BLM

U.S. Department of the Interior
Bureau of Land Management

Environmental Assessment

Weideman Trust, Weideman F, Hunt and Tarin APDs

August, 2015

PREPARING OFFICE

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Bureau of Land Management
Royal Gorge Field Office
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Environmental Assessment
Weideman Trust, Weideman F, Hunt and Tarin APDs

DOI-BLM-CO-F02-2015-0023 EA

Prepared by
U.S. Department of the Interior
Bureau of Land Management
Royal Gorge Field Office
Canon City, CO

August, 2015

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Chapter 1 Introduction

1.1. Identifying Information:

1.1.1. Title, EA number, and type of project:

Weideman Trust, Weideman F, Hunt and Tarin APDs

DOI-BLM-CO-F02-2015-0023 EA

1.1.2. Location of Proposed Action:

4 N 66 W S 28, 29, and 32

1.1.3. Name and Location of Preparing Office:

Royal Gorge Field Office

1.1.4. Identify the Subject Function Code, Lease, Serial, or Case File Number:

COC 52367, COC 28426 and COC 54080

1.1.5. Applicant Name:

PDC Energy

1.2. Introduction and Background

BACKGROUND:This EA has been prepared by the BLM to analyze environmental impacts of the construction of four well pads and the drilling of up to eighteen horizontal oil and gas wells on private surface estates/over private mineral estates (fee/fee/fed). The projects are located in cultivated, irrigated agricultural fields in Weld County just outside the town of Gilcrest Colorado, near highway 85. The federal mineral estate involved in this project lies underneath the railroad right of way, which extends 200' each direction from the centerline of the railroad. The administration of these leases are subject to the 1930 Railroad act. A portion of each horizontal wellbore will produce federal minerals within this right of way. The remaining portion of each wellbore will produce privately owned minerals. All surface activities related to these actions will take place on privately owned surface, there is no public land or public access in the project area.

1.3. Purpose and Need

The purpose of the action is to provide the applicant the opportunity to develop federal oil and gas leases. The need for the action is to develop oil and gas resources consistent with the 1930 Railroad Act.

1.4. Decision to be Made

The BLM will decide whether to approve the Weideman Trust, Weideman F, Hunt and Tarin Applications for Permits to Drill (APDs) project based on the analysis contained in this Environmental Assessment (EA). This EA will analyze the proposed action; to construct four well pads, install production facilities, and drill wells in order to develop federal and private minerals from a private surface (fee/fee/fed). Access to the proposed project would be on existing highway, county and oil field roads. The finding associated with this EA may not constitute the final approval for the proposed action.

1.5. Plan Conformance Review

PLAN CONFORMANCE REVIEW: The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

> Name of Plan: Northeast Resource Area Plan and Record of Decision as amended by the Colorado Oil and Gas Final EIS and Record of Decision (RD)
>
> Date Approved: 09/16/86 amended 12/06/91
>
> Decision Number/Page: O&G Resources, Issue 21
>
> Decision Language: "These 210,410 acres of surface and subsurface may be leased and developed for oil and gas with the standard stipulations included in the leases and standard site-specific stipulations included in any use authorization."

1.6. Scoping, Public Involvement and Issues

NEPA regulations (40 CFR §1500-1508) require that the BLM use a scoping process to identify potential significant issues in preparation for impact analysis. The principal goals of scoping are to allow public participation to identify issues, concerns, and potential impacts that require detailed analysis.

Persons/Public/Agencies Consulted: Scoping, by posting this project on the Royal Gorge Field Office NEPA website, was the primary mechanism used by the BLM to initially identify issues.

Issues Identified: No issues were identified during public scoping.

Chapter 2 Proposed Action and Alternatives

2.1. Description of the Proposed Action

The BLM RGFO has received sixteen Applications for Permit to Drill (APDs), and is anticipating receiving two additional APDs in the near future, proposing the construction of four well pads, access roads, and the drilling of eighteen oil and gas wells on private surface over private minerals, developing both private and federal minerals (fee/fee/fed). The federal minerals involved with this project are limited to the what lies under the railroad right of way, which is a very small percentage of the total of minerals that will be produced by the fee/fee/fed wells. The operator plans to drill completely fee (100% private) wells from the surface of at least one of these proposed pads, regardless of the BLM's decision on the proposed federal wells. Since all surface activity and related disturbance is taking place on private surface, and private minerals are targeted along with federal minerals, BLM has limited authority over the actions that take place on the surface, including authority to impose mitigation measures (as COAs to the approved APD) pertaining to the surface management of the well site. However, BLM will analyze the impacts to applicable resources, including some that BLM has no authority to affect.

Since totally fee wells are planned for these pads, which are located on private surface over private minerals, the operator may construct pad(s) and drill totally fee wells prior to issuance of any BLM APD(s), depending on rig and permitting schedules. However, a well intended to be completed in BLM minerals shall not be drilled until a BLM APD is issued to the operator for that well.

2.2. Alternatives Analyzed in Detail

Proposed Action

Individual pad details:

Wiedeman Trust Pad: The new portion of the access road will be approximately .5 miles in length, 30' wide. This will result in approximately 1.8 acres disturbance. The maximum slope of road is less than 6% and the only cut/fills associated with the road are what is necessary to crown and ditch road. The road will be surfaced with class 6 road base over a clay base.

The proposed Wiedeman Trust pad is the planned surface location of three horizontal fee/fee/fed oil wells. It will have a maximum cut of approximately 1.5' and a maximum of 1.5' of fill which will result in a balanced pad with no excess material. The 5,808 cu yards of topsoil which will be stripped from the top 6" of the surface and stockpiled before construction, will be stockpiled for use during interim reclamation. Construction of the well pad would result in approximately 5.7 acres of new surface disturbance, which would be reduced to approximately 3.8 acres after successful interim reclamation.

Wiedeman F Pad: There will be two short access roads connecting the Weidman F pad to Weld CR 29. The new portion of the access roads will be approximately 90' in length (each), 30' wide (each). This will result in approximately .12 acre disturbance. The maximum slope of road is less than 6% and the only cut/fills associated with the road are what is necessary to crown and ditch road. The road will be surfaced with class 6 road base over a clay base.

The proposed Wiedeman F pad is the planned surface location of a total of sixteen horizontal wells, but only two will produce any federal minerals. The remaining fourteen wells are entirely

fee, which will produce only private minerals, and will not require BLM approval. It will have a maximum cut of approximately 2.5' and a maximum fill of approximately 3' which will result in a balanced pad with no excess material. The 20,595 cu yards of topsoil which will be stripped from the top 6" of the surface and stockpiled before construction, will be stockpiled for use during interim reclamation. Construction of the well pad would result in approximately 12.8 acres of new surface disturbance, which would be reduced to approximately 8.8 acres after successful interim reclamation.

Tarin Pad: There is an existing access road that will be utilized as one of the access roads to the Tarin pad, but another 80' length of access road is proposed. The new access will be 30' wide. This will result in approximately .05 acre disturbance. The maximum slope of road is less than 6% and the only cut/fills associated with the road are what is necessary to crown and ditch road. The road will be surfaced with class 6 road base over a clay base.

The proposed Tarin pad is the planned surface location of 8 horizontal fee/fee/fed oil wells. It will have a maximum cut of approximately 3.1' and a maximum fill of approximately 3' which will result in a balanced pad with no excess material. The 10,325 cu yards of topsoil which will be stripped from the top 6" of the surface and stockpiled before construction, for use during interim reclamation. Construction of the well pad would result in approximately 6.4 acres of new surface disturbance, which would be reduced to approximately 4.2 acres after successful interim reclamation.

Hunt Pad: 200' of new access road will be constructed. Road will be 60' wide, resulting in approximately .28 acre disturbance. The maximum slope of road is less than 6% and the only cut/fills associated with the road are what is necessary to crown and ditch road. The road will be surfaced with class 6 road base over a clay base.

The proposed Hunt pad is the planned surface location of 5 horizontal fee/fee/fed oil wells. The pad will have a maximum cut of approximately 2.9' and a maximum fill of approximately 1.7' which will result in a balanced pad with no excess material. The 7,920 cu yards of topsoil which will be stripped from the top 6" of the surface and stockpiled before construction, for use during interim reclamation. Construction of the well pad would result in approximately 6 acres of new surface disturbance, which would be reduced to approximately 4.3 acres after successful interim reclamation.

Construction and reclamation of pads and roads will be done in accordance with BLM's Gold Book standards, and employ applicable oilfield BMPs. Stormwater/erosion control measures will be taken to stabilize the site. Each well is estimated to require approximately 11 acre feet of water to drill and complete each well. The water will be purchased from state approved sources. PDC is a member in good standing of SPWRAP, which mitigates water depletions in the South Platte River. The proposed drilling and completion of all wells will utilize closed loop systems. All liquids will be stored in tanks on the pad. No pits will be utilized. Drill cuttings will be temporarily stored onsite in steel containers, de-watered and solidified then hauled to one of PDC's COGCC approved beneficial reuse area. All other waste materials produced during drilling, completion and operation of the well (completion fluids, produced water, sewage and garbage) will be hauled off site and recycled or disposed of at applicable state permitted commercial treatment/disposal facilities. The duration of drilling is estimated to be 14 days per well.

Interim reclamation of each pad will begin within 6 months (weather permitting) of completion of the final well. Interim reclamation will consist of redistribution of excess soil, re-contouring the areas of the pad not needed for production as close to original as possible. All areas not needed

for transportation of produced liquids and routine maintenance will be re-vegetated in accordance with the reclamation section of the multi-point surface operations plan.

Final reclamation of each project will begin within 6 months (weather permitting) of final well plugging, or in the event of a dry hole. Final reclamation will be completed in accordance with the reclamation section of the multi-point surface operations plan, which consists of proper plugging of wells, removal of all facilities and related equipment from the surface of the site (if left in place, abandoned flowline swill be flushed, cut below plow depth, and capped), and removal of any surfacing materials on road or pad. Top soil will be stripped and segregated so it can be spread evenly over the entire area. Pad and road areas will be ripped, re-contoured to their original form and top soil will be evenly spread over the surface. The area will be drill or broadcast seeded, and if necessary covered with weed free mulch. Area will be monitored for presence of weeds, which will be controlled if present. If initial seeding is not successful, the operator must re-seed the area until desirable vegetation is established. The bond will not be released until BLM has determined that successful reclamation has been achieved.

The Application for Permit to Drill (APD) for each new well includes a detailed and specific drilling program and multi-point surface operations plan (including detailed construction and reclamation plans.) The proposed action would be implemented consistent with the operations plans provided with approved permit, with Conditions Of Approval (COAs), Onshore Oil and Gas Orders, and 43 CFR §3100.

Figure 2.1.

