County Fire Rescue (ACFR), Adams County Sheriff's Office, City of Westminster, Colorado Department of Health and Environment (CDPHE), Colorado Department of Transportation (CDOT), Regional Transportation District (RTD), Tri-County Health Department (TCHD), and Xcel Energy.

Only CDOT has requested further action related to a new application for a state permit due to the change to an electronic sign. This can be done concurrently or following County review.

EA2: Referral agency comments generally are described in the staff report and may be recommended conditions or notes of approval for the applicant to adhere to if the development application is approved. If additional referral agency comments are received following this letter staff will forward to the applicant to respond in next submittal.

Commenting Division: Public Comment

Review Status: Ongoing

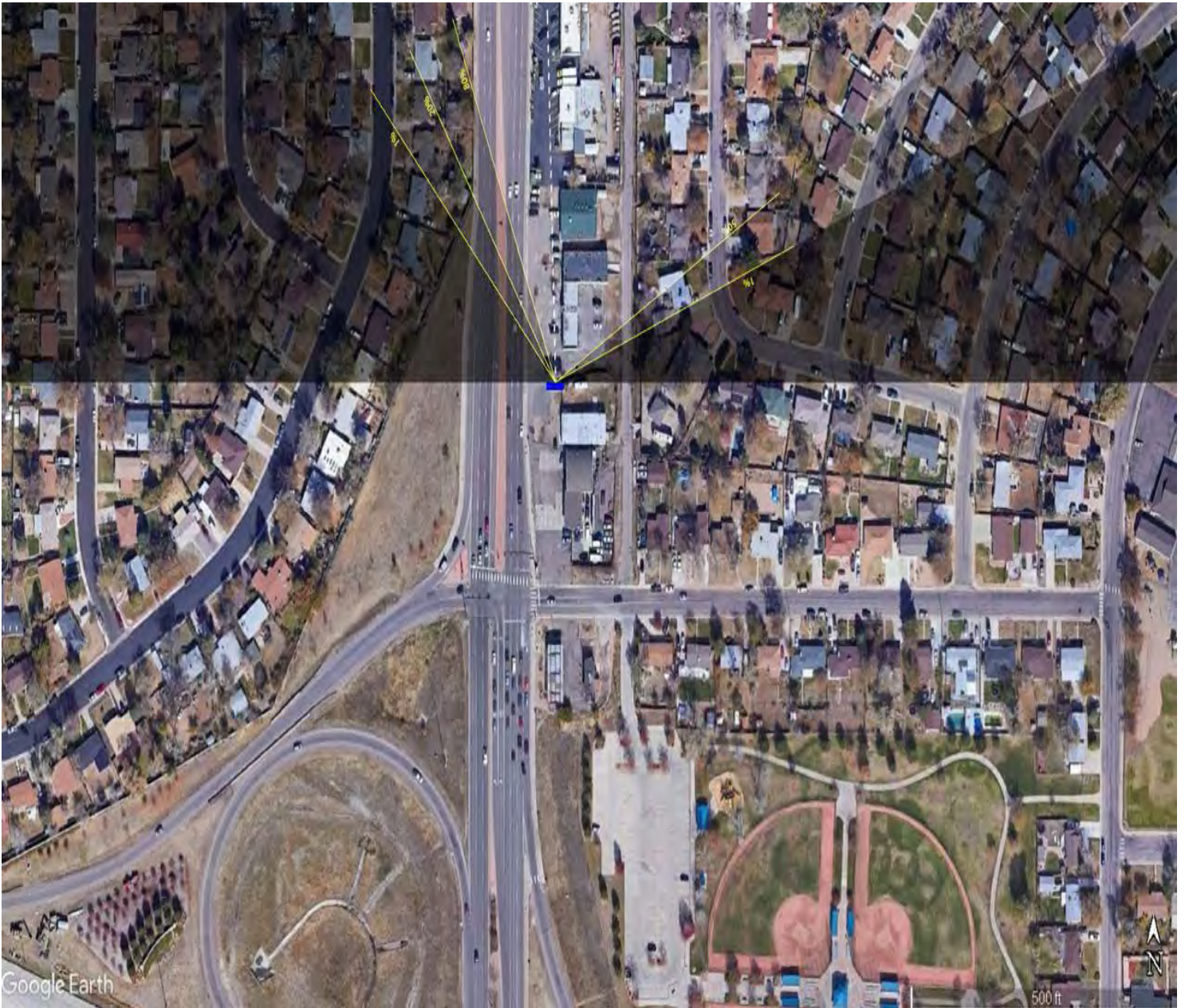
PC1: As of the date of this comment letter, 0 public comments have been received. Public comment will continue to be accepted moving forward and all comments will be included in appendices to the staff report provided to the Planning Commission and Board of County Commissioners once public hearings are scheduled. It is recommended to provide a response to individual public comments or evidence of direct outreach if any public comment is received.



Exhibit A



Exhibit B





Video of Siteline light mitigating technology

<https://vimeo.com/365082755>



Exhibit C



MEDIA RESOURCES

1387 Cornwall Rd.
Oakville, ON
Canada L6J 7T5

T 905.337.0993
F 905.337.9531

August 27, 2020

Lakewood Planning and Development
Civic Center North
470 Allison Pkwy
Lakewood, CO 80226

Attn: Paige Johnson

Re; 200 S Harlan St Sign Permit Application

Media Resources is a manufacturer of LED digital message displays for the sign industry. We have been selected as a supplier for the proposed Large Freestanding Electronic Message Sign described on page 5 of the Gold Crown Foundation – All Star Park, comprehensive sign plan.

In response to zoning questions submitted to the applicant via email, please consider the following additional details of our SITELINE LED Displays:

- The SITELINE display is a 16mm full-color message sign.
- The SITELINE display is designed with down angled led diodes and horizontal light cutoff louvers for the mitigation of unintended light to adjacent uses.
- The SITELINE display is equipped with redundant light sensors to automatically adjust display brightness to the calibrated levels and can be remotely or locally shut down in case of any malfunction.
- The SITELINE display is computer controlled for programming of displayed content and capable of compliance with all applicable requirements of the Lakewood Zoning ordinance 17.9.4.3 (D) Electronic Message Signs. Specifically, Items G.- L of the Supplemental Standards listed in Table 17.9.11.
- As a standard service, upon installation and commissioning of the SITELINE display, brightness will be calibrated to meet the ISA recommended levels by our factory commissioning technician, measurements will be taken and documented and provided to the customer for submission to the appropriate regulatory authorities.

Thank you for your interest in our products and processes for zoning compliance. If you should have any questions, feel free to contact me directly for additional information.

Best regards,

Jared Johnson
Director of Business Development DOOH
Media Resources, Inc
jjohnson@mediaresources.com
801-430-2391



Request for Comments

Case Name: Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
Case Number: RCU2021-00004

March 4, 2021

The Adams County Planning Commission is requesting comments on the following application:
Renewal of a Conditional Use Permit for existing off-premise advertising device located at 7850-7854 Federal Blvd. The existing two-sided static sign will be replaced by a two-sided digital LED sign.

This request is located at 7850 Federal Blvd. The Assessor's Parcel Number is 0171932106039.

Applicant Information: MILE HIGH OUTDOOR
CHAD KOCHENBERGER
9250 E COSTILLA AVE.
STE 500
GREENWOOD VILLAGE, CO 80112

Please forward any written comments on this application to the Community and Economic Development Department at 4430 South Adams County Parkway, Suite W2000A Brighton, CO 80601-8216 or call (720) 523-6817 by 03/26/2021 in order that your comments may be taken into consideration in the review of this case. If you would like your comments included verbatim please send your response by way of e-mail to ASielaff@adcogov.org.

Once comments have been received and the staff report written, the staff report and notice of public hearing dates may be forwarded to you upon request. The full text of the proposed request and additional colored maps can be obtained by contacting this office or by accessing the Adams County web site at www.adcogov.org/planning/currentcases.

Thank you for your review of this case.

Alan Sielaff
Planner II



Public Hearing Notification

Case Name:	Mile High Outdoor 7850 Federal Blvd. Billboard Conversion
Case Number:	RCU2021-00004
Planning Commission Hearing Date:	07/08/2021 at 6:00 p.m.
Board of County Commissioners Hearing Date:	07/27/2021 at 9:30 a.m.

June 14, 2021

A public hearing has been set by the Adams County Planning Commission and the Board of County Commissioners to consider the following request: **Conditional Use Permit for existing billboard located at 7850 Federal Blvd. Applicant would also like to convert from a static sign to a two-sided digital LED sign with the same dimensions.** This request is located at 7850 Federal Blvd. The Assessor's Parcel Number(s) 0171932106039.

Applicant Information: MILE HIGH OUTDOOR
CHAD KOCHENBERGER
9250 E COSTILLA AVE. STE 500
GREENWOOD VILLAGE, CO 80112

The hearings will be held in the Adams County Hearing Room located at 4430 South Adams County Parkway, Brighton CO 80601-8216. These will be a public hearing and any interested parties may attend and be heard. The Applicant and Representative's presence at these hearings is requested. Please visit <http://www.adcogov.org/planning-commission> and <http://www.adcogov.org/bocc> for up to date information on accessing the public hearings and submitting comment prior to the hearings.