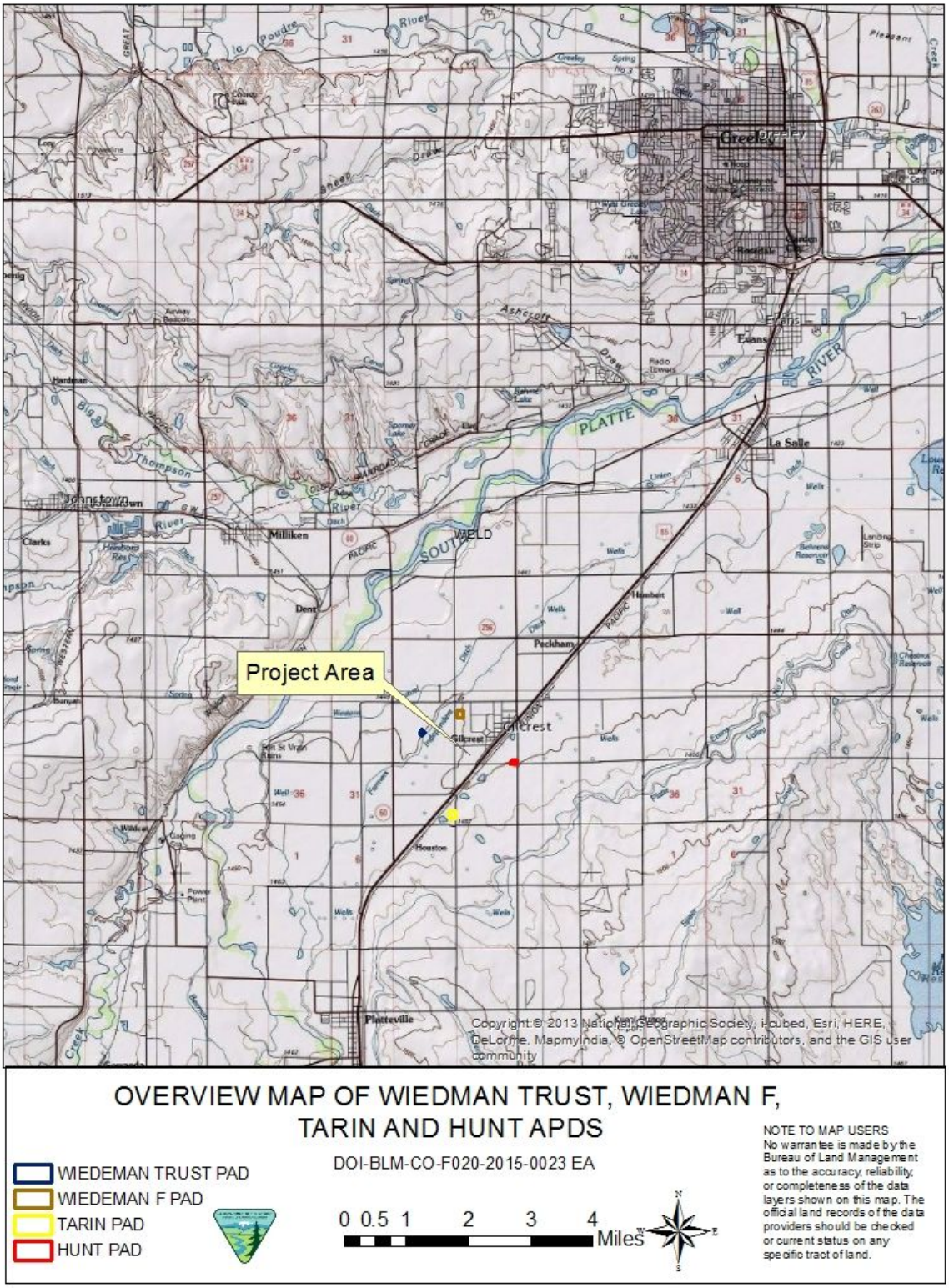
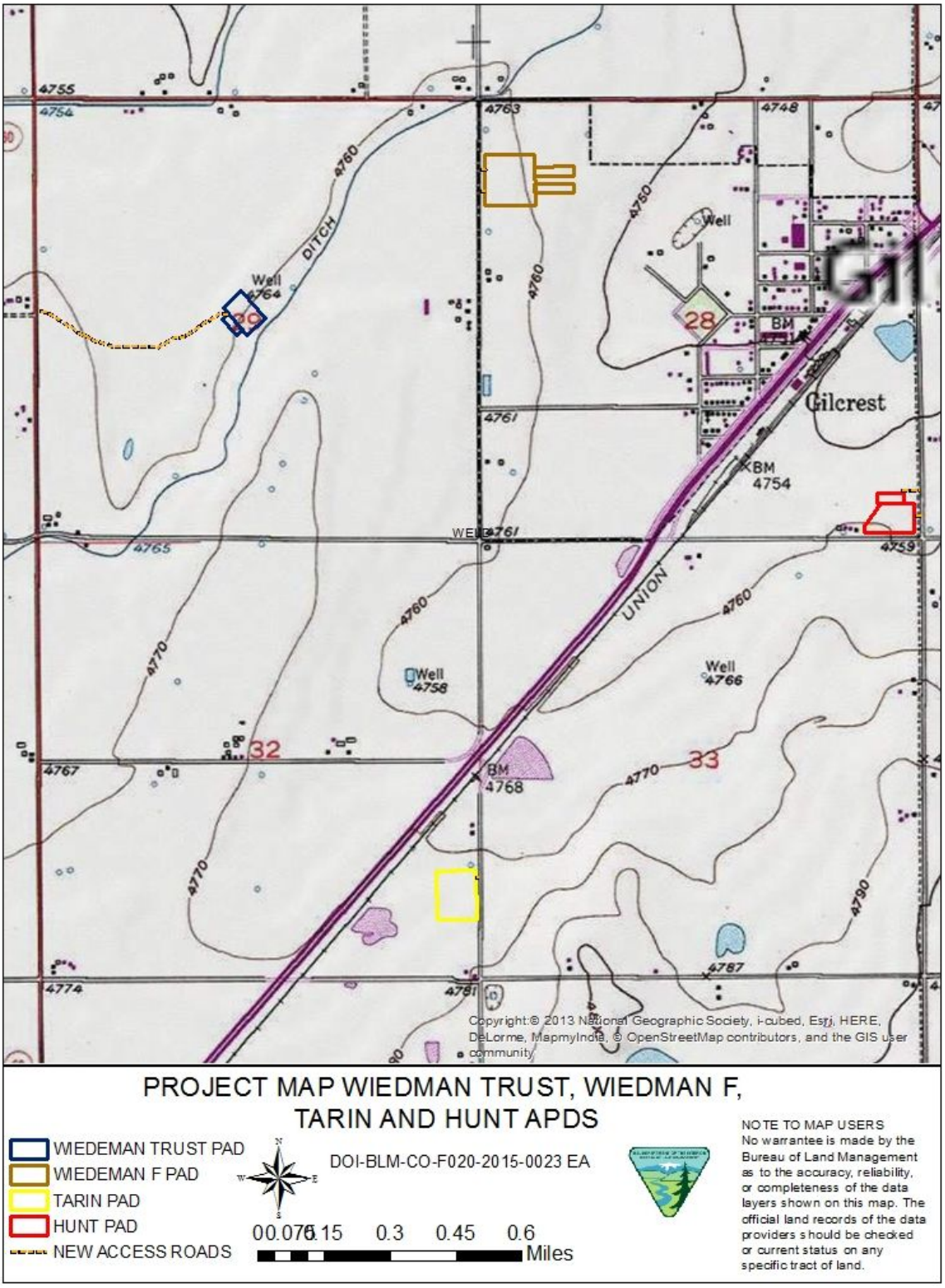

Project Area
Greeley
Evans
La Salle
Milliken
Johnstown
Dent
Peckham
Silcrest
Houston
Platteville
Copyright © 2013 National Geographic Society, i-cubed, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
OVERVIEW MAP OF WIEDMAN TRUST, WIEDMAN F, TARIN AND HUNT APDS
DOI-BLM-CO-F020-2015-0023 EA
WIEDEMAN TRUST PAD
WIEDEMAN F PAD
TARIN PAD
HUNT PAD
0 0.5 1 2 3 4 Miles
NOTE TO MAP USERS
No warrantee is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of the data layers shown on this map. The official land records of the data providers should be checked or current status on any specific tract of land.

Figure 2.2.


PROJECT MAP WIEDMAN TRUST, WIEDMAN F,
TARIN AND HUNT APDS
WIEDEMAN TRUST PAD
WIEDEMAN F PAD
TARIN PAD
HUNT PAD
NEW ACCESS ROADS
DOI-BLM-CO-F020-2015-0023 EA
0 0.075 0.15 0.3 0.45 0.6
Miles
NOTE TO MAP USERS
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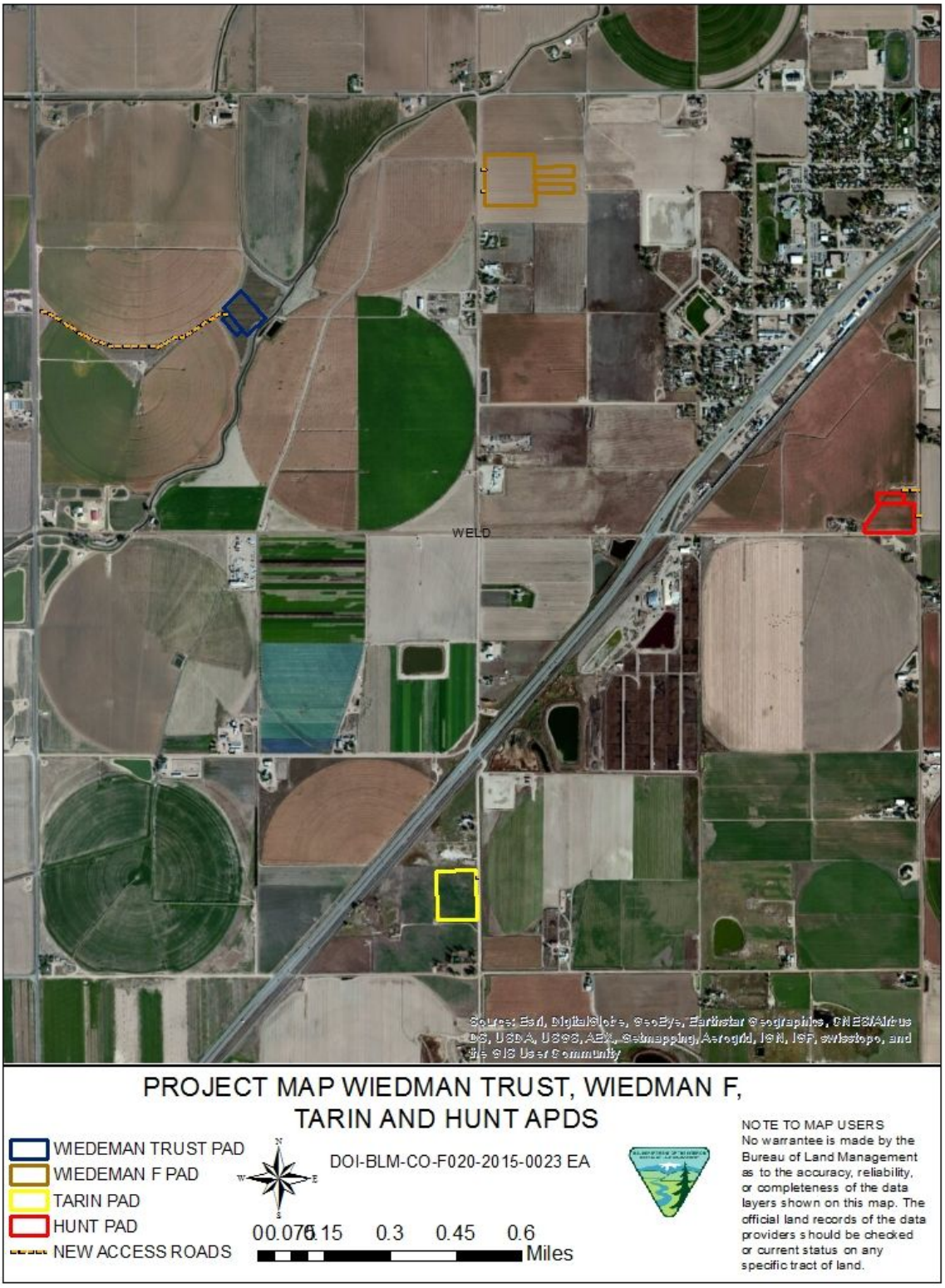
Copyright:© 2013 National Geographic Society, i-cubed, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Gilcrest
UNION
DITCH
Well
BM
4754
4768
28
32
33

Figure 2.3.


WELD
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
PROJECT MAP WIEDMAN TRUST, WIEDMAN F, TARIN AND HUNT APDS
WIEDEMAN TRUST PAD
WIEDEMAN F PAD
TARIN PAD
HUNT PAD
NEW ACCESS ROADS
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Miles
NOTE TO MAP USERS
No warrantee is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of the data layers shown on this map. The official land records of the data providers should be checked or current status on any specific tract of land.

2.2.1. No Action Alternative

The proposed action involves federal subsurface minerals and takes place on private surface estate located above private mineral estate (off BLM lease). Although BLM can deny individual APDs, in cases such as this, in which the surface location is to be located on private surface estate overlying private mineral estate (fee/fee/fed), BLM has very limited authority in the surface operations. The no action alternative constitutes denial of the APDs associated with the proposed action. In this case, all proposed surface activity takes place on private surface over private minerals, therefore, denial of the APDs would preclude the federal minerals from being accessed but would not prevent development of the private minerals, or any other surface activity associated with this project.

2.3. Alternatives Considered

2.3.1. Alternatives Considered, but not Analyzed in Detail

Other alternatives were not considered due to the proposed project being a non-discretionary action being proposed on private surface over private mineral estate.

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Chapter 3 Affected Environment and Effects

3.1. Introduction

3.1.1. Interdisciplinary Team Review

The following table is provided as a mechanism for resource staff review, to identify those resource values with issues or potential impacts from the proposed action and/or alternatives. Those resources identified in the table as impacted or potentially impacted will be brought forward for analysis.

Resource	Initial and date	Comment or Reason for Dismissal from Analysis
Air Quality Ty Webb, Chad Meister, Forrest Cook	CM 6/24/2015	See Analysis
Geology/Minerals Stephanie Carter, Melissa Smeins	MJS, 5/22/2015	See analysis
Soils Aaron Richter	AR 7/31/2015	Project is confined to privately owned cultivated fields which already have disturbed and modified soils. After drilling phase, much of the project area will be returned to active farmland. After final abandonment, the entire project area will be returned to active farmlamnd.
Water Quality Surface and Ground Aaron Richter	AR 7/31/2015	See analysis
Invasive Plants John Lamman	JL, 3/23/2015	See analysis
T&E and Sensitive Species Lara Duran	LAD, 4/23/15	See analysis
Vegetation Jeff Williams, Chris Cloninger, John Lamman	JL, 3/23/2015	Project location is surrounded by active farm land. No established native vegetation exists.
Wetlands and Riparian Dave Gilbert	DG, 03/09/2015	Roads and pads are in upland agriculture fields; no wetlands present.
Wildlife Aquatic Dave Gilbert	DG, 03/09/2015	Roads and pads are in upland agriculture fields; aquatic habitat is not directly affected.
Wildlife Terrestrial Lara Duran	LAD, 4/23/2015	See analysis
Migratory Birds Lara Duran	LAD, 3/9/2015	See analysis
Cultural Resources Monica Weimer	MMW, 2/25/15	See Analysis
Native American Religious Concerns Monica Weimer	MMW, 2/25/15	See Analysis

Resource	Initial and date	Comment or Reason for Dismissal from Analysis
EconomicsAaron Richter	AR, 7/31/15	Development of federal minerals associated with the proposed action would result in royalty payments to the federal government and severance payments to the state.
Paleontology Melissa Smeins, Stephanie Carter	MJS, 5/22/ 2015	See analysis
Visual Resources Linda Skinner	LS 7/9/15	The project is consistent with the view of the surrounding area that is already developed with agriculture and wells.
Environmental Justice Aaron Richter	AR, 7/31/2015	The project is confined to privately owned cultivated fields. There would be no negative impacts to economically disadvantaged or minority populations.
Wastes Hazardous or Solid Melissa Smeins	MJS, 5/22/ 2015	See analysis
Recreation Linda Skinner	LS 7/9/15	Not Present, project is confined to privately owned cultivated fields.
Farmlands Prime and Unique Jeff Williams, Chris Cloninger, John Lamman, Aaron Richter	AR, 7/7/2015	The location of the Wiedeman Trust, Wiedeman F and Tarin pads and roads are classified as prime farmland if irrigated, which they currently are. Approximately 19 acres of prime farmland will be taken out of agricultural production for the life of the wells. Once the wells are reclaimed after well plugging, the land will be made available to farming again.
Lands and Realty	AR 7/31/2015	Not present, project is confined to privately owned cultivated fields.
Wilderness, WSAs, ACECs, Wild & Scenic Rivers Linda Skinner	LS 7/9/15	Not Present, project is confined to privately owned cultivated fields.
Wilderness Characteristics Linda Skinner	LS 7/9/15	Not Present, project is confined to privately owned cultivated fields.
Range Management Jeff Williams, Chris Cloninger, John Lamman	JL, 3/09/2015	Not present
Forest Management Ken Reed	AR for KR 7/31/15	Not Present, project is confined to privately owned cultivated fields.
Cadastral Survey	AR 7/31/15	Chain of Survey certificate is in project folder.
Noise Aaron Richter	AR 7/31/15	There will be some noise associated with the project, mostly during the construction and drilling phases. Noise impacts would be mostly temporary. Project is confined to privately owned cultivated fields, which experience periodic noise generated by farm equipment.
Fire Ty Webb	AR for TW, 7/31/15	Project is confined to privately owned cultivated fields, not under the jurisdiction of BLM fire.
Law Enforcement Steve Cunningham	AR for SC	Project is confined to privately owned cultivated fields, not under the jurisdiction of BLM law enforcement.

The affected resources brought forward for analysis include:

- Air Quality
- Geology/Minerals
- Water Quality
- Invasive Plants
- T&E and Sensitive Species
- Wildlife Terrestrial
- Migratory Birds
- Cultural Resources
- Native American Religious Concerns
- Paleontology
- Wastes, Hazardous or Solid

3.2. Physical Resources

3.2.1. Air Quality and Climate

Affected Environment:

The Clean Air Act (CAA), which was last amended in 1990, requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS), codified at 40 Code of Federal Regulations (CFR) part 50, for criteria pollutants. Criteria pollutants are air contaminants that are commonly emitted from the majority of emissions sources and include carbon monoxide (CO), lead (Pb), sulfur dioxide (SO2), particulate matter smaller than 10 and 2.5 microns (PM10 and PM2.5, respectively), ozone (O3), and nitrogen dioxide (NO2). Ambient air quality standards must not be exceeded in areas where the general public has access.

The CAA established two types of NAAQS:

Primary standards: – Primary standards set limits to protect public health, including the health of "sensitive" populations (such as asthmatics, children, and the elderly).

Secondary standards: – Secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

The EPA regularly reviews the NAAQS (every five years) to ensure that the latest science on health effects, risk assessment, and observable data such as hospital admissions are evaluated, and can revise any NAAQS if the data supports a revision. The Colorado Air Pollution Control Commission can establish state ambient air quality standards for any criteria pollutant. Any state standard must be at least as stringent as the federal standards. Table 3-1 lists the federal and Colorado ambient air quality standards.

Table 3-1: Ambient Air Quality Standards

Pollutant **[final rule citation]**		**Standard** **Type**	**Averaging Period**	**Level a**	**Form**
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year c
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		Primary and secondary	Rolling 3-month average	0.15 µg/m3	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and secondary	Annual	53 ppb	Annual mean
Ozone [73 FR 16436, Mar 27, 2008]		Primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter [73 FR 3086, Jan 15, 2013]	PM2.5	Primary	Annual	12 µg/m3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m3	Annual mean, averaged over 3 years
		Primary and secondary	24-hour	35 µg/m3	98th percentile, averaged over 3 years
	PM10	Primary and secondary	24-hour	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[38 FR 25678, Sept 14, 1973]		Secondary	3-hour	0.5 ppm b	Not to be exceeded more than once per year

a mg/m3 = milligrams per cubic meter, µg/m3 = micrograms per cubic meter, ppb = parts per billion, ppm = parts per million.

b Colorado Ambient Air Quality Standard for 3-hour SO2 is 0.267 ppm.

Source: National – 40 CFR 50, Colorado – 5 CCR 1001-14

c 8-hr CO standard is based on the second high

For areas that do not meet the NAAQS (these are designated by EPA as nonattainment areas), the CAA establishes timetables for each region to achieve attainment of the NAAQS. The State (Colorado Department of Public Health and Environment [CDPHE]) must prepare a State Implementation Plan (SIP), which documents how the region will reach attainment by the required date. A SIP includes inventories of emissions within the area and establishes emission budgets (targets) and emission control programs that are designed to bring the area into compliance with the NAAQS. In maintenance areas (nonattainment areas that have achieved attainment), SIPs document how the State intends to maintain compliance with NAAQS.

In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs). HAPs are chemicals that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. EPA currently lists 188 identified compounds as hazardous air pollutants, some of which can be emitted from oil and gas development operations, such as benzene, toluene, and

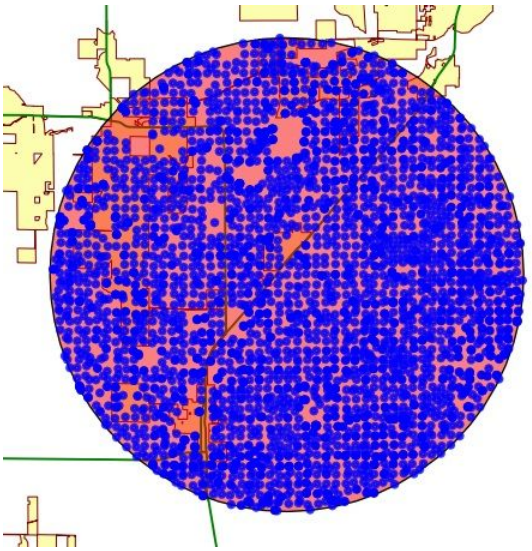
formaldehyde. Ambient air quality standards for HAPs do not exist; rather these emissions are regulated by the source type, or specific industrial sector responsible for the emissions.

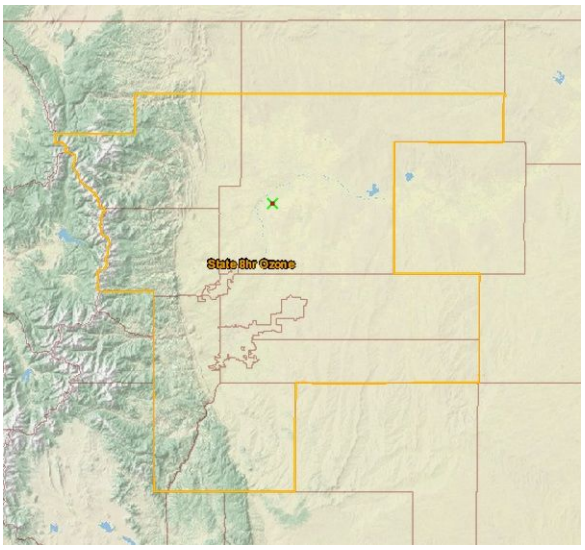
The CAA and the Federal Land Policy and Management Act of 1976 (FLPMA) require BLM and other federal agencies to ensure actions taken by the agency comply with federal, state, tribal, and local air quality standards and regulations. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands [Section 302 (b)], and to manage the public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" [Section 102 (a)(8)].

Section 176(c) of the CAA prohibits Federal entities from taking actions in nonattainment or maintenance areas that do not "conform" to the SIP. The purpose of this conformity requirement is to ensure that Federal activities: (1) do not interfere with the budgets in the SIPs; (2) do not cause or contribute to new violations of the NAAQS; and (3) do not impede the ability to attain or maintain the NAAQS. To implement CAA Section 176(c), EPA issued the General Conformity Rule (40 CFR Part 93, Subpart B), which applies to all Federal actions not funded under U.S.C. Title 23 or the Federal Transit Act (BLM actions are not funded by U.S.C. Title 23 or the Federal Transit Act). The General Conformity Rule established emissions thresholds (40 CFR 93.153), known as *de minimis* levels, for use in evaluating the conformity of a federal action. If the net emissions increases due to the action are less than these thresholds, the project is presumed to conform and no further conformity evaluation is required. If the emissions increases exceed any of these thresholds, a conformity determination is required. The conformity determination can entail air quality modeling studies, consultation with EPA and state air quality agencies, and commitments to revise the SIP or to implement measures to mitigate air quality impacts. The BLM, as the federal entity with jurisdiction for the federal portion of the proposed action (i.e. the approval of any APD seeking to develop federal minerals), must demonstrate that the proposed action(s) meet(s) the requirements of the General Conformity rule.

The proposed PDC Energy APDs and the anticipated future APDs are located within the EPA-designated Denver-Boulder-Greeley-Fort Collins ozone nonattainment area. Because the General Conformity rule applies to actions in nonattainment or maintenance areas, these wells are subject to the general conformity requirements. Figure 3-1 depicts their general location with respect to the nonattainment area and also provides context for the current and historical oil and gas development within the area, with the blue dots indicating existing well locations out to a 10km radius.

Figure 3-1. Well locations and Ozone Nonattainment Area & Area O&G Development





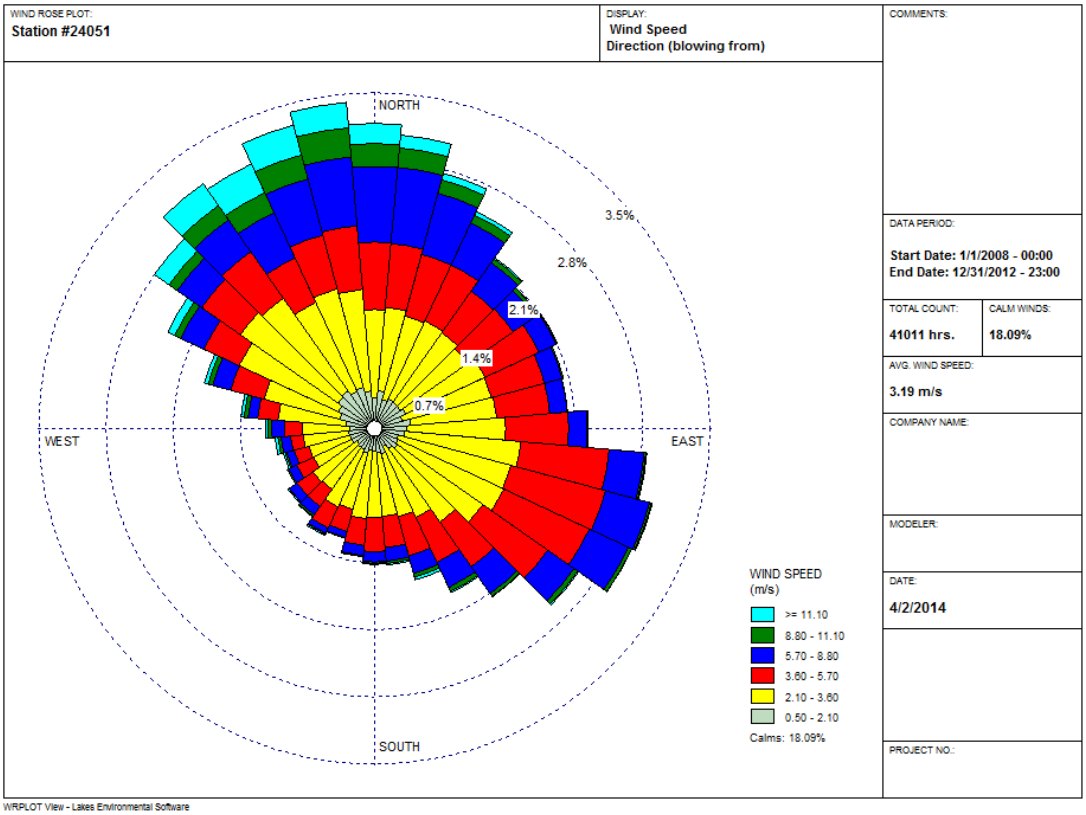
The Prevention of Significant Deterioration (PSD) provision of the CAA established Class I areas in which very little degradation of air quality is allowed (e.g., national parks and large wilderness areas) and Class II areas (all non-Class I areas). The PSD Class II designation allows for moderate degradation of air quality within certain limits above baseline air quality. In addition to the criteria PSD pollutants, Class I & II areas may also be analyzed for Air Quality Related Values (AQRVs). AQRVs are metrics for atmospheric phenomenon like visibility and deposition impacts that may adversely affect specific scenic, cultural, biological, physical, ecological, or recreational resources. Visibility changes can occur when excessive air contaminates (mostly fine particles) scatter light such that the background scenery becomes hazy. Deposition (via wet and dry mechanical processes) can cause excess nutrient loading in native soils and acidification of the landscape, which can lead to declining buffering capacity changes in sensitive stream and lake water chemistries (commonly referred to as acid neutralization change (ANC)). The PDC Energy pads are within an area designated as Class II. The closest Class I area to the proposed well site locations is Rocky Mountain National Park, which lies approximately 65 kilometers to the west.