The full text of the proposed request can be obtained by accessing the Adams County Community and Economic Development Department website at www.adcogov.org/planning/currentcases. If you require any special accommodations, please contact the Adams County Department of Community and Economic Development (CEDD) at cedd-pod@adcogov.org, or 720-523-6800 at least one hour prior to the meeting date.

Thank you,

Alan Sielaff
Planner II

BOARD OF COUNTY COMMISSIONERS

Eva J. Henry
DISTRICT 1

Charles "Chaz" Tedesco
DISTRICT 2

Emma Pinter
DISTRICT 3

Steve O'Dorisio
DISTRICT 4

Lynn Baca
DISTRICT 5



RCU2021-00004 Vicinity Map



Legend

Highways

- Interstate
- Highway
- Tollway

Streets

- Streets
- Ramp

- Building
- Parcels

1: 3,974



0.1 0 0.06 0.1 Miles

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Site: 7850 Federal Blvd.

PUBLICATION REQUEST

Case Name: Mile High Outdoor 7850 Federal Blvd. Billboard Conversion

Case Number: RCU2021-00004

Planning Commission Hearing Date: July 8, 2021 at 6:00 p.m.

Board of County Commissioners Hearing Date: July 27, 2021 at 9:30 a.m.

Case Manager: Alan Sielaff, asielaff@adcogov.org, 720-523-6817

Request: Conditional Use Permit for existing billboard located at 7850 Federal Blvd. Applicant would also like to convert from a static sign to a two-sided digital LED sign with the same dimensions

Parcel Number: 0171932106039

Address of the Request: 7850 Federal Blvd.

Applicant: Mile High Outdoor, Chad Kochenberger, 9250 E. Costilla Ave. STE 500 Greenwood Village, CO 80112

Legal Description: FAIRVIEW COMMERCIAL PROPERTY CORRECTION PLAT LOT 9

Public Meeting and Comment Information: The hearings will be in the Hearing Room of the Adams County Government Center, 4430 South Adams County Parkway, Brighton, CO – 1st Floor. Please visit <http://www.adcogov.org/planning-commission> and <http://www.adcogov.org/bocc> for up to date information on accessing the public hearings and submitting comment prior to the hearings. These will be public hearings and any interested parties may attend and be heard. The Applicant and Representative's presence at these hearings is requested. The full text of the proposed request and additional colored maps can be obtained by accessing the Adams County Community and Economic Development Department website at www.adcogov.org/planning/currentcases. If you require any special accommodations, please contact the Adams County Department of Community and Economic Development at (CEDD) at cedd-pod@adcogov.org, or 720-523-6800 at least one hour prior to the meeting date.



Referral Listing
Case Number RCU2021-00004
Mile High Outdoor 7850 Federal Blvd. Billboard
Conversion

Agency	Contact Information
Adams County Attorney's Office	Christine Fitch 4430 S Adams County Pkwy Brighton CO 80601 720-523-6352 CFitch@adcogov.org
Adams County CEDD Development Services Engineer	Devt. Services Engineering 4430 S. Adams County Pkwy. Brighton CO 80601 720-523-6800
Adams County CEDD Environmental Services Division	Katie Keefe 4430 S. Adams County Pkwy. Brighton CO 80601 720-523-6986 kkeefe@adcogov.org
Adams County CEDD Right-of-Way	Mark Alessi 4430 S. Adams County Pkwy. Brighton CO 80601 720-523-6837 malessi@adcogov.org
Adams County Community Safety & Wellbeing, Neighborhood Services	Gail Moon 4430 S. Adams County Pkwy. Brighton CO 80601 720-523-6856 gmoon@adcogov.org
Adams County Development Services - Building	Justin Blair 4430 S Adams County Pkwy Brighton CO 80601 720-523-6825 JBlair@adcogov.org
Adams County Fire Protection District	Whitney Even 7980 Elmwood Lane Denver CO 80221 303-539-6802 weven@acfpd.org 303-539-6802
Adams County Fire Protection District	Carla Gutierrez 7980 Elmwood Ln. Denver CO 80221 303-539-6862 cgutierrez@acfpd.org

Agency	Contact Information
Adams County Parks and Open Space Department	Marc Pedrucci 303-637-8014 mpedrucci@adcogov.org
Adams County Parks and Open Space Department	Aaron Clark (303) 637-8005 aclark@adcogov.org
Adams County Sheriff's Office	Rick Reigenborn (303) 654-1850 rreigenborn@adcogov.org
Adams County Sheriff's Office	- - 303-655-3283 CommunityConnections@adcogov.org
CDOT Colorado Department of Transportation	Bradley Sheehan 2829 W. Howard Pl. 2nd Floor Denver CO 80204 303.757.9891 bradley.sheehan@state.co.us
CDPHE	Sean Hackett 4300 S Cherry Creek Dr Denver CO 80246 303.692.3662 303.691.7702 cdphe_localreferral@state.co.us
CDPHE - WATER QUALITY PROTECTION SECT	Patrick Pfaltzgraff 4300 CHERRY CREEK DRIVE SOUTH WQCD-B2 DENVER CO 80246-1530 303-692-3509 cdphe_localreferral@state.co.us
CDPHE SOLID WASTE UNIT	Andy Todd 4300 CHERRY CREEK DR SOUTH HMWMD-CP-B2 DENVER CO 80246-1530 303.691.4049 cdphe_localreferral@state.co.us
Century Link, Inc	Brandyn Wiedreich 5325 Zuni St, Rm 728 Denver CO 80221 720-578-3724 720-245-0029
CITY OF WESTMINSTER	Rita McConnell 4800 W 92ND AVE. WESTMINSTER CO 80031 303-658-2093 planning@cityofwestminster.us
CITY OF WESTMINSTER	Andy Walsh 4800 W 92nd Avenue WESTMINSTER CO 80031 303-658-2563 awalsh@cityofwestminster.us

Agency	Contact Information
COLORADO DEPARTMENT OF TRANSPORT.	Steve Loeffler 2000 South Holly Street, Room 228 Denver CO 80222 303-757-9891 steven.loeffler@state.co.us
COLORADO DEPT OF TRANSPORTATION	Steve Loeffler 2000 S. Holly St. Region 1 Denver CO 80222 303-757-9891 steven.loeffler@state.co.us
Colorado Division of Wildlife	Hannah Posey 6060 Broadway St. Denver CO 80216-1000 303-947-1798 hannah.posey@state.co.us
COLORADO DIVISION OF WILDLIFE	Serena Rocksund 6060 BROADWAY DENVER CO 80216 3039471798 serena.rocksund@state.co.us
COMCAST	JOE LOWE 8490 N UMATILLA ST FEDERAL HEIGHTS CO 80260 303-603-5039
Crestview Water & Sanitation	Patrick Stock 7145 Mariposa St PO Box 21299 Denver CO 80221-0299 303-430-1660 303-434-0607 PatrickStock@crestviewwater.net
METRO WASTEWATER RECLAMATION	CRAIG SIMMONDS 6450 YORK ST. DENVER CO 80229 303-286-3338 CSIMMONDS@MWRD.DST.CO.US
PERL MACK NEIGHBORHOOD GROUP	DAN MICEK - PRESIDENT 7294 NAVAJO ST. DENVER CO 80221 303-428-8557 DANMICEK54@COMCAST.NET
REGIONAL TRANSPORTATION DIST.	Engineering RTD 1560 BROADWAY SUITE 700 DENVER CO 80202 303-299-2439 engineering@rtd-denver.com
TRI-COUNTY HEALTH DEPARTMENT	Sheila Lynch 6162 S WILLOW DR, SUITE 100 GREENWOOD VILLAGE CO 80111 720-200-1571 landuse@tchd.org

Agency	Contact Information
TRI-COUNTY HEALTH DEPARTMENT	MONTE DEATRICH 4201 E. 72ND AVENUE SUITE D COMMERCE CITY CO 80022 (303) 288-6816 mdeatrich@tchd.org
Tri-County Health: Mail CHECK to Sheila Lynch	Tri-County Health landuse@tchd.org .
WESTMINSTER FIRE DEPT.	CAPTAIN DOUG HALL 9110 YATES ST. WESTMINSTER CO 80031 303-430-2400 x4542 dhall@ci.westminster.co.us
WESTMINSTER SCHOOL DISTRICT #50	Jackie Peterson 7002 Raleigh Street WESTMINSTER CO 80030 720-542-5100 jpeterson@adams50.org
Xcel Energy	Donna George 1123 W 3rd Ave DENVER CO 80223 303-571-3306 Donna.L.George@xcelenergy.com
Xcel Energy	Donna George 1123 W 3rd Ave DENVER CO 80223 303-571-3306 Donna.L.George@xcelenergy.com