Land Use in the Project Region: The vicinity of the Project Area (central Weld County) is predominantly used for agriculture. Approximately 75% of the available land area of Weld County is linked to the agricultural sector of the economy in one form or another. Oil and gas

development is another major economic driver for the area, and Weld County has almost 17,000 active wells within its boundaries. The population density of Weld County within the vicinity of the Project Area is generally dispersed, with less than 25 people per square mile. Activities occurring within the area that affect air quality include exhaust emission from cars, drilling rigs, agricultural equipment, and other vehicles, and oil and gas development activities, as well as fugitive dust from roads, agriculture, and energy development.

Meteorology in the Project Region: Mean temperatures in the area range from 15.6 degrees Fahrenheit (°F) in January to 88.7° F in July. The area receives average annual precipitation of approximately 14.22 inches. Frequent winds in the area and a lack of complex topographical features provide for excellent dispersion characteristics for anthropogenic emissions within the region.

Figure 3-2 5 Year Meteorological Wind Rose for Northern Front Range Area



Existing Air Quality Measured in the Region and County Emissions: The Air Pollution Control Division (APCD) of the Colorado Department of Public Health and Environment measures ambient air quality at a number of locations throughout the state. The nearest APCD air monitors to the project are the Weld County West Annex (CO), County Tower (O3), and Hospital (PM10 and PM2.5) sites located in Greeley, and one site in Briggsdale (O3). Table 3-2 provides the measured concentrations of criteria pollutants at these monitors for the most recent three years. There are no lead, NO2, or SO2 monitors near the project area. Table 3-2 indicates that no

violations of the NAAQS have occurred in the project region in the last three years, (O3 3 yr. ave. = 72.3 ppb). Table 3-3 provides a look at the corresponding emissions levels within Weld County that may contribute to the monitored air quality data. The EPA compiles the National Emissions Inventory (NEI) as a triennial report, with the last available compilation year being 2011.

Table 3-2: Measured Ambient Concentrations in the Region

Monitor Location	**Pollutant (Averaging Period – Unit, Form)**	**Measured Concentration**		
		2012	**2013**	**2014**
Weld County West Annex, Greeley	CO (1 Hour – ppm, maximum)	3.2	2.6	2.7
	CO (8 Hour – ppm, maximum)	1.6	1.4	1.7
Weld County Tower, Greeley	O3 (8 Hour – ppm, 4th maximum)	0.074	0.073	0.070
Weld County Health Dept. (Hospital), Greeley	PM10 (24 Hour - µg/m3, maximum)	91	47	71
	PM2.5 (24 Hour - µg/m3, 98th percentile)	32	18	27
	PM2.5 (Annual - µg/m3, annual mean)	7.9	7	8.1

Source: EPA 2015

Table 3-3: CDPHE APEN Source Emissions

Pollutant	Tons per Year
VOC	1958
NO2	644
PM10	18
PM2.5	17
SO2	23
CO	803

Emissions within 10km of project area

Table 3-4: Weld County NEI Data

Weld	PM10	PM2.5	VOC	CO	NOX	SO2	CO2	CH4	N2O	NH3	HAPs
Agriculture	9,082.1	1,865.76	.	.	.	.	.	.	.	15,762.85	.
Biogenics	.	.	21,009.7	4,785.29	1,977.03	.	.	.	.	.	4,285.85
Bulk Gasoline Terminals	.	.	201.55	3.72	2.22	.	.	.	.	.	3.01
Commercial Cooking	57.41	53.25	7.72	22.07	.	.	.	.	.	.	2.96
Dust	14,441.01	1,746.99	.	.	.	.	.	.	.	.	.
Fires	1,143.49	662.71	912.93	7,256.49	236.89	113.98	31,689.18	125.99	.	42.12	333.41
Fuel Comb	755.03	751.5	2,716.57	10,024.4	7,566.29	118.99	.	.	.	172.3	485.6
Gas Stations	.	.	688.37	.	.	.	.	.	.	.	12.14
Industrial Processes	1,890.59	646.6	105,039.54	4,616.66	7,534.01	295.91	.	.	.	.	535.53
Miscellaneous	.	.	158.17	.	.	.	.	.	.	.	11.66
Mobile	457.31	383.81	3,743.02	41,484.96	8,320.49	43.51	1,750,627.	140.48	59.45	103.	940.11
Solvent	22.41	18.7	3,069.71	7.47	18.58	.	.	.	.	.	1,258.83
Waste Disposal	110.34	64.94	170.21	21.16	7.51	2.13	.	.	.	.	16.77
Sum Totals:	**27,959.7**	**6,194.28**	**137,717.5**	**68,222.23**	**25,663.02**	**574.52**	**1,782,316.18**	**266.48**	**59.45**	**16,080.26**	**7,885.87**

Source: EPA NEI 2011

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and several industrial gases in the Earth's atmosphere. An increase in GHG emissions is said to result in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level,

ocean acidification, chemical reaction rates, and precipitation rates, which is collectively referred to as climate change. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the average global temperature rise between 1990 and 2100 could be as great as 5.8°C (10.4°F), which could have massive deleterious impacts on the natural and human environments. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and the burning of fossil carbon fuel sources have caused GHG concentrations to increase measurably, from approximately 280 ppm in 1750 to 400 ppm in 2014 (as of April). The rate of change has also been increasing as more industrialization and population growth is occurring around the globe. This fact is demonstrated by data from the Mauna Loa CO2 monitor in Hawaii that documents atmospheric concentrations of CO2 going back to 1960, at which point the average annual CO2 concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO2 concentration since pre-industrial times occurred within the last 54 years.

Proposed Action:

Direct and Indirect Impacts:

The proposed action will have a temporary localized impact to air quality which will mostly occur during the construction phase. Utilization of the access road, surface disturbance, and construction activities such as drilling, hydraulic fracturing, well completion, and equipment installation will all impact air quality through the generation of dust related to travel, transport, and general construction. This phase will produce short term emissions of criteria, hazardous, and greenhouse gas pollutants from vehicle and construction equipment exhausts. Once construction is complete the daily activities at the site will be reduced to operational and maintenance checks which may be as frequent as daily visits. Emissions will result from vehicle exhausts from the maintenance and process technician visits, as well as oil and produced water collection or load out trips. The pads can be expected to produce fugitive emissions of well gas and liquid flashing gases, which can contains a mixture of methane, volatile organic compounds, and inert or non-regulated gases. Fugitive emissions may result from pressure relief valves and working and breathing losses from any tanks located at the sites, as well as any flanges, seals, valves, or other infrastructure connections used at the sites.

Emissions inventories have been compiled for each well pad based on the levels of activities required to implement the proposed action (see tables 3-4 - 3-7 below). The emissions inventories (EI) considered reasonably foreseeable oil and gas development activities for the proposed wells, and includes emissions from both construction and production operations. The following pollutants were inventoried where an appropriate basis, methodology, and sufficient data exists: CO, NOX (includes NO2), PM2.5, PM10, SO2, VOCs, HAPs, CO2, CH4, and N2O. The EI was developed using reasonable but conservative scenarios for each activity. Production emissions were calculated based on full production activity for an entire year. Potential emissions were calculated for each well assuming the minimum/basic legally required control measures, site specific voluntary operator controls, operational parameters, and equipment configurations data that was provided by the applicant. The tables below present only the federal portion of the emissions associated the proposed action, since the BLM has no jurisdiction over the non-federal mineral development or production activities.

Table 3-5: Wiedeman Trust Pad Emissions Inventory

Activity	Criteria Pollutants						GHGs				HAPs
Construction	PM10	PM2.5	VOC	NOx	CO	SO2	CO2	CH4	N2O	CO2eq	All
Construction Activities	0.02	0.00	0.00	0.01	0.00	0.00	1.48	0.00	0.00	1.49	0.00
Rig & Drilling Ops	0.02	0.02	0.02	0.42	0.24	0.01	49.74	0.77	0.15	116.36	0.00
Completion	0.01	0.01	0.01	0.20	0.08	0.00	44.37	0.01	0.00	45.38	0.00
Initial Reclaimation	0.01	0.00	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.74	0.00
Sub-total: Construction	0.06	0.03	0.04	0.63	0.33	0.02	96.31	0.78	0.16	163.97	0.00
Operations											
Fugitive Dust	0.09	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
On-Road Mobile	0.00	0.00	0.00	0.00	0.02	0.00	0.71	0.00	0.00	0.72	0.00
Off-Road Mobile	0.00	0.00	0.01	0.05	0.02	0.00	6.65	0.00	0.00	6.70	0.00
Non-Road Portable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanks	NA	NA	0.97	NA	NA	NA	NA	0.00	NA	0.00	0.22
Tank (liquids) Loadouts	NA	NA	0.80	NA	NA	NA	NA	0.00	NA	0.00	0.00
Components	NA	NA	0.01	NA	NA	NA	0.00	0.02	NA	0.44	0.00
Pnenmatic Devices	NA	NA	0.01	NA	NA	NA	0.00	0.01	NA	0.32	0.00
Heaters	0.00	0.00	0.00	0.05	0.04	0.00	60.29	0.00	0.00	60.66	0.00
Stationary Engines / Pumps	0.00	0.00	0.07	0.09	0.19	0.00	42.36	0.48	0.00	54.39	0.00
Engine / Compression Start-up & Shutdown	NA	NA	0.14	NA	NA	NA	NA	0.36	NA	8.94	0.01
Dehydration Units	NA	NA	0.00	NA	NA	NA	NA	0.00	NA	0.00	0.00
Flares / Control Equipment	0.00	0.00	0.00	0.02	0.08	0.00	24.93	0.00	0.00	25.03	0.00
Blowdown Venting	NA	NA	0.19	NA	NA	NA	0.04	0.49	NA	12.28	0.00
Flares / Blowdowns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Workovers - Re-completions	0.01	0.01	0.01	0.10	0.04	0.00	22.18	0.01	0.00	22.69	0.00
Flares / Workovers - Re-completions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Operations	0.11	0.03	2.20	0.31	0.39	0.00	157.16	1.37	0.00	192.17	0.23
Sub-total: General Conformity	NA	NA	1.27	0.87	NA	NA	NA	NA	NA	NA	NA
Total Emissions (tons)	0.16	0.06	2.24	0.94	0.72	0.02	253.47	2.14	0.16	356.15	0.23

Notes:

Recompletion and workover activities are unlikely to occure in the first few years of production when other production based emissions (flashing, delay, loadouts, etc. ...) are at their highest, thus they are not included in the totals but are presented for informational purposes only.

Conformity subtotals calculated for the Denver - Northern Front Range 8 hr Ozone Nonattainment area only. Future updates may include calcs for other state Maintenance areas as needed.

Table 3-6: Tarin Pad Emissions Inventory

Activity	Criteria Pollutants						GHGs				HAPs
Construction	PM10	PM2.5	VOC	NOx	CO	SO2	CO2	CH4	N2O	CO2eq	All
Construction Activities	0.03	0.01	0.00	0.01	0.00	0.00	1.77	0.00	0.00	1.78	0.00
Rig & Drilling Ops	0.05	0.05	0.08	1.38	0.79	0.05	164.08	2.47	0.49	378.68	0.00
Completion	0.04	0.03	0.03	0.56	0.24	0.01	135.79	0.04	0.01	139.04	0.00
Initial Reclaimation	0.01	0.00	0.00	0.01	0.00	0.00	1.14	0.00	0.00	1.15	0.00
Sub-total: Construction	0.14	0.09	0.11	1.96	1.04	0.05	302.77	2.50	0.50	520.65	0.00
Operations											
Fugitive Dust	0.12	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA
On-Road Mobile	0.00	0.00	0.00	0.00	0.02	0.00	0.77	0.00	0.00	0.79	0.00
Off-Road Mobile	0.01	0.01	0.02	0.13	0.06	0.00	18.26	0.00	0.00	18.41	0.00
Non-Road Portable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanks	NA	NA	2.09	NA	NA	NA	NA	0.00	NA	0.00	0.51
Tank (liquids) Loadouts	NA	NA	1.58	NA	NA	NA	NA	0.00	NA	0.00	0.00
Components	NA	NA	0.06	NA	NA	NA	0.01	0.15	NA	3.70	0.00
Pnenmatic Devices	NA	NA	0.02	NA	NA	NA	0.00	0.04	NA	1.03	0.00
Heaters	0.01	0.01	0.01	0.16	0.14	0.00	193.24	0.00	0.00	194.43	0.00
Stationary Engines / Pumps	0.01	0.01	0.53	0.27	1.13	0.00	120.43	1.37	0.00	154.66	0.00
Engine / Compression Start-up & Shutdown	NA	NA	0.26	NA	NA	NA	NA	0.64	NA	16.11	0.02
Dehydration Units	NA	NA	0.00	NA	NA	NA	NA	0.00	NA	0.00	0.00
Flares / Control Equipment	0.00	0.00	0.00	0.03	0.15	0.00	44.94	0.00	0.00	45.12	0.00
Blowdown Venting	NA	NA	0.62	NA	NA	NA	0.14	1.57	NA	39.34	0.01
Flares / Blowdowns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Workovers - Re-completions	0.02	0.02	0.01	0.28	0.12	0.00	67.89	0.02	0.00	69.52	0.00
Flares / Workovers - Re-completions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Operations	0.18	0.07	5.19	0.87	1.62	0.01	445.69	3.79	0.01	543.10	0.54
Sub-total: General Conformity	NA	NA	3.22	2.57	NA	NA	NA	NA	NA	NA	NA
Total Emissions (tons)	0.32	0.17	5.30	2.84	2.66	0.06	748.46	6.30	0.51	1,063.75	0.54

Notes:

Recompletion and workover activities are unlikely to occure in the first few years of production when other production based emissions (flashing, delay, loadouts, etc. ...) are at their highest, thus they are not included in the totals but are presented for informational purposes only.

Conformity subtotals calculated for the Denver - Northern Front Range 8 hr Ozone Nonattainment area only. Future updates may include calcs for other state Maintenance areas as needed.

Table 3-7: Hunt Pad Emissions Inventory

Activity	Criteria Pollutants						GHGs				HAPs
Construction	PM10	PM2.5	VOC	NOx	CO	SO2	CO2	CH4	N2O	CO2eq	All
Construction Activities	0.02	0.00	0.00	0.01	0.00	0.00	1.64	0.00	0.00	1.65	0.00
Rig & Drilling Ops	0.04	0.04	0.06	0.88	0.48	0.03	106.53	1.40	0.28	228.70	0.00
Completion	0.25	0.04	0.02	0.39	0.18	0.00	90.70	0.03	0.01	93.46	0.00
Initial Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.68	0.00
Sub-total: Construction	0.32	0.09	0.08	1.28	0.66	0.03	199.54	1.43	0.29	324.49	0.00
Operations											
Fugitive Dust	0.14	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA
On-Road Mobile	0.00	0.00	0.00	0.00	0.02	0.00	0.85	0.00	0.00	0.86	0.00
Off-Road Mobile	0.01	0.01	0.01	0.07	0.03	0.00	9.97	0.00	0.00	10.05	0.00
Non-Road Portable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanks	NA	NA	1.30	NA	NA	NA	NA	0.00	NA	0.00	0.34
Tank (liquids) Loadouts	NA	NA	0.91	NA	NA	NA	NA	0.00	NA	0.00	0.00
Components	NA	NA	0.02	NA	NA	NA	0.00	0.05	NA	1.29	0.00
Pnenmatic Devices	NA	NA	0.01	NA	NA	NA	0.00	0.02	NA	0.59	0.00
Heaters	0.01	0.01	0.01	0.09	0.08	0.00	110.41	0.00	0.00	111.10	0.00
Stationary Engines / Pumps	0.00	0.00	0.06	0.09	0.18	0.00	40.54	0.46	0.00	52.06	0.00
Engine / Compression Start-up & Shutdown	NA	NA	0.18	NA	NA	NA	NA	0.46	NA	11.46	0.01
Dehydration Units	NA	NA	0.00	NA	NA	NA	NA	0.00	NA	0.00	0.00
Flares / Control Equipment	0.00	0.00	0.00	0.02	0.10	0.00	31.96	0.00	0.00	32.08	0.00
Blowdown Venting	NA	NA	0.36	NA	NA	NA	0.08	0.90	NA	22.48	0.01
Flares / Blowdowns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Workovers - Re-completions	0.12	0.02	0.01	0.19	0.09	0.00	45.35	0.02	0.00	46.73	0.00
Flares / Workovers - Re-completions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Operations	0.28	0.06	2.87	0.47	0.50	0.01	239.16	1.91	0.01	288.69	0.36
Sub-total: General Conformity	NA	NA	1.65	1.68	NA	NA	NA	NA	NA	NA	NA
Total Emissions (tons)	0.61	0.15	2.95	1.75	1.16	0.04	438.70	3.34	0.29	613.18	0.36

Notes:

Recompletion and workover activities are unlikely to occure in the first few years of production when other production based emissions (flashing, delay, loadouts, etc. ...) are at their highest, thus they are not included in the totals but are presented for informational purposes only.

Conformity subtotals calculated for the Denver - Northern Front Range 8 hr Ozone Nonattainment area only. Future updates may include calcs for other state Maintenance areas as needed.

Table 3–8: Wiedeman F Pad Emissions Inventory

Activity	Criteria Pollutants						GHGs				HAPs
Construction	PM10	PM2.5	VOC	NOx	CO	SO2	CO2	CH4	N2O	CO2eq	All
Construction Activities	0.07	0.01	0.00	0.04	0.02	0.00	6.14	0.00	0.00	6.19	0.00
Rig & Drilling Ops	0.35	0.22	0.31	4.45	2.34	0.15	557.03	5.93	1.19	1,074.63	0.00
Completion	1.58	0.41	0.27	5.06	2.71	0.08	937.54	0.66	0.13	994.58	0.00
Initial Reclamation	0.03	0.01	0.00	0.02	0.01	0.00	3.32	0.00	0.00	3.35	0.00
Sub-total: Construction	2.03	0.65	0.59	9.56	5.07	0.23	1,504.03	6.60	1.32	2,078.74	0.00
Operations											
Fugitive Dust	0.35	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA
On-Road Mobile	0.00	0.00	0.00	0.01	0.05	0.00	2.36	0.00	0.00	2.41	0.00
Off-Road Mobile	0.01	0.01	0.01	0.10	0.05	0.00	13.14	0.00	0.00	13.24	0.00
Non-Road Portable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tanks	NA	NA	3.42	NA	NA	NA	NA	0.00	NA	0.00	0.41
Tank (liquids) Loadouts	NA	NA	3.89	NA	NA	NA	NA	0.00	NA	0.00	0.00
Components	NA	NA	0.28	NA	NA	NA	0.06	0.70	NA	17.63	0.00
Pnenmatic Devices	NA	NA	0.04	NA	NA	NA	0.01	0.10	NA	2.49	0.00
Heaters	0.03	0.03	0.02	0.39	0.33	0.00	465.62	0.01	0.01	468.49	0.00
Stationary Engines / Pumps	0.00	0.00	0.19	0.27	0.54	0.00	122.67	1.39	0.00	157.53	0.00
Engine / Compression Start-up & Shutdown	NA	NA	0.31	NA	NA	NA	NA	0.78	NA	19.42	0.02
Dehydration Units	NA	NA	0.00	NA	NA	NA	NA	0.00	NA	0.00	0.00
Flares / Control Equipment	0.00	0.00	0.00	0.03	0.18	0.00	54.15	0.00	0.00	54.36	0.00
Blowdown Venting	NA	NA	1.51	NA	NA	NA	0.33	3.78	NA	94.80	0.01
Flares / Blowdowns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Workovers - Re-completions	0.79	0.20	0.13	2.53	1.35	0.04	468.77	0.33	0.07	497.29	0.00
Flares / Workovers - Re-completions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Operations	1.18	0.30	9.81	3.32	2.50	0.05	1,127.10	7.09	0.07	1,327.66	0.45
Sub-total: General Conformity	NA	NA	6.99	12.64	NA	NA	NA	NA	NA	NA	NA
Total Emissions (tons)	3.21	0.96	10.39	12.88	7.57	0.28	2,631.14	13.69	1.40	3,406.40	0.45

Notes:

Recompletion and workover activities are unlikely to occure in the first few years of production when other production based emissions (flashing, delay, loadouts, etc. ...) are at their highest, thus they are not included in the totals but are presented for informational purposes only.

Conformity subtotals calculated for the Denver - Northern Front Range 8 hr Ozone Nonattainment area only. Future updates may include calcs for other state Maintenance areas as needed.

Ozone is noticeably absent from the emissions inventories due to the fact that it is not directly emitted like other criteria pollutants. Ozone is chemically formed in the atmosphere via interactions of oxides of nitrogen (NOX) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NOX and VOCs are ozone precursors). Ozone formation and prediction is complex, non-linear, generally results from a combination of significant quantities of VOCs and NOX emissions from various sources within a region, and has the potential to be transported across long ranges. Therefore, it is typically not appropriate to assess (i.e. model) potential ozone impacts of a single project on potential regional ozone formation and transport. However, to obtain region wide ozone assessment data the BLM performed the Colorado Air Resources Management Modeling Study (CARMMS). The study

utilized the Comprehensive Air-quality Model with extensions (CAMx) to predict statewide impacts to air quality and air quality related values from projected oil and gas development out to year 2021 for three development scenarios (low, medium, and high). Each BLM field office was modeled with the source apportionment option, meaning that incremental impacts to regional ozone and AQRVs from development in these areas are essentially tracked to better understand the significance of such development on impacted resources and populations. The CARMMS high / RFD modeling scenario results will be used to describe potential air quality impacts of future federal oil and gas development within the RGFO Planning Area (see the cumulative impacts section below).

The General Conformity Rule at 40 CFR 93.153 defines the *de minimis* thresholds for NOX and VOC in a marginal or moderate ozone nonattainment areas, and outside of any designated transport region, as 100 tons per year (tpy). Although the 4 well pads and associated APDs have been grouped for the convenience of the government within this single environmental assessment, we do NOT consider them to be connected actions under NEPA. As stated previously the BLM retains the authority to deny any single APD for cause, as determined by our analysis of the proposed action. General conformity is triggered when the BLM responds to any single APD, which is required for each well seeking to produce federal minerals.

The proposed action(s) under NEPA is scheduled to commence in the fall of 2015, with the construction phase lasting approximately 12 months. The life of the wells, if economically viable, would be expected to sustain operations for approximately 20 – 30 years once production begins. Maximum foreseeable direct and indirect emissions would occur at the beginning of the project (2015 – 2016 timeframe). The conformity rule thresholds have been established as an annual standard, and even though the project is expected to break across calendar years, the BLM has evaluated the entire federal portion of the emissions as if it were to occur within a single calendar year (2016).

The entirety of the federal portion of the NEPA proposed action, as designed and submitted, has been evaluated in accordance with the requirements of 40 CFR 93.153 subpart B and have been found to conform for the following reason(s):

[X] Potential maximum total Direct and Indirect emissions that are not subject to exemptions under the rule are below *de minimis* threshold levels:

Ozone (NOX): 17.75 tpy in 2016 (maximum year, combined construction and production)

Ozone (VOC): 13.13 tpy in 2016 (maximum year, combined construction and production)

A screening-level near-field ambient air quality impact assessment was performed to quantify and evaluate maximum potential pollutant impacts at sensitive ambient receptors in the immediate area of the proposed well pad facilities. The BLM Colorado near-field modeling tool uses the EPA AERMOD modeling system for estimating ambient air concentrations for access road (or corridor) construction / travel emissions and emissions associated with one or two centralized O&G well-pads / facilities. Five years (2008-2012) of Colorado-based surface and upper-air meteorology is used to predict possible air quality impacts for both screening tools modules (roadway and centralized facilities). The screening model predicts the maximum concentration of a pollutant for a given receptor distance for typical O&G volume and point source release parameters (fugitive / mobile and combustion related emissions sources, respectively). Using aerial images and GIS, the nearest ambient receptor (location of residence, business, school, hospital, etc…) was determined to be approximately 150 meters from the proposed Wiedeman F

pad. The screening tool was run for the maximum emissions rate (drilling) as determined from the emissions inventory for all of the estimated processes / activities. With the exception of the Wiedeman Trust pad, the screening tool produced exceedences to the NAAQS for the 1-hour NO2 standard for every other pad (receptors located within 150 to 220 meters, table 3-9). Each pad is located more than a kilometer away from the next nearest pad, such that when the rig moves to drill a different pad, the previously most impacted receptor will be well below the NAAQS level for the remainder of the project development cycle (see table 3-10). None of the nearby receptors for each pad showed an exceedance for production related emissions sources (see table 3-11). The background concentrations for the NO2 1-hr, PM10 and PM2.5 24-hour, and the PM2.5 annual were all derived from the 2021 CARMMS grid cell results (includes all future development) near the project area. The NO2 annual is from the CDPHE and the CO value was estimated from the 1st maximum monitored value within the area.