7870 CRESTVIEW LLC
1168 SUNSHINE CANYON DR
BOULDER CO 80302-9725

FOSTER MAX I
2880 COTTONWOOD DR
DENVER CO 80221-3211

BERZINS ANDRIS AND
BERZINS MARSHA E
222 S SALEM CT
AURORA CO 80012-1301

GANTOS ROSALIE M
3341 SHOSHONE ST
DENVER CO 80211-3426

BOYLE ROBERT F AND BARBARA H
FAMILY TRUST
7190 KINGSBURY BLVD
SAINT LOUIS MO 63130-4306

GONZALES DANIEL L AND
GONZALES DEBRA A
2790 COTTONWOOD DR
DENVER CO 80221-3209

BURCIAGA JESUS JOSE AND
BURCIAGA BERTHA ALICIA
2860 COTTONWOOD DRIVE
DENVER CO 80221

GOVEA LLC
2920 W 73RD AVE
WESTMINSTER CO 80030-5000

CABALLERO JOSE GABRIEL HUERTA
2311 W 92ND AVE LOT 81
DENVER CO 80260-5231

GROVE ST LLC
13051 W VASSAR PL
LAKEWOOD CO 80228-4921

CHEN ZAIXING
1178 OCALA ST
MYRTLE BEACH SC 29577

GTY-PACIFIC LEASING LLC
ATTN ASSET MANAGEMENT
TWO JERICO PLAZA STE 110 WING C
JERICO NY 11753

CRESTVIEW WATER AND SANITATION DISTRICT
PO BOX 666
WESTMINSTER CO 80036-0666

HYLAND HILLS PARK AND
RECREATION DISTRICT
8801 N PECOS ST
FEDERAL HEIGHTS CO 80260

DEWELL JOHN B
2020 S MONROE ST APT 502
DENVER CO 80210-3770

INGALLS TROY D
13777 W 59TH PL
ARVADA CO 80004-3745

ESCHENBACH STEVEN
2451 KIPLING ST APT 204
LAKEWOOD CO 80215-1481

KERCEL TAMMIE L AND
KERCEL ADAM H AND KILBURN SARA E
7820 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

FAIRVIEW CO
600 JOSEPHINE ST
DENVER CO 80206-3723

LITZ JOSHUA AND
HILL PATRICIA
2890 COTTONWOOD DR
DENVER CO 80221-3211

LOCMY LLLP
8358 W 62ND PL
ARVADA CO 80004-3410

TRIOLOGY TRUST
2800 COTTONWOOD DR
DENVER CO 80221-3211

LUEVANO RAUL RICARDO
5274 WHEELING ST
DENVER CO 80239-5866

WEAVER GREGORY A AND
NAIL DEBRA
1645 W MANOR ST
CHANDLER AZ 85224-5104

MALOUFF DANIEL A AND
MALOUFF JOAN M
2920 COTTONWOOD DR
DENVER CO 80221-3270

WELLTON MORTGAGE COMPANY
6045 W MANSFIELD AVE UNIT 245
DENVER CO 80235-3019

MC DONNELL BARBARA J
2840 COTTONWOOD DR
DENVER CO 80221-3211

WILMOTH NORMA F
2820 COTTONWOOD DR
DENVER CO 80221-3211

MSR LLC II
1280 S PARKER RD
DENVER CO 80231-2128

ALARID LISA MARIE AND
DURAN LEROY MANUEL
OR CURRENT RESIDENT
7930 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4223

NGUYEN PHUC VAN AND
NGUYEN AMY HONG-OANH
10074 VINE CT
THORNTON CO 80229-2386

APODACA ANDREA M
OR CURRENT RESIDENT
2920 COTTONWOOD DR
DENVER CO 80221-3270

RAMIREZ MAGDALENA TARANGO
2930 W 80TH AVE
DENVER CO 80221-3891

ARAUZ YANIRA AND
ARAUZ RUDY
OR CURRENT RESIDENT
7921 VALLEY VIEW DR
DENVER CO 80221-3846

SCHNABEL JANE F AND
SCHNABEL ROBERT R
7005 GRANDVIEW AVENUE
ARVADA CO 80002-2619

ARCHULETA DOINICIA LYNN
OR CURRENT RESIDENT
7901 VALLEY VIEW DR
DENVER CO 80221-3846

SHOCKLEY GERALD E
2900 COTTONWOOD DRIVE
DENVER CO 80221

ARRIAGA JAIME AND
ARRIAGA LETICIA G
OR CURRENT RESIDENT
7851 ROBIN LN
DENVER CO 80221-3812

THE TRIPLETT FAMILY TRUST
PO BOX 13128
SAN LUIS OBISPO CA 93406-3128

AUSTIN ANDREW CLAUDE
OR CURRENT RESIDENT
7961 GREEN CT
WESTMINSTER CO 80030-4224

AVALOS RAMON AYALA
OR CURRENT RESIDENT
7930 GREEN CT
WESTMINSTER CO 80030-4225

CARRILLO MARIA
OR CURRENT RESIDENT
2941 COTTONWOOD DR
DENVER CO 80221-3269

BACA BEVERLY J
OR CURRENT RESIDENT
7910 GREEN CT
WESTMINSTER CO 80030-4225

CASADO JESUS AND
CASADO ELISA M
OR CURRENT RESIDENT
7891 ROBIN LANE
DENVER CO 80221

BANUELOS RICARDO
OR CURRENT RESIDENT
7830 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

CELESTINO AVELINA P
OR CURRENT RESIDENT
2940 COTTONWOOD DR
DENVER CO 80221-3270

BARILLAS LUIS
OR CURRENT RESIDENT
7830 GROVE ST
WESTMINSTER CO 80030-4288

CHAVEZ LOMELI CARLOS
OR CURRENT RESIDENT
7880 ROBIN LN
DENVER CO 80221-3870

BETTALE TOMMY J
OR CURRENT RESIDENT
7961 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

COHEN JESSE
OR CURRENT RESIDENT
7860 ROBIN LN
DENVER CO 80221-3870

BORQUEZ LUCIA L AND
BORQUEZ CONRAD R
OR CURRENT RESIDENT
7921 APPLEBLOSSOM LANE
WESTMINSTER CO 80030

COLLINS STEPHANIE AND
MONTOKA ANTHONY E
OR CURRENT RESIDENT
7881 ROBIN LN
DENVER CO 80221-3812

BREWER CLAIRE ELIZABETH
OR CURRENT RESIDENT
7900 CRESTVIEW LN
DENVER CO 80221-3806

CORDOVA ABRAHAM E AND
CORDOVA REBECCA
OR CURRENT RESIDENT
7839 ELMWOOD LN
DENVER CO 80221-3265

BURCIAGA JESUS JOSE AND
BURCIAGA BERTHA ALICIA
OR CURRENT RESIDENT
2860 COTTONWOOD DRIVE
DENVER CO 80221

CRUZ ANGEL D AND CRUZ MERCY
OR CURRENT RESIDENT
7960 ROBIN LN
DENVER CO 80221-3819

BURR JERROLD J AND
BURR AMANDA M
OR CURRENT RESIDENT
7861 ROBIN LN
DENVER CO 80221-3812

DAVEY ROBERT A AND
DAVEY IRENE N
OR CURRENT RESIDENT
7940 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4223

BUSTILLOS GUIDO E AND
BUSTILLOS ESMERALDA
OR CURRENT RESIDENT
7940 ROBIN LN
DENVER CO 80221-3819

DAVIS WOODROW P
OR CURRENT RESIDENT
7965 ROBIN LN
DENVER CO 80221-3816

DELGADO ROBERT M AND DELGADO SHERRI L
OR CURRENT RESIDENT
7891 VALLEY VIEW DR
DENVER CO 80221-3848

GERLICK DANIEL LEE AND
GERLICK PAMELA JO
OR CURRENT RESIDENT
7840 GROVE ST
WESTMINSTER CO 80030-4288

DIAZ RICARDO
OR CURRENT RESIDENT
7920 CRESTVIEW LN
DENVER CO 80221-3806

GILL JOSEPH F
OR CURRENT RESIDENT
2900 W 80TH AVE
DENVER CO 80221-3863

ESTEVEZ JOSE
OR CURRENT RESIDENT
7880 VALLEY VIEW DR
DENVER CO 80221-3849

GIMER DAVID C AND
GIMER LINDA S
OR CURRENT RESIDENT
7871 VALLEY VIEW DRIVE
DENVER CO 80221

FAUSETT SARAH B AND
FAUSETT SHAWN D
OR CURRENT RESIDENT
7900 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4223

GIRON JOSEPH K
OR CURRENT RESIDENT
7821 APPLEBLOSSOM LN
WESTMINSTER CO 80030

FENNELL PATRICK W
OR CURRENT RESIDENT
7861 VALLEY VIEW DR
DENVER CO 80221-3848

GODSOE TRAVIS R
OR CURRENT RESIDENT
7951 GREEN CT
WESTMINSTER CO 80030-4224

FINO NICOLAS JR
OR CURRENT RESIDENT
7921 ROBIN LN
DENVER CO 80221

GONZALES DANIEL L AND
GONZALES DEBRA A
OR CURRENT RESIDENT
2790 COTTONWOOD DR
DENVER CO 80221-3209

FISH BRADLEY J AND
FISH RITA R
OR CURRENT RESIDENT
7831 ROBIN LN
DENVER CO 80221-3812

GOWER DOUGLAS J
OR CURRENT RESIDENT
7881 VALLEY VIEW DR
DENVER CO 80221

FITZGERALD ANTHONY L
OR CURRENT RESIDENT
7990 ROBIN LN
DENVER CO 80221-3819

GRIFFIN JOSHUA
OR CURRENT RESIDENT
7921 GREEN CT
WESTMINSTER CO 80030-4224

FRANK RODNEY S
OR CURRENT RESIDENT
7920 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4223

GUINN SUSAN
OR CURRENT RESIDENT
7910 GROVE ST
WESTMINSTER CO 80030-4227

GARCIA PAUL A AND
GARCIA REBECCA R
OR CURRENT RESIDENT
7901 CRESTVIEW LANE
DENVER CO 80221

HAYS RAYMOND J AND
HAYS AURORA
OR CURRENT RESIDENT
7811 ROBIN LN
DENVER CO 80221-3812

HERRERA ALICE M AND
HERRERA DELORES
OR CURRENT RESIDENT
2771 COTTONWOOD DR
DENVER CO 80221-3268

LOPEZ MARIO
OR CURRENT RESIDENT
2851 COTTONWOOD DR
DENVER CO 80221-3210

HILLIARD JR STANLEY G
OR CURRENT RESIDENT
7870 VALLEY VIEW DR
DENVER CO 80221-3849

LOPEZ MERRILL E
OR CURRENT RESIDENT
7859 ELMWOOD LN
DENVER CO 80221-3265

HINTON THERESA A
OR CURRENT RESIDENT
7871 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4220

LOWE ROBERTA C
OR CURRENT RESIDENT
7810 GROVE ST
WESTMINSTER CO 80030-4288

KERCEL TAMMIE L AND
KERCEL ADAM H AND KILBURN SARA E
OR CURRENT RESIDENT
7820 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

LUCERO MANUEL
OR CURRENT RESIDENT
7868 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

KIRrane JAMES P
OR CURRENT RESIDENT
7961 ROBIN LN
DENVER CO 80221-3816

MA XUETING
OR CURRENT RESIDENT
2871 COTTONWOOD DR
DENVER CO 80221-3210

KREUTZER JAMES AND
KREUTZER DOREEN E
OR CURRENT RESIDENT
7870 GROVE ST
WESTMINSTER CO 80030-4288

MAES RAOUL L AND
MAES GERALDINE E AND MAES LAURA E
OR CURRENT RESIDENT
7945 ROBIN LN
DENVER CO 80221-3816

KURTZ RICHARD J
OR CURRENT RESIDENT
7820 VALLEY VIEW DR
DENVER CO 80221-3849

MALDONADO RIGOBERTO
OR CURRENT RESIDENT
7986 ROBIN LN
DENVER CO 80221-3819

LARA PEDRO G BOJOQUEZ
OR CURRENT RESIDENT
7830 ROBIN LN
DENVER CO 80221-3815

MALLY RICHARD
OR CURRENT RESIDENT
7950 GREEN CT
WESTMINSTER CO 80030-4225

LAUVER GARY W AND
LAUVER GLADYS E
OR CURRENT RESIDENT
7950 ROBIN LN
DENVER CO 80221-3819

MARCHESE DONALD V AND
MARCHESE KATHRYN D
OR CURRENT RESIDENT
7860 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

LITZ JOSHUA AND
HILL PATRICIA
OR CURRENT RESIDENT
2890 COTTONWOOD DR
DENVER CO 80221-3211

MARTINEZ REYNALDA E
OR CURRENT RESIDENT
2780 COTTONWOOD DR
DENVER CO 80221-3209

MC DONNELL BARBARA JAUNITA
OR CURRENT RESIDENT
2840 COTTONWOOD DR
DENVER CO 80221-3211

NGUYEN CAMVAN T AND
NGUYEN THANH PHONG CONG
OR CURRENT RESIDENT
7890 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

MEDINA VARGAS J NICANOR AND
MEDINA JUDITH AND CHURAPEDEMEDINA ROSALINDA
OR CURRENT RESIDENT
7900 GROVE ST
WESTMINSTER CO 80030-4227

NOLFF KRISTEN
OR CURRENT RESIDENT
7821 ROBIN LN
DENVER CO 80221-3812

MENDOZA SAUL
OR CURRENT RESIDENT
7810 APPLEBLOSSOM LANE
WESTMINSTER CO 80030

OLVERA ROLANDO
OR CURRENT RESIDENT
7890 CRESTVIEW LN
DENVER CO 80221-3804

MIDDLETON JOEANA AND
PETERSON NEIL
OR CURRENT RESIDENT
2901 COTTONWOOD DR
DENVER CO 80221-3269

OXLEY JEREMY
OR CURRENT RESIDENT
7860 GROVE ST
WESTMINSTER CO 80030-4288

MONCAYO EVARISTO AND
BAEZA MARIA E AND BAEZA SALVADOR
OR CURRENT RESIDENT
2921 COTTONWOOD DR
DENVER CO 80221

PACHELLO ROXANNE M AND
MOWEN WILLIAM
OR CURRENT RESIDENT
7971 GREEN CT
WESTMINSTER CO 80030-4224

MONDRAGON ANGELITA
OR CURRENT RESIDENT
2880 COTTONWOOD DR
DENVER CO 80221-3211

PARKER HOWARD KIMBERLY A
OR CURRENT RESIDENT
7871 CRESTVIEW LN
DENVER CO 80221-3803

MORENO EDGAR F
OR CURRENT RESIDENT
7930 GROVE ST
WESTMINSTER CO 80030-4227

PARKS ADAM M AND PARKS JESSICA E
OR CURRENT RESIDENT
7981 ROBIN LN
DENVER CO 80221-3816

MORUA ELIZABETH
OR CURRENT RESIDENT
7911 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

PEREZ ADELFINA AND
PEREZ DANIEL
OR CURRENT RESIDENT
2890 W 80TH AVE
DENVER CO 80221-3810

MURPHY MICHAEL P
OR CURRENT RESIDENT
7941 CRESTVIEW LN
DENVER CO 80221-3805

PETERSEN CLAUDIA MARIA
OR CURRENT RESIDENT
7931 GREEN CT
WESTMINSTER CO 80030-4224

NGUYEN BICH AND
NGUYEN MICHAEL THAI
OR CURRENT RESIDENT
7951 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

PHAN HUONG VAN
OR CURRENT RESIDENT
7941 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

PUGA ESTRADA EDUARDO AND
PUGA PATRICIA
OR CURRENT RESIDENT
7850 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

RUBIO ROBERTO YANEZ
OR CURRENT RESIDENT
7880 CRESTVIEW LN
DENVER CO 80221-3804

RAINS CLELLAN C
OR CURRENT RESIDENT
7941 GREEN CT
WESTMINSTER CO 80030-4224

RUIZ NORA AVILA
OR CURRENT RESIDENT
7831 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4220

RAMIREZ MAGDALENA TARANGO
OR CURRENT RESIDENT
2930 W 80TH AVE
DENVER CO 80221-3891

SANCHEZ-ROMAN JUAN ENRIQUE AND
SANCHEZ SANDRA
OR CURRENT RESIDENT
7931 CRESTVIEW LN
DENVER CO 80221-3805

RAYFIELD BEVERLY A 71.5% AND
RAYFIELD ROGER 28.5% INT
OR CURRENT RESIDENT
7970 GREEN CT
WESTMINSTER CO 80030-4225

SCHILL REBECCA E AND
SCHILL CHRISTINA R
OR CURRENT RESIDENT
7870 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

REALE ROBERT
OR CURRENT RESIDENT
7820 GROVE ST
WESTMINSTER CO 80030-4288

SCHOEN RAYMOND LEE AND
SCHOEN DIANA E
OR CURRENT RESIDENT
2831 COTTONWOOD DR
DENVER CO 80221-3210

REGAN DAVID K AND
FEESER DAVID M AND FEESER ANN R
OR CURRENT RESIDENT
7840 VALLEY VIEW DR
DENVER CO 80221-3849

SCIACCA JAMES C AND
SCIACCA JOAN M
OR CURRENT RESIDENT
7851 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4220

RIEBSCHLAGER LAURENCE P AND
RIEBSCHLAGER DONNA R
OR CURRENT RESIDENT
7931 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

SELLARS KENNETH MELVIN/MARY LYNN AND
SOUTHWICK ADDISON DWIGHT III/SHERYL LYNN
OR CURRENT RESIDENT
7888 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

RIEBSCHLAGER MARIE V
OR CURRENT RESIDENT
7940 GREEN CT
WESTMINSTER CO 80030-4225

SERNA JUNE
OR CURRENT RESIDENT
7901 APPLEBLOSSOM LN
WESTMINSTER CO 80030

RODRIGUEZ ROBERT AND MELISSA
OR CURRENT RESIDENT
2881 COTTONWOOD DR
DENVER CO 80221-3210

SHEEHAN MEGAN
OR CURRENT RESIDENT
7850 GROVE ST
WESTMINSTER CO 80030-4288

ROWE FAMILY TRUST UA THE
OR CURRENT RESIDENT
7920 GREEN CT
WESTMINSTER CO 80030

SHOCKLEY GERALD E
OR CURRENT RESIDENT
2900 COTTONWOOD DRIVE
DENVER CO 80221

SMITH HOLLY ANN
OR CURRENT RESIDENT
7830 VALLEY VIEW DR
DENVER CO 80221-3849

VARGAS FABIAN SR
OR CURRENT RESIDENT
7971 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