Table 3-9 Screening Model Results (Max Development Related Impacts)

Pollutant	Ave. Period	Modeled Parameter(s)	Concentration (ug/m3)		Standard (ug/m3)	Percent of NAAQS
			Modeled	**Background**		
CO	1 hour	production, point source (engines)	274.70	3.2	40,000	0.69
NO2	1 hour	construction, point source (completion)	303.83	74.5	189	200
NO2	Annual	construction, point source (completion)	11.01	20.7	100	32
PM10	24 hour	production, volume (fugitive dust)	5.17	31.5	150	24
PM2.5	24 hour	production, volume (fugitive dust)	2.51	11.4	35	40
PM2.5	Annual	production, volume (fugitive dust)	0.44	7	12	62

Table 3-10 Screening Model Results (Max Development Related Impacts – After Rig Move)

Pollutant	Ave. Period	Modeled Parameter(s)	Concentration (ug/m3)		Standard (ug/m3)	Percent of NAAQS
			Modeled	Background		
CO	1 hour	production, point source (engines)	46.86	3.2	40,000	0.12
NO2	1 hour	construction, point source (completion)	47.85	74.5	189	65
NO2	Annual	construction, point source (completion)	1.30	20.7	100	22
PM10	24 hour	production, volume (fugitive dust)	0.59	31.5	150	21
PM2.5	24 hour	production, volume (fugitive dust)	0.25	11.4	35	33
PM2.5	Annual	production, volume (fugitive dust)	0.05	7	12	59

Table 3-11 Screening Model Results (Max Production Related Impacts)

Pollutant	Ave. Period	Modeled Parameter(s)	Concentration (ug/m3)		Standard (ug/m3)	Percent of NAAQS
			Modeled	Background		
CO	1 hour	production, point source (engines)	17.53	3.2	40,000	0.05

NO2	1 hour	construction, point source (completion)	18.46	74.5	189	40
NO2	Annual	construction, point source (completion)	0.67	20.7	100	21
PM10	24 hour	production, volume (fugitive dust)	2.42	31.5	150	23
PM2.5	24 hour	production, volume (fugitive dust)	0.32	11.4	35	34
PM2.5	Annual	production, volume (fugitive dust)	0.06	7	12	51

From the screening results the maximum 3 year average 1-hour NO2 value would be 198 micrograms per cubic meter or approximately 5% above the NAAQS. However, given that; 1) the development duration for each pad is shorter than a single year, 2) the total project development duration is shorter than two years, and 3) the screening tool assumes the source is always directly up wind of the receptor, it is highly unlikely that the actual three year average of the 8th high 1- hour NO2 concentrations at any nearby receptor would produce a violation of the standard. All of the other pollutants were below the standards for all averaging periods. This information is disclosed for informational purposes only, as this project will occur at these locations with or without BLM approval.

The BLM also performed a screening analysis for two Hazardous Air Pollutants (HAPs); formaldehyde (point – engines), and benzene (volume – fugitives). Background pollutant concentration data collected at a regional monitoring site that is located in a high-density area of oil and gas were obtained from EPA Air Quality System (AQS) database and are included for total modeled concentrations. These background concentrations (4.37 and 28.75 1-hr, 1.34 and 9.11 annual, respectively) represent all non-Project near-field emissions sources impacts and were added to the near-field screening model concentrations to produce cumulative predicted near-field concentrations for comparison to applicable air quality impact thresholds.

Short-term (1-hour) HAP concentrations are compared to acute Reference Exposure Levels (RELs), shown in the table below. RELs are defined as concentrations at or below which no adverse health effects are expected. These values approximate pollutant concentrations likely to produce mild effects during 1-hour exposures. The 1 hr. maximums results for both pollutants were not more than 48% of the applicable RELs.

Long-term maximum potential exposures to HAPs are compared to Reference Concentrations for Chronic Inhalation (RfCs). An RfC is defined by USEPA as the daily inhalation concentration at which no long-term adverse health effects are expected. RfCs exist for both non-carcinogenic and carcinogenic effects on human health. Annual modeled HAP concentrations are compared directly to the non-carcinogenic RfCs, and modeled benzene and formaldehyde annual average concentrations for all receptors are no more than 30% of their respective RfCs.

As for air quality related values (AQRVs) such as deposition and visibility impacts, the BLM used the Flag 2010 screening guidance for projects that are at distances greater than 50km from any Class I or sensitive Class II area to determine if a more refined analysis should be considered. Although the screening method is not explicitly applicable to non-PDS sources (i.e. minor sources), it still provides useful data for determining if additional analysis should be considered. The results (0.36 <= 10) of the Q/d analysis (NOX + PM10 + SO2 / distance) suggest the project will have negligible impacts to Rocky Mountain National Park, the closest Class I area. Thus, no further discussion of project level AQRVs is warranted.

The implementation of the federal portion of the proposed action is estimated to contribute 3,088 tons of carbon dioxide equivalent (CO2e) in the maximum year (2016). Annual operating GHG emissions will be approximately 76% of the total emissions shown for the maximum year within the first year of full production. Over the average 25 year project timeframe the total GHG emissions can be conservatively estimated to be approximately 63,400 tons of CO2e. The estimate is a linear interpolation and does not account for production declines nor additional lift or compression that may be required as the wells age. The total provided also does not account for the ultimate use or consumption of any produced minerals at this time due to the fact that the ultimate form of use and any additional processing required to render the product to sufficient quality (which would cause changes to the quantity of product) cannot be predicted with any reasonable certainty. Additionally, it should be noted that production values are all estimates at this time and will vary significantly over the life of the project making any prediction of the quantities of GHG emitted very speculative.

In 2010, the state of Colorado's GHG emissions was 130,000,000 metric tons. The proposed action's lifetime GHG emissions represent about 0.043% of the state of Colorado's annual GHG emissions. The relative magnitude of greenhouse gas emissions associated with the development of the 18 wells as compared to the state's GHG annual emission levels is extremely small. To provide additional context for the level of project emissions and potential impacts, the EPA has recently modeled global climate change impacts from a model source emitting 20% more GHGs than a 1500MW coal-fired steam electric generating plant (approx. 14,132,586 metric tons per year of CO2, 273.6 metric tons per year of nitrous oxide, and 136.8 metric tons per year of methane). It estimated a hypothetical maximum mean global temperature value increase resulting from such a project. The results ranged from 0.00022 and 0.00035 degrees Celsius occurring approximately 50 years after the facility begins operation. The modeled changes are extremely small, and any downsizing of these results from the global scale would produce greater uncertainly in the predictions. The EPA concluded that even assuming such an increase in temperature could be downscaled to a particular location, it "would be too small to physically measure or detect", see Letter from Robert J. Meyers, Principal Deputy Assistant Administrator, Office of Air and Radiation re: "Endangered Species Act and GHG Emitting Activities (Oct. 3, 2008). The project emissions are a fraction of the EPAs modeled source and are shorter in duration, and therefore it is reasonable to conclude that the project would have no measurable impact on the climate.

Protective/Mitigation Measures:

PDC Energy, Inc. will comply with the following requirements and make every effort to minimize emissions through good engineering and operating practices to the maximum extent practical.

- PDC Energy, Inc. will use industry best practices, including watering, graveling, and reseeding to reduce fugitive dust emissions from vehicular traffic and disturbed surfaces. Interim reclamation and any existing agricultural practices will be implemented in order to stabilize the site and prevent fugitive dust from being generated. No visible dust plumes should be observed leaving the site.

- Process equipment will be permitted by CDPHE in accordance with applicable requirements and required emissions standards to limit the facility's potential to emit and provide appropriate operating, monitoring, and recordkeeping requirements.

- All FRAC Pump engines will be required to meet EPA Non-Road Tier II Emissions Standards or better.
- 'Green Completions' will be performed for all authorized wells.
- All Drill Rigs will be required to meet EPA Non-Road Tier II Emissions Standards, or better, for all drilling and completion operations.

Cumulative Impacts:

The area currently has a high degree of alteration in the form of agricultural fields, roads, houses, and oil and gas production. The addition of the infrastructure needed to construct and drill the additional pad and wells would have a cumulative impact to the area's air quality; however, given the existing level of development in the area, the proposed action's impacts would be very minor. In the long term, if economical quantities of oil and gas are found and /or produced, additional wells can be expected to be drilled on Federal, State, and private lands. This could result in additional impact to air quality in the future.

As discussed above, the BLM in an effort to analyze cumulative impacts to air quality (including ozone and AQRVs), has initialized the Colorado Air Resources Management Modeling Study (CARMMS). The BLM continually tracks authorized oil and gas activity to determine which CARMMS scenario would be most appropriate to estimate air resource impacts correlations based on the source apportionment area's cumulative federal development and total production. Although the predicted impacts will be based on future year modeling results (2021), the changes in the impacts between the scenarios provide insight into understanding how mass emissions impact the atmosphere on a relative basis, and are thus useful for making qualitative correlations for the tracked emissions levels. The results shown below are for the high RFD scenario. The complete CARMMS report and associated data is available on our website at: http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality.html.

Table 3-12 Current Tracking Data Weld County (2014 COGCC & AFMSS Data)

Oil Production (bbl)	Gas Production (Mcf)	Producing Wells	RGFO Area 1 Federal Wells Since 2011
76,632,950	375,250,994	25,632	49

Table 3-13 CARMMS High 2021 Emissions (tons)

CARMMS High Scenario SA Area Name	PM10	PM2.5	VOC	CO	NOX	SO2	CO2	CH4	N2O
RGFO Area 1 Federal (I + J)	910	118	2,437	1,092	1,233	4.6	146,617	6,263	2
RGFO Area 1 Non-Federal	10,431	1,355	49,536	16,073	15,307	51	4,184,047	178,738	66
All BLM CO Federal O&G (R)	5,987	1,602	51,927	24,867	31,857	977	8,870,164	235,746	138
All CO Non-Federal O&G (S)	14,999	2,650	100,540	39,141	42,926	225	13,230,131	481,719	208

PSD Increment Impacts: EPA has defined PSD Concentrations Increments for Class I and II areas for 8 different pollutant concentration/averaging time

combinations. In this section we present the "Average" PSD concentration impacts at applicable Class I and sensitive Class II areas. Of the 8 defined PSD increments, only the 24 hour PM10 and PM2.5 yielded significant data for RGFO Area 1. The increments for SO2 (all averaging times), annual PM10, annual PM2.5, and annual NO2 are of little consequence as RGFO SA Area 1 contributes 0% towards these area's metrics. The modeled impacts are based on the CAMx PSAT source apportionment contributions. For short-term averaging times (i.e., not annual), the highest second high concentration at each Class I/II area is selected for comparison with the PSD increment. Rows for source groups that had no predicted impacts (i.e., 0.000 ug/m3) were removed from table 3-14 to reduce its size. The PSD data below does not constitute an official PSD increment analysis, which is the sole function and responsibility of CDPHE. Further, the cumulative source groups do not represent PSD permit applications where such an analysis would be conducted. The data is presented for informational purposes only. Please note that it is expected that the larger cumulative source groups would always exceed the increments which are used to gauge significance of individual sources or projects requiring such an analysis.