SONG GUANG GU AND
ZHOU XING G
OR CURRENT RESIDENT
7920 GROVE ST
WESTMINSTER CO 80030-4227

VAUGHN MICHAEL JR AND
VAUGHN KELLI
OR CURRENT RESIDENT
7841 APPLEBLOSSOM LANE
WESTMINSTER CO 80030

STRAWMIER BARBARA J AND
STRAWMIER THOMAS J
OR CURRENT RESIDENT
2861 COTTONWOOD DR
DENVER CO 80221-3210

VAZQUEZ ANTONIO AND
HERNANDEZ VICTORIA
OR CURRENT RESIDENT
7840 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

SUAREZ MARIA
OR CURRENT RESIDENT
7921 CRESTVIEW LN
DENVER CO 80221-3805

VELVIS NIEK AND
DYM ALANA
OR CURRENT RESIDENT
7871 ROBIN LN
DENVER CO 80221-3812

SUTHERLAND ELAINE AND
SUTHERLAND DAVID L
OR CURRENT RESIDENT
7860 VALLEY VIEW DR
DENVER CO 80221-3849

VONFELDT DOROTHY J
OR CURRENT RESIDENT
7910 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4223

TORRES HECTOR L JR AND
TORRES HECTOR L SR
OR CURRENT RESIDENT
7849 ELMWOOD LN
DENVER CO 80221-3265

WARNELL RACHEL REBECCA
OR CURRENT RESIDENT
7878 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

TRILOGY TRUST
OR CURRENT RESIDENT
2800 COTTONWOOD DR
DENVER CO 80221-3211

WILLIAMS LLYNDA JO
OR CURRENT RESIDENT
7901 GREEN CT
WESTMINSTER CO 80030-4224

TRUE ROBIN LEE
OR CURRENT RESIDENT
7900 GREEN CT
WESTMINSTER CO 80030-4225

WILLIAMSON JAMES ALAN AND
KNIGHT NANCY JEAN
OR CURRENT RESIDENT
7800 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

URIBE LUCERO JUAN ANTONIO
OR CURRENT RESIDENT
7930 CRESTVIEW LN
DENVER CO 80221-3806

WILMOTH NORMA
OR CURRENT RESIDENT
2820 COTTONWOOD DR
DENVER CO 80221

VARELA RICARDO AND
TAFOLLA ANA M
OR CURRENT RESIDENT
7920 ROBIN LN
DENVER CO 80221-3819

WILSON WESLEY
OR CURRENT RESIDENT
7880 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4221

WOOD MARYBETH L AND
WOOD BENJAMIN J
OR CURRENT RESIDENT
7975 ROBIN LN
DENVER CO 80221-3816

CURRENT RESIDENT
7900 FEDERAL BLVD
WESTMINSTER CO 80030-4204

YANKER MARGARET S
OR CURRENT RESIDENT
7960 GREEN CT
WESTMINSTER CO 80030-4225

CURRENT RESIDENT
7930 FEDERAL BLVD
WESTMINSTER CO 80030-4204

ZURITA COLLAZO JUAN FERNANDO AND
RAUDEL COLLAZO MARIA
OR CURRENT RESIDENT
2920 W 80TH AVE
DENVER CO 80221-3863

CURRENT RESIDENT
7950 FEDERAL BLVD
WESTMINSTER CO 80030-4204

CURRENT RESIDENT
7790 FEDERAL BLVD
WESTMINSTER CO 80030-4201

CURRENT RESIDENT
7970 FEDERAL BLVD
WESTMINSTER CO 80030-4204

CURRENT RESIDENT
7840 FEDERAL BLVD
WESTMINSTER CO 80030-4202

CURRENT RESIDENT
7990 FEDERAL BLVD
WESTMINSTER CO 80030-4204

CURRENT RESIDENT
7850 FEDERAL BLVD
WESTMINSTER CO 80030-4202

CURRENT RESIDENT
7811 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4220

CURRENT RESIDENT
7860 FEDERAL BLVD
WESTMINSTER CO 80030-4202

CURRENT RESIDENT
7861 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4220

CURRENT RESIDENT
7870 FEDERAL BLVD
WESTMINSTER CO 80030-4202

CURRENT RESIDENT
7975 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

CURRENT RESIDENT
7880 FEDERAL BLVD
WESTMINSTER CO 80030-4202

CURRENT RESIDENT
7981 APPLEBLOSSOM LN
WESTMINSTER CO 80030-4222

CURRENT RESIDENT
7995 FEDERAL BLVD
WESTMINSTER CO 80030-4203

CURRENT RESIDENT
7911 GREEN CT
WESTMINSTER CO 80030-4224

CURRENT RESIDENT
7961 FEDERAL BLVD UNIT 101
WESTMINSTER CO 80030-4283

CURRENT RESIDENT
7955 ROBIN LN
DENVER CO 80221-3816

CURRENT RESIDENT
7961 FEDERAL BLVD UNIT 102
WESTMINSTER CO 80030-4283

CURRENT RESIDENT
7971 ROBIN LN
DENVER CO 80221-3816

CURRENT RESIDENT
7800 GROVE ST
WESTMINSTER CO 80030-4288

CURRENT RESIDENT
7900 ROBIN LN
DENVER CO 80221-3819

CURRENT RESIDENT
7881 CRESTVIEW LN
DENVER CO 80221-3803

CURRENT RESIDENT
7970 ROBIN LN
DENVER CO 80221-3819

CURRENT RESIDENT
7870 CRESTVIEW LN
DENVER CO 80221-3804

CURRENT RESIDENT
7850 VALLEY VIEW DR
DENVER CO 80221-3849

CURRENT RESIDENT
7951 CRESTVIEW LN
DENVER CO 80221-3805

CURRENT RESIDENT
2930 W 80TH AVE STE 1
DENVER CO 80221-3890

CURRENT RESIDENT
7841 ROBIN LN
DENVER CO 80221-3812

CURRENT RESIDENT
2930 W 80TH AVE STE 2
DENVER CO 80221-3890

CURRENT RESIDENT
7931 ROBIN LN
DENVER CO 80221-3816

CURRENT RESIDENT
2930 W 80TH AVE STE 3
DENVER CO 80221-3890

CURRENT RESIDENT
7941 ROBIN LN
DENVER CO 80221-3816

CURRENT RESIDENT
2930 W 80TH AVE STE 4
DENVER CO 80221-3890

CURRENT RESIDENT
7951 ROBIN LN
DENVER CO 80221-3816

CERTIFICATE OF POSTING



I, Alan Sielaff, do hereby certify that I had the property posted at

7850 Federal Boulevard, Westminster, CO 80030

on June 23, 2021

in accordance with the requirements of the Adams County Development Standards
and Regulations

Alan Sielaff, Planner II


Mile High Outdoor 7850 Federal Blvd. Billboard Conversion

RCU2021-00004

7850 Federal Blvd.

July 27, 2021

Planning Commission Public Hearing
Community and Economic Development Department
Case Manager: Alan Sielaff



Requests

1. Conditional Use Permit to allow the existing billboard to remain.
2. Conversion of existing static sign to a two-sided digital LED sign with the same dimensions in the Commercial-5 (C-5) zone district.
3. Variation from the setback requirements to allow the sign faces to be setback 7.5' from the northern property line.

Background

- Original Conditional Use Permit approved in 2011
- Maximum height set at 35 ft. to match C-5 zone
- Overnight lighting prohibited (between 10pm and 6am)
- Matching height setback variation approved for 7.5 ft. from north property line

Aerial View



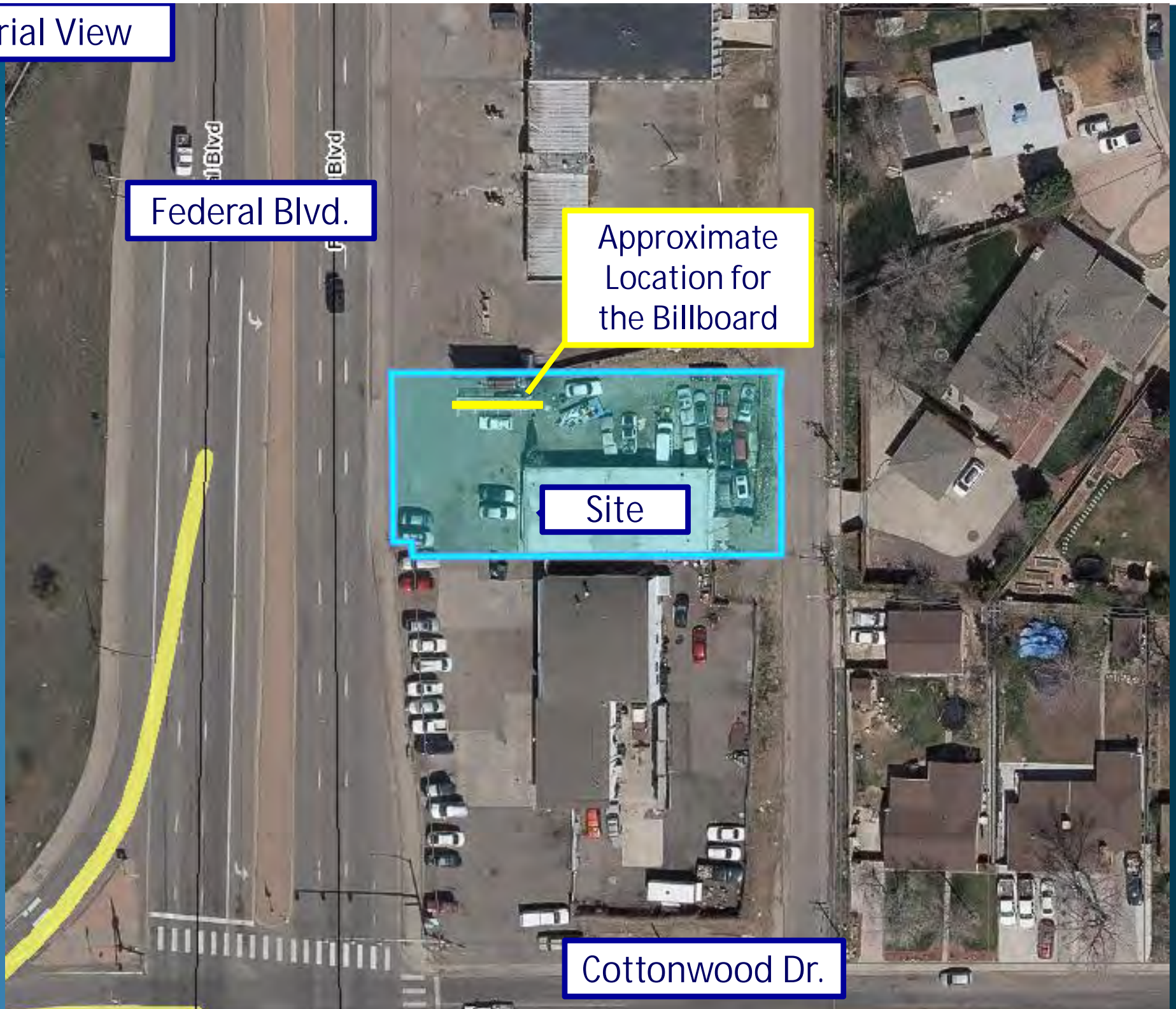
Aerial View

Federal Blvd.

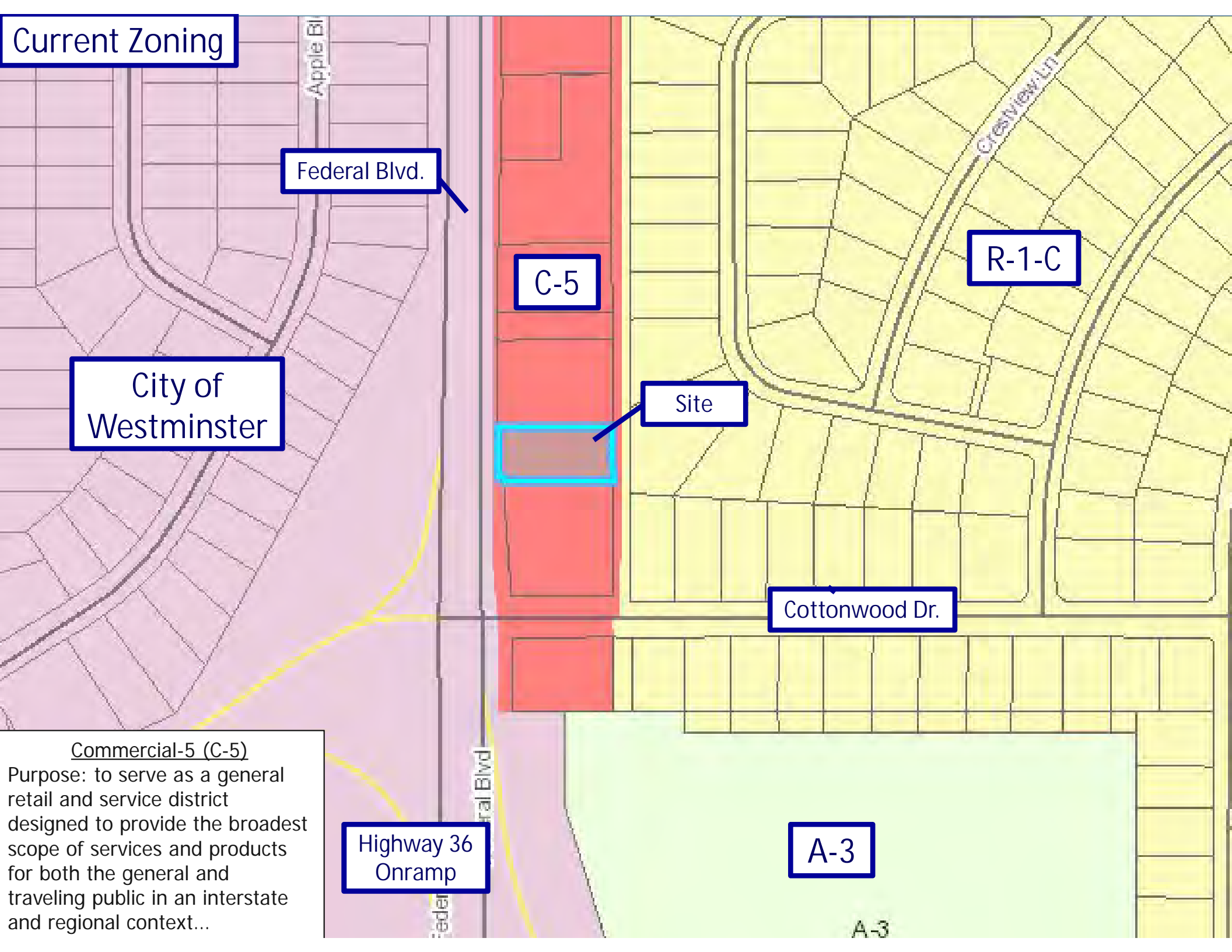
Approximate
Location for
the Billboard

Site

Cottonwood Dr.



Current Zoning



Federal Blvd.

City of
Westminster

C-5

Site

R-1-C

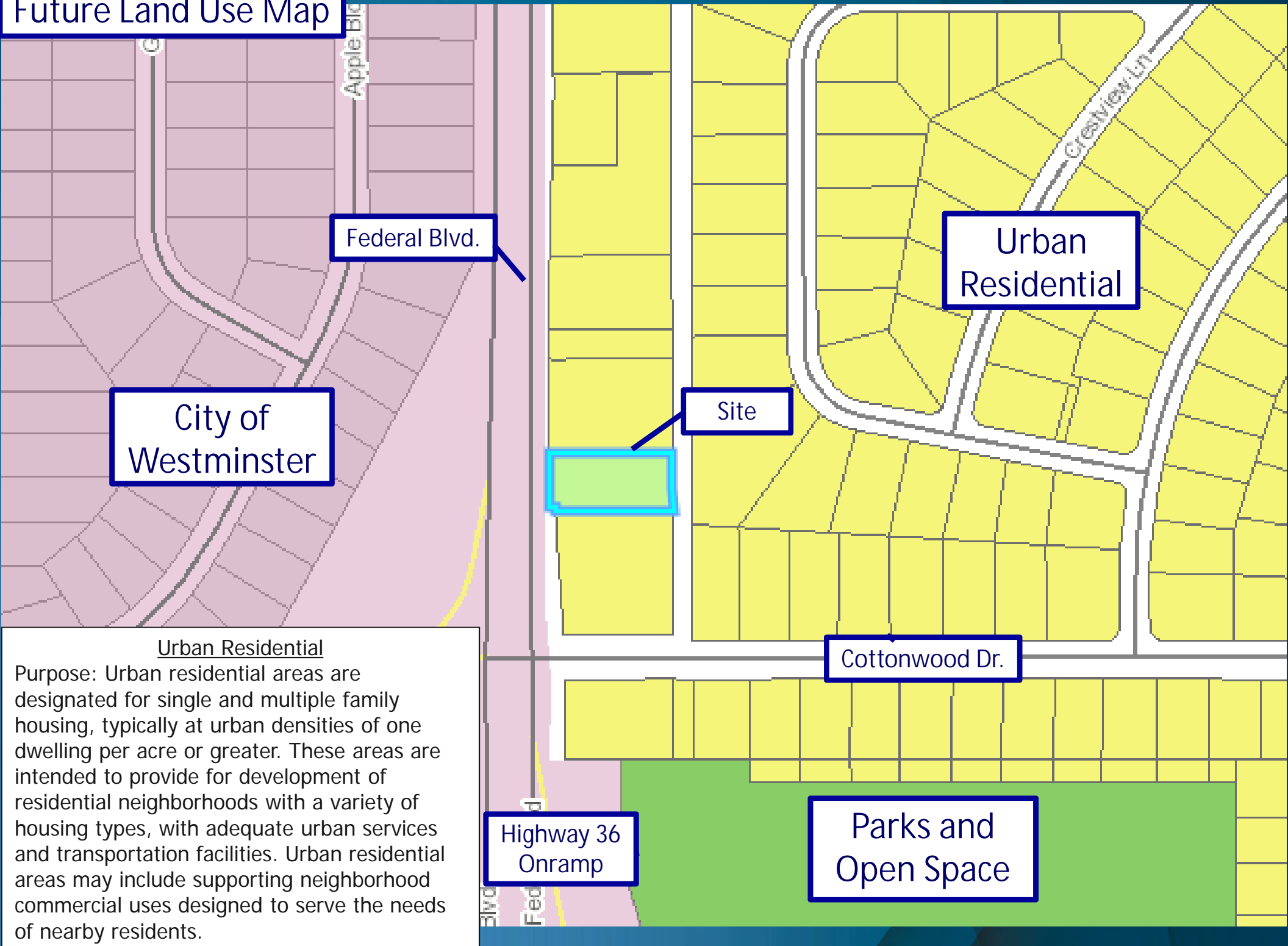
Cottonwood Dr.