Table 3-14 CARMMS High Scenario – Average PSD Concentrations

Group	PSD Class I Increment	Max @ any Class I area	Percent of PSD Class I Increment	Class I Area where Max occurred	PSD Class II Increment	Max @ any Class II area	Percent of PSD Class II Increment	Class II Area where Max occurred
NO**2** Annual								
R	2.5	0.350	14.0%	Mesa_Verde	25	0.436	1.7%	Hovenweep
S	2.5	0.787	31.5%	Mesa_Verde	25	1.242	5.0%	Hovenweep
PM**10** 24-hour								
I + J	8	0.014	0.0%	Rocky_Mountain	30	0.01	0.0%	Mount_Evans
R	8	0.478	6.0%	Mount_Zirkel	30	0.483	1.6%	Raggeds
S	8	0.636	7.9%	Mesa_Verde	30	1.153	3.8%	Aztec_Ruins
PM**10** Annual								
R	4	0.108	2.7%	Mesa_Verde	17	0.126	0.7%	Raggeds
S	4	0.221	5.5%	Mesa_Verde	17	0.378	2.2%	Aztec_Ruins
PM**2.5** 24-hour								
I + J	2	0.007	0.3%	Rocky_Mountain	9	0.005	0.0%	Mount_Evans
R	2	0.455	22.7%	Mount_Zirkel	9	0.428	4.8%	Raggeds
S	2	0.480	24.0%	Mount_Zirkel	9	0.525	5.8%	Colorado
PM**2.5** Annual								
R	1	0.101	10.1%	Mount_Zirkel	4	0.104	2.6%	Raggeds
S	1	0.111	11.1%	Mount_Zirkel	4	0.124	3.1%	Raggeds
SO**2** 3-hour								
R	25	0.531	2.1%	Dinosaur_CO	512	0.427	0.1%	Dinosaur_all
S	25	0.604	2.4%	Dinosaur_CO	512	0.486	0.1%	Dinosaur_all
SO**2** 24-hour								
R	5	0.135	2.7%	Dinosaur_CO	91	0.108	0.1%	Dinosaur_all
S	5	0.154	3.1%	Dinosaur_CO	91	0.123	0.1%	Dinosaur_all
SO**2** Annual								
R	2	0.014	0.7%	Dinosaur_CO	20	0.011	0.1%	Dinosaur_all
S	2	0.016	0.8%	Dinosaur_CO	20	0.013	0.1%	Dinosaur_all

Visibility Impacts: Table 3-15 displays the Class I and II areas where the maximum number of days Δdv (dv = deciview, w/ 1 dv being equivalent to a "just perceptible" change in visibility clarity) exceeds the 0.5 and 1.0 thresholds

and the maximum Δdv due to the source groups. The RGFO SA Area 1 did not have any days where the modeled deciview change was greater than 0.5, and thus according to the FLAG 2010 guidance, the projected development in this area does not contribute to visibility changes in any Class I or Class II area. All cumulative visibility impacts in the future improve for the 20% worst days. Approximately half of the 20% best visibility days at monitored Class I areas improve, while the other half degrade slightly (indicated by negative values) in the future. The results shown for the cumulative areas (Table 3-16) were selected based on the individual source group impact areas within Table 3-15.

Table 3-15 CARMMS High Scenario – Max dv Days and Calculated dv

Source Group	Max # Days > 0.5 dv @ Any Class Area	Where > 0.5 dv Count Occurs	Max # Days > 1.0 dv @ Any Class Area	Where > 1.0 dv Count Occurs	Max dv@ Any Class I	Where Max Occurs
Class I Area Impacts						
I + J	0	NA	0	NA	0.14798	CI_Rocky_Mountain
R	72	CI_Mount_Zirkel	12	CI_Mount_Zirkel	1.63971	CI_Flat_Tops
S	281	CI_Mesa_Verde	55	CI_Mesa_Verde	4.19030	CI_Rocky_Mountain
Class II Area Impacts						
I + J	0	NA	0	NA	0.06658	CII_Mount_Evans
R	110	CII_Dinosaur_all	27	CII_Dinosaur_all	2.63206	CII_Colorado
S	288	CII_South_San_Juan	55	CII_Colorado	4.59771	CII_Colorado

Table 3-16 CARMMS High Scenario – Cumulative Worst & Best Days at Class I & II Areas

Class I Name	Class Type	State	2008 Base	2021 High	High w/o R	High w/o S	2021 High Improvement from 2008	dv from R	dv from S
Worst 20% Visibility (dv)									
Flat Tops Wilderness	I	CO	8.68	8.07	8.06	7.89	0.61	0.01	0.18
Rocky Mountain NP	I	CO	12.04	11.15	11.14	11.09	0.89	0.01	0.06
Colorado NM	II	CO	8.68	8.00	7.98	7.78	0.68	0.02	0.22
Dinosaur NM	II	CO	8.68	8.06	8.05	8.02	0.62	0.01	0.04
Mount Evans Wilderness	II	CO	8.68	8.02	8.01	7.95	0.66	0.01	0.07
Best 20% Visibility (dv)									
Flat Tops Wilderness	I	CO	0.69	0.55	0.53	0.41	0.14	0.02	0.14
Rocky Mountain NP	I	CO	1.91	1.87	1.86	1.82	0.04	0.01	0.05
Colorado NM	II	CO	0.69	0.60	0.58	0.45	0.09	0.02	0.15
Dinosaur NM	II	CO	0.69	0.57	0.56	0.53	0.12	0.01	0.04
Mount Evans Wilderness	II	CO	0.69	0.57	0.56	0.52	0.12	0.01	0.05

Deposition Impacts: Table 3-17 shows the cumulative model results for nitrogen deposition averaged across the entire class I or II area. Although sulfur deposition was also modeled, the BLM authorized emissions are insignificant such that disclosure would be meaningless. For the areas affected in Table 3-17 the future cumulative deposition values are all above the critical load value of 2.3 kg/ha-yr (as identified by the National Park Service for sensitive high alpine ecosystems). Compared to the cumulative base year deposition model results, it's clearly evident that predicted deposition rates will be in decline in the future (Table 3-18). The

result is consistent with the overall cumulative emissions inventory declines. Cumulative emissions from the RGFO SA Area 1 (I + J) are not significant.

Table 3-17 CARMMS High Scenario – Cumulative Nitrogen Deposition (Average)

Group	2021 Max @ any Class I area (kg/ha-yr)	Class I Area where Max occurred	2021 Max @ any Class II area (kg/ha-yr)	Class II Area where Max occurred
I + J	0.0007	Rocky_Mountain	0.0009	Lost_Creek
R	0.1454	Flat_Tops	0.1160	Colorado
S	0.2550	Flat_Tops	0.2191	Colorado

Table 3-18 CARMMS High Scenario – Class I Cumulative Nitrogen Deposition Change (Average)

Area	Class Type	2008 (kg/ha-yr)	2021 (kg/ha-yr)	2021 – 2008	% 2021 Reduction
Rocky_Mountain	I	3.50	2.58	-0.92	26.3
Flat_Tops	I	3.09	2.39	-0.70	22.6

Ozone Impacts: EPA's Model Attainment Test Software (MATS) was used to make future year ozone Design Value (DV) projections using the CAMx 2008 Base Case and 2021 High Development Scenario modeling results. MATS was also used to make future year 2021 ozone DV (DVF) projections for the 2021 High Development Scenario removing the contributions of two of the combined Source Groups R and S. MATS was used to make 2021 ozone DVF projections at the monitoring sites as well as throughout the CARMMS modeling domain using the MATS Unmonitored Area Analysis (UAA) procedures. Table 3-19 provides the change in predicted ozone values at monitored location throughout Colorado (as existed in 2008). All of the future monitor values go down in the future with the exception of the 0011 monitor in Larimer County. Further the total number of exceedances/violations drops from five monitors to two in the future. Federal oil and gas contributions (source group R) do not exceed 1 ppb in the DVF results. Figures 3-4 and 3-5 provide a graphical representation of how ozone concentrations are expected to change in the future, and in general the changes show decreasing values.

Table 3-19 CARMMS High Scenario –Cumulative Ozone Impacts

Name	**2008 Base DVC**	**DVF**			**Contributions**	
		2021 Hi	**2021 Hi w/o R**	**2021 Hi w/o S**	**Group R**	**Group S**
CO_Adams_3001	71.5	70.5	69.7	67.2	0.8	3.3
CO_Boulder_0011	77.3	74.4	73.5	69.0	0.9	5.4
CO_Denver_0014	70.3	69.0	68.3	66.2	0.7	2.8
CO_Douglas_0004	78.3	75.7	74.9	72.3	0.8	3.4
CO_El Paso_0013	68.0	66.0	65.4	64.5	0.6	1.5
CO_El Paso_0016	70.3	68.8	68.4	67.7	0.4	1.1
CO_Jefferson_0002	75.0	73.5	72.6	70.0	0.9	3.5
CO_Jefferson_0005	74.3	72.4	71.8	70.0	0.6	2.4
CO_Jefferson_0006	82.0	79.5	78.6	74.5	0.9	5.0
CO_Jefferson_0011	76.3	74.0	73.3	71.0	0.7	3.0
CO_La Plata_1004	70.0	69.8	69.5	69.3	0.3	0.5
CO_La Plata_7001	66.0	65.9	65.5	65.1	0.4	0.8
CO_La Plata_7003	67.0	66.8	66.4	66.0	0.4	0.8

CO_Larimer_0007	74.3	72.7	72.4	70.1	0.3	2.6
CO_Larimer_0011	78.0	78.9	78.6	73.5	0.3	5.4
CO_Larimer_1004	67.3	67.4	67.2	62.9	0.2	4.5
CO_Montezuma_0101	69.3	68.9	68.6	68.3	0.3	0.6
CO_Weld_0009	72.7	72.1	71.5	64.9	0.6	7.2

Figure 3-3 CARMMS High Scenario –Cumulative Ozone Impacts (DVC & DVF)

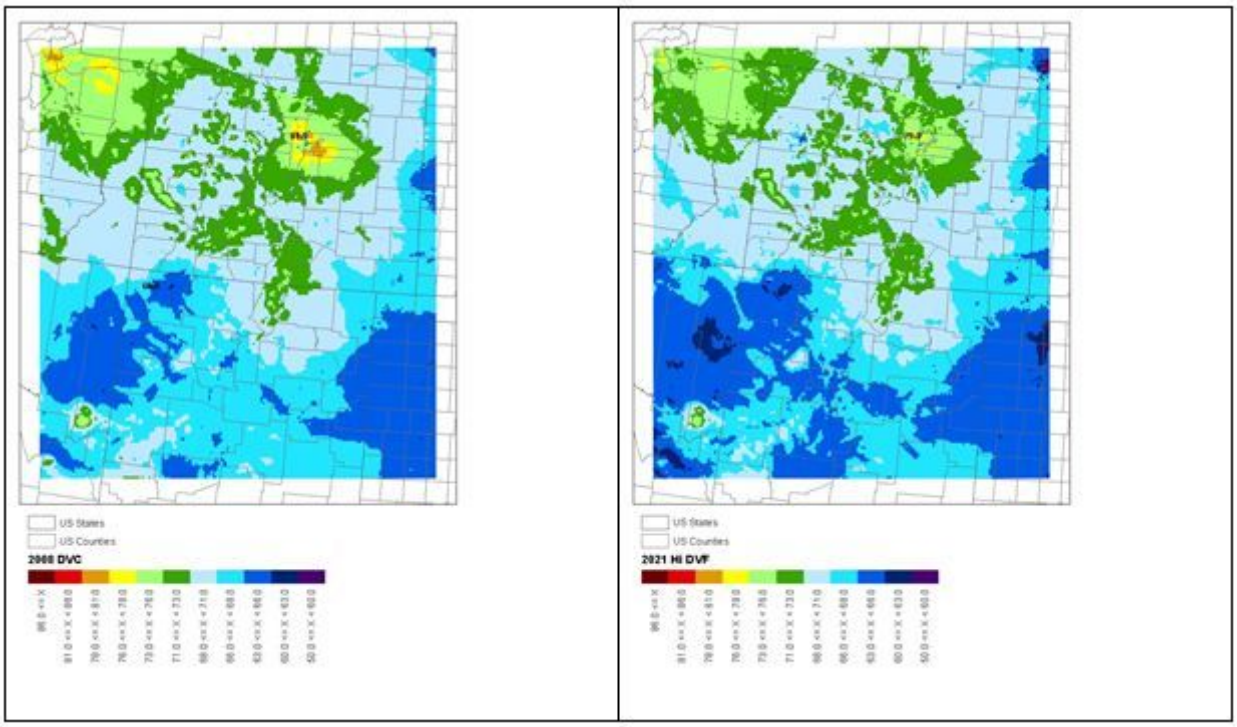


Figure 3-4 CARMMS High Scenario –Cumulative Ozone Impacts (Group R & S Contributions)