Highway 36
Onramp

A-3

Commercial-5 (C-5)
Purpose: to serve as a general retail and service district designed to provide the broadest scope of services and products for both the general and traveling public in an interstate and regional context...

Future Land Use Map



Criteria for Conditional Use

Section 2-02-09-06

1. Permitted in zone district
2. Consistent with regulations
3. Complies with performance standards
4. Harmonious & compatible
5. Addressed all off-site impacts
6. Site suitable for use
7. Site plan adequate for use
8. Adequate services

Performance Standards

- Maximum Height: 40 feet, 35 ft. existing. No change proposed (match C-5 max. height).
- Maximum Size: 300 sq. ft. , 300 sq. ft existing. No change proposed.
- Only one two-faced off-premise sign per site.
- Setback equal to the height (variation requested for 7.5 ft. to north)
- Minimum of 2,000 ft. on the same side of the road
- Remain motionless for a min. of 4 seconds, 10 is optimal (applicant proposes 8 second message time)

Applicant Proximity Map

Applicant Proximity Map

Applicant Proximity Map

Applicant Site Plan







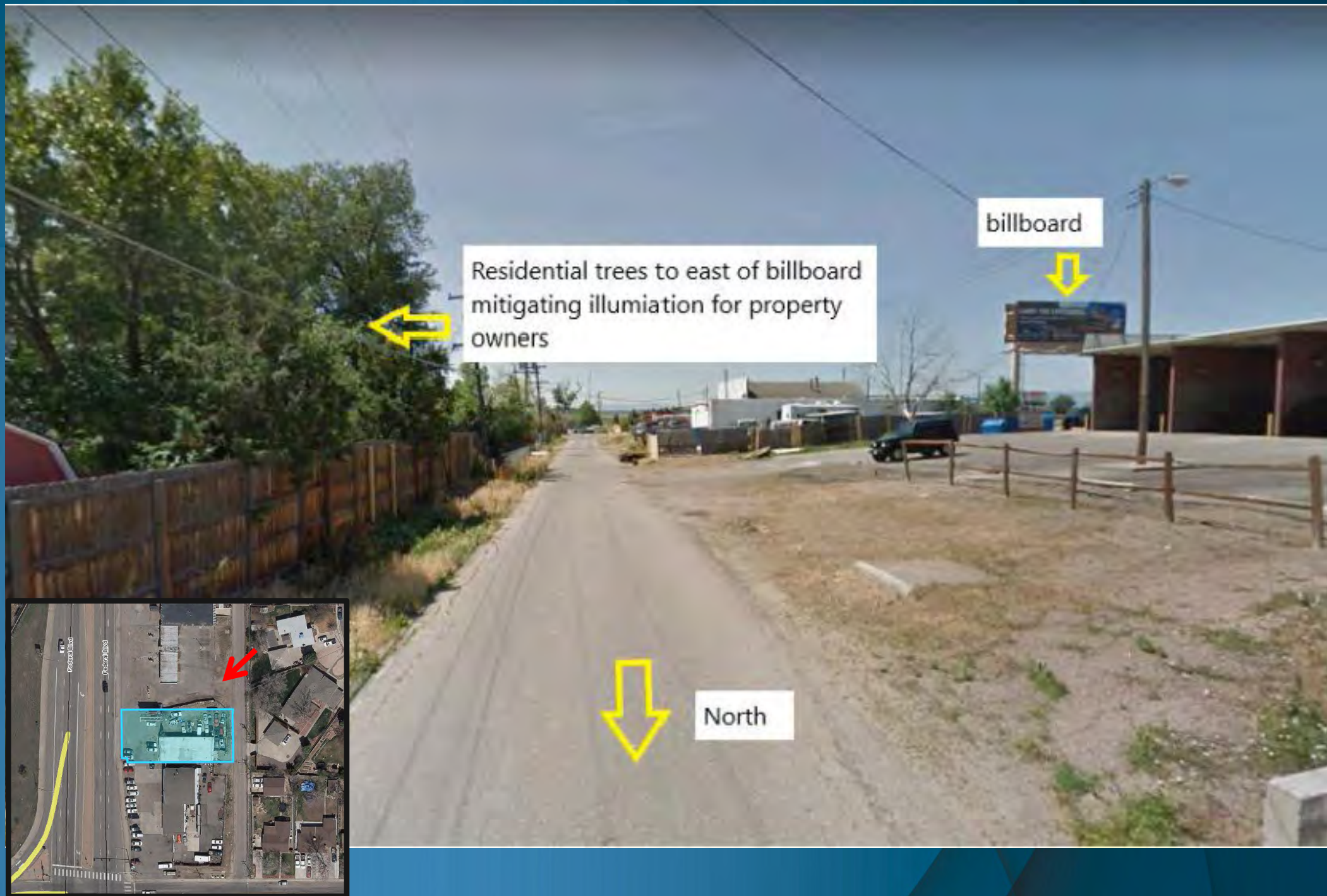




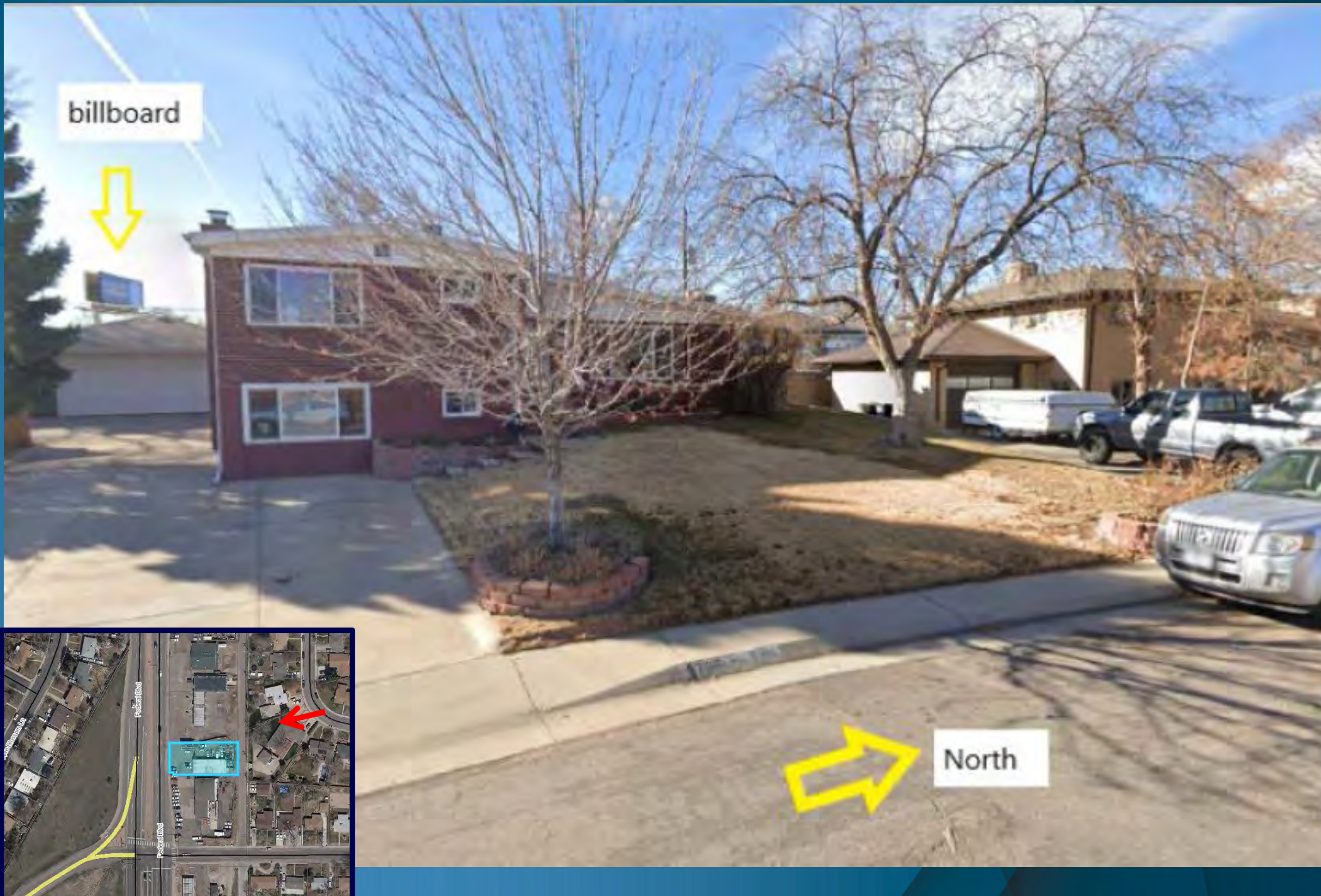
Applicant Photosimulations



Applicant Photosimulations



Applicant Photosimulations



Applicant Photosimulations



Light Study



Referral Comments

Notifications Sent*	# Comments Received
199	1

*Property owners and occupants within 800 ft.

Public Comment:

- One (1) comment in opposition – concerned about brightness overnight

Referral Agency Comment:

- Comment:
 - CDOT
- Responding without concerns:
 - ACFR, ACSO, City of Westminster, CDPHE, RTD, TCHD, Xcel
- Additional referrals provided no response

Planning Commission Update

(RCU2021-00004: Mile High Outdoor 7850 Federal Blvd. Billboard Conversion)

- Recommended Approval (6-1) on July 8, 2021
- PC members had questions regarding the existing lighting of the sign, the brightness of the proposed electronic sign at night, the previous limitation on overnight lighting, and whether the sign faces will be back-to-back or V-shaped.
- No members of the public spoke in favor or opposition to the request.

Staff Recommendation

(RCU2021-00004: Mile High Outdoor 7850 Federal Blvd. Billboard Conversion)

Staff recommends APPROVAL of the subject requests (RCU2021-00004), with 8 Findings-of-Fact, 4 Conditions, and 2 Notes to the applicant.

Recommended Findings-of-Fact

1. The conditional use is permitted in the applicable zone district.
2. The conditional use is consistent with the purposes of these standards and regulations.
3. The conditional use will comply with the requirements of these standards and regulations, including but not limited to, all applicable performance standards.
4. The conditional use is compatible with the surrounding area, harmonious with the character of the neighborhood, not detrimental to the immediate area, not detrimental to the future development of the area, and not detrimental to the health, safety, or welfare of the inhabitants of the area and the County.
5. The conditional use permit has addressed all off-site impacts.
6. The site is suitable for the proposed conditional use including adequate usable space, adequate access, and absence of environmental constraints.
7. The site plan for the proposed conditional use will provide the most convenient and functional use of the lot including the parking scheme, traffic circulation, open space, fencing, screening, landscaping, signage, and lighting.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are available and adequate to serve the needs of the conditional use as designed and proposed.

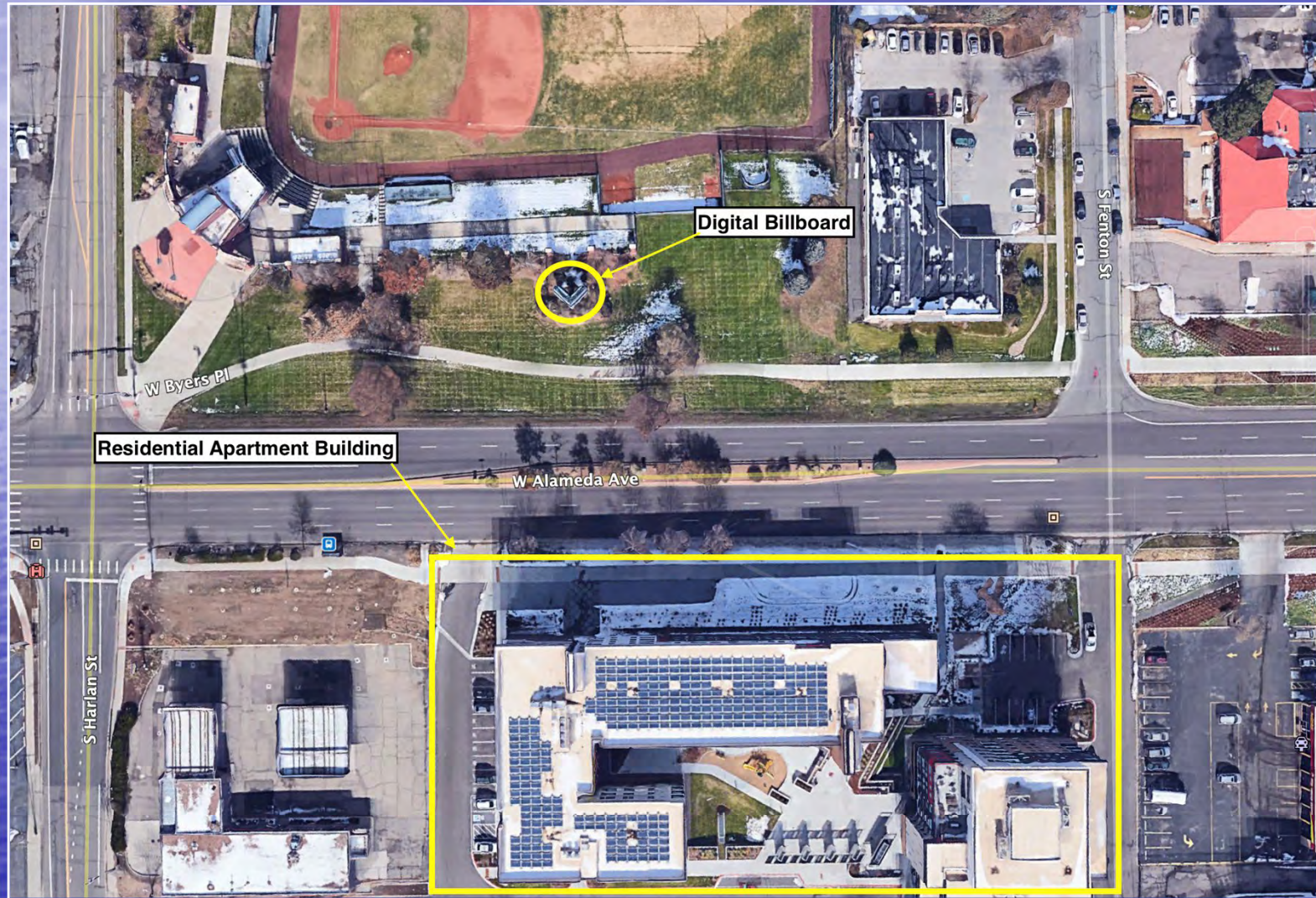
Recommended Conditions

1. The applicant shall obtain a building permit from Adams County for the billboard, including all required building permit inspections.
2. The maximum height of the sign is to remain at 35 ft. in compliance with the Commercial-5 zone district maximum height.
3. Each message displayed on the billboard shall remain static for a minimum of eight (8) seconds and must transition immediately to the next message displayed.
4. The approval of the off-premise sign shall expire July 27, 2031.

Recommended Notes to the Applicant

1. All applicable building, zoning, health, fire, and engineering requirements and codes shall be adhered to with this request. The applicant may submit an alternative design that can be approved through a Minor Amendment to this Conditional Use Permit by staff, as long as the design complies with the Adams County Development Standards and Regulations at the time of building permit application.
2. The conditional use permit shall expire on July 27, 2022 if a building permit is not obtained from Adams County for the digital sign conversion.

Mile High Outdoor - Digital Billboard, Lakewood



Light Mitigation Examples

Traffic
View



Louvres mitigate light
at angle



The greater the angle,
the greater the
mitigation



View From Apartment Complex – Full Mitigation



Key Points regarding the FHWA Research

- The Federal Highway Administration (FHWA) contracted the Science Applications International Corporation (SAIC) to study the effects of digital billboards on driver attention and distraction in 2007.
- This study was aimed at determining if digital billboards posed an unsafe driver distraction and was based on how long drivers took their eyes off the road when in the presence of digital billboards.
- FHWA emphasized that the study employed highly accurate state of the art research methodology and eye tracking equipment, which ensures a high level of confidence in the eventual findings.
- The study was completed in early 2010, and a draft report was subjected to peer review in 2012.
- On December 30, 2013, FHWA released its final report

The FHWA conducted its research on digital billboards based on an eye-glance analysis in two test markets: Reading, PA, and Richmond, VA.

In both cities, digital billboards were located on freeways and local arterials.

Results from the FHWA study indicate the following:

1. The presence of digital billboards does not appear to be related to a decrease in looking toward the road ahead, which is consistent with earlier industry sponsored field research studies (VTTI).
2. The longest fixation to a digital billboard was 1.34 seconds, and to a standard billboard it was 1.28 seconds, both of which are well below the accepted standard.¹
3. When comparing the gaze at a CEVMS versus a standard billboard, the drivers in this study were more likely to gaze at CEVMS than at standard billboards.
4. The researchers were careful to note the FHWA study adds to the knowledge base of digital billboard safety, but does not "present definitive answers" to the questions investigated.

Southwest Area Framework Plan

- Policy 14.7 to Enhance the area's role as an important County Gateway. Strategies in completing the goals include:
 - 1) 14.7.a. Entryway Image
 - 2) 14.7.b. Screening and Buffering
 - 3) 14.7.c Signs- Review and update the sign regulation provisions, including control of off-premise signs, applicable to private lands visible from I-70, I-25, and I-76 and key highway exits into the County.

Alternative Findings-of-Fact

1. The conditional use is not permitted in the applicable zone district.
2. The conditional use is not consistent with the purposes of these standards and regulations.
3. The conditional use will not comply with the requirements of these standards and regulations, including but not limited to, all applicable performance standards.
4. The conditional use is not compatible with the surrounding area, not harmonious with the character of the neighborhood, is detrimental to the immediate area, is detrimental to the future development of the area, and is detrimental to the health, safety, or welfare of the inhabitants of the area and the County.
5. The conditional use permit has not addressed all off-site impacts.
6. The site is not suitable for the proposed conditional use including adequate usable space, adequate access, and absence of environmental constraints.
7. The site plan for the proposed conditional use will not provide the most convenient and functional use of the lot including the parking scheme, traffic circulation, open space, fencing, screening, landscaping, signage, and lighting.
8. Sewer, water, storm water drainage, fire protection, police protection, and roads are not available and adequate to serve the needs of the conditional use as designed and proposed.