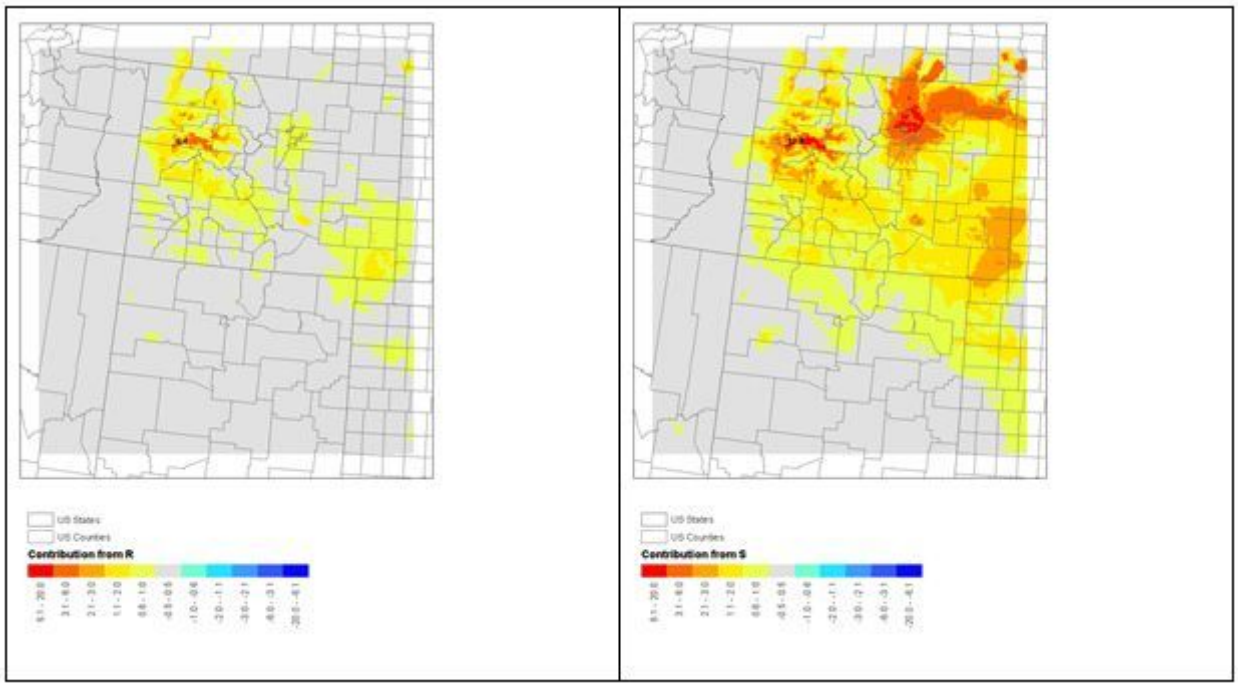
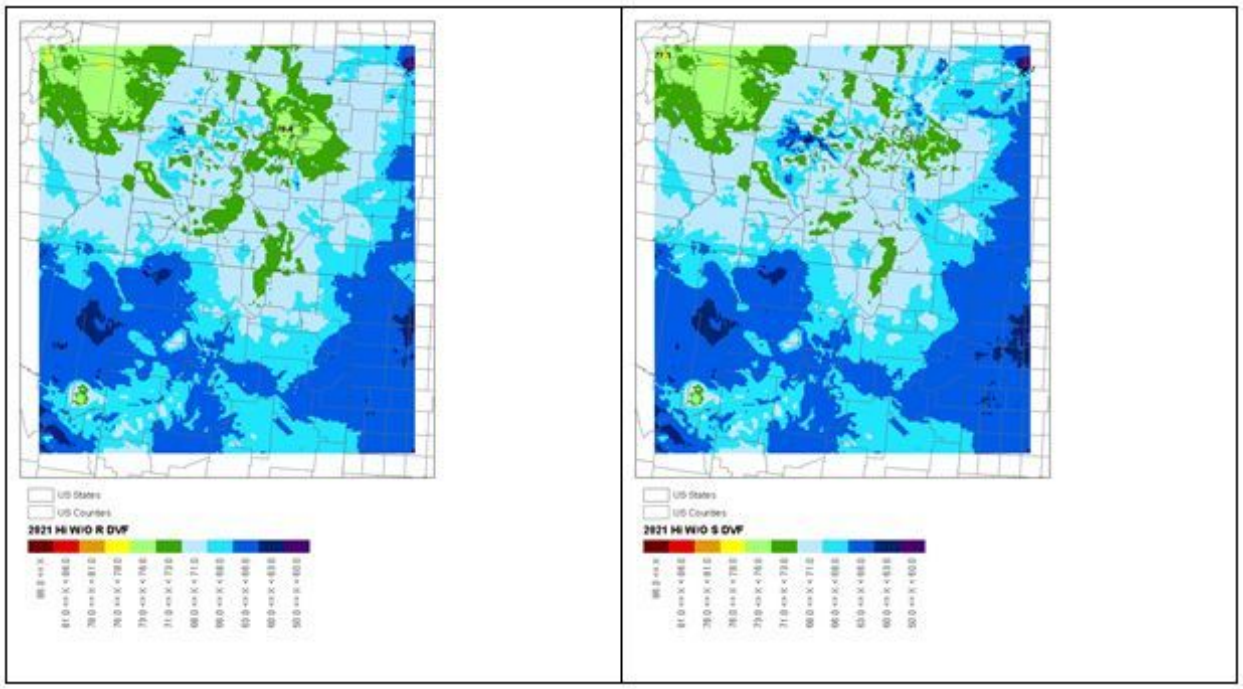


Figure 3-4 CARMMS High Scenario –Cumulative Ozone Impacts (w/o Groups R & S)



The 2021 High Development Scenario UAA ozone DVF without Source Group R (Federal O&G and mining in 13 CO BLM Planning Areas) results in reduction in the DVFs with the highest reduction of 6.4 ppb in the Piceance Basin and the peak DVF reduced from 79.3 to 78.4 ppb and occurs just northwest of Denver. There are still areas in Denver with 2021 DVFs exceeding the NAAQS with Source Group R removed. Removing both Federal O&G and mining and non-Federal O&G (Source Group S) results in more reductions in the 2021 DVFs, especially in

Weld County in the greater Denver area. There are large reductions in 2021 DVFs in the Piceance and D-J Basins (Weld County) with the largest reduction being 12.8 ppb in the Piceance Basin. There are no longer any ozone exceedances in the greater Denver area without emissions from Source Group S.

With respect to GHG emissions, the following predictions were identified by the EPA for the Mountain West and Great Plains region:

- The region will experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow will be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts will occur.
- Crop and livestock production patters could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions will reduce the range and health of ponderosa and lodge pole pine forests, and increase the susceptibility to fire.
- Grasslands and rangelands could expand into previously forested areas.
- Ecosystems will be stressed and wildlife such as the mountain line, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

If these predictions are realized as mounting evidence suggests is already occurring, there could be impacts to other resources within the region. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Warmer temperatures with decreased snowfall could have an impact on a particular plants ability to sustain itself within its current range. An increased length of growing season in higher elevations could lead to a corresponding variation in vegetation and change in species composition. These types of changes would be most significant for special status plants that typically occupy a very specific ecological niche. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened or endangered plants may be accelerated. Invasive plant species would be more likely to out-compete native species.

Increases in winter temperatures in the mountains could have impacts on traditional big game migration patterns. Due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Warmer winters with less snow would impact the Canada lynx by removing a competitive advantage they have over other mountain predators. Earlier snowmelt could also have impacts on cold water fish species that occupy streams throughout the planning area. Climate change could affect seasonal frequency of flooding and alteration of floodplains, which could impact riparian conditions. More frequent and severe droughts would have impacts on many wildlife species throughout the region as well as vegetative composition and availability of livestock forage in some areas. Climate change could increase the growing season within the region, which could result in more

forage production provided there is sufficient precipitation. Drier conditions could have severe impacts on forests and woodlands and could leave these areas more susceptible to insect damage and at higher risk of catastrophic wildfires. Increased fire activity and intensity would increase greenhouse gas emissions, providing for a negative feedback loop. In fact most of the predicted changes on a global scale have some level of a predicted negative feedback loop, making the problem particularly vexing.

No Action Alternative:

Direct and Indirect Impacts:

None of the BLM APDs would be approved, therefore none of the potential emissions causing activities related to developing federal minerals would occur. However, since the federal minerals in the project area are a small percentage of the total minerals that are planned to be produced by the wells, and the projects are to take place on private lands, the operator would likely construct pads and drill fee wells avoiding federal minerals resulting in similar impacts to the proposed action, likely with a slight decrease in production emissions that would result from the production of federal minerals. The incremental increase to global GHG burden would not happen, however it is entirely likely the predicted cumulative climatic changes will occur regardless.

3.2.2. Geologic and Mineral Resources

Affected Environment:

The proposed wells are located within the Wattenberg gas field in the Denver Basin, where the primary target is the Codell/Niobrara oil and gas. Most oil and gas in the Denver Basin has been produced from Cretaceous sandstones: J-Sandstone, Codell Sandstone, Niobrara Formation, Hygiene Sandstone, and Terry Sandstone (also known informally as the Sussex and Shannon Sandstones). The Project Area is surrounded by privately owned producing gas wells on a Colorado state spacing order of 20 acres per well.

Groundwater resources in the area include the Laramie-Fox Hills aquifer, the lowermost of the Denver Basin aquifer system. The aquifer underlies approximately 6,700 square miles and marks the areal extent of the basin for economic ground water development. The Laramie-Fox Hills aquifer is from 250 to 300 feet thick, and includes about 150 to 200 feet of fine-grained and medium-grained sandstone. Water is also present in the Upper Pierre Shale at depths of up to 1,500 feet (CDWR, 2013). Water from the aquifer is used extensively throughout the area for domestic and agricultural purposes. Well yields may be as high as 100 gallons per minute (GPM), but are generally somewhat lower. Both the Laramie-Fox Hills and Arapahoe aquifers are under artesian pressure at the present time.

In addition to oil and gas, uranium and coal resources are also found in Weld County. Uranium resources are found in the Upper Laramie Formation north of Greeley. Coal resources are found throughout the Denver Basin in the Denver Formation and the upper Laramie Formation in the Denver Basin, although most of the coal resources in the Denver Basin have come from Laramie Coals. Sand and gravel resources are also located throughout Weld County; several sand and gravel pits have also been developed within five miles of the proposed wells.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

The Proposed Action would drill through the Laramie-Fox Hills aquifer to produce hydrocarbons from underlying formations. The Laramie formation contains important coal and uranium deposits. During drilling operations on parcels, loss of circulation or problems cementing the surface casing could directly affect freshwater aquifer and mineral zones encountered. Known water-bearing zones in the APD areas would be protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely.

Protective/Mitigation Measures:

Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones and prospective mineral zones. At the APD stage, geologic and engineering reviews will be completed to ensure that cementing and casing programs are adequate to protect all downhole resources. Known water bearing zones in the APD area are protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely. Casing along with cement would be extended well beyond fresh-water zones to ensure that drilling fluids remain within the well bore and do not enter groundwater.

Cumulative Impacts: None

No Action Alternative:

Direct and Indirect Impacts:

Under the No Action alternative, the APDs would be denied, and no federal action would occur. Not approving the APDs could result in a situation in which reservoirs are not adequately developed, and public minerals could be drained by nearby private or state wells. The applicant could explore and develop the private land and private minerals and not access the federal minerals. Drainage cases commonly occur in northeastern Colorado where land and mineral ownership patterns are complex.

Protective/Mitigation Measures:

none

3.2.3. Hydrology/Water Quality

Surface, Groundwater, Floodplains

Affected Environment:

The proposed project areas are in irrigated, cultivated agricultural fields in the South Platte Watershed. There are some agricultural ditches and are numerous water wells near the project areas. The project areas overly the Laramie-Fox Hills aquifer, which is extensively used for agricultural and domestic purposes. Water of varying quality may also be found in sands located within the Pierre Shale formation.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

It is estimated that the construction, drilling and completion of horizontal wells requires approximately 11 acre feet of water per well. This would result in the use of approximately 198 acre feet of water for the entire project. The state of Colorado regulates water usage, and all water used for the project would be obtained from state-approved sources. PDC energy is a member of The South Platte Water Related Activities Program, which mitigates water depletions in the South Platte River resulting from energy development through a water replacement program. Most impacts to surface water from oil and gas activity is due to removal of vegetation and exposure of mineral soils. Specific impacts would be soil compaction caused by construction that would reduce the soil infiltration rates, in turn increasing runoff during precipitation events. Downstream effects of the increased runoff may include changes in downstream channel morphology such as bed and bank erosion or accretion. Due to the flat nature of the topography and infiltration rates of the soils in this area, stormwater management practices, and interim and final reclamation practices little to no new impacts to surface water quality would result from the surface disturbance portion of drilling the proposed wells. Additional surface water impacts could result from chemicals, or other fluids, accidentally spilled or leaked during the development process and could result in the contamination of both ground and surface waters, however secondary containment structures, PDC's spill management plan and federal and state spill cleanup requirements would mitigate this threat.

The drilling of the proposed wells would pass through usable groundwater. Groundwater in this area is relied on for agricultural uses, as well as, domestic use. Potential impacts to groundwater resources could occur if proper cementing and casing programs are not followed. This could include loss of well integrity, surface spills, or loss of fluids in the drilling and completion process. It is possible for chemical additives used in drilling activities to be introduced into the water producing formations without proper casing and cementing of the well bore. Changes in porosity or other properties of the rock being drilled through can also result in the loss of drilling fluids. When this occurs, fluids can be introduced into groundwater without proper cementing and casing. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted.

The operator is proposing using hydraulic fracturing methods to complete the wells. In addition to changing the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore; hydraulic fracturing can introduce chemical additives into the hydrocarbon producing formations. The target formations for hydrocarbon production are isolated from usable groundwater by confining zones located between the groundwater zones and the target formation in which the wells are completed. Types of chemical additives used in completion fluid may include acids, hydrocarbons, gelling agents, lubricants, and other additives that are operator and location specific, however the main components of completion fluids are sand and water. Concentrations of these

additives also vary considerably since different mixtures can be used for different purposes in oil and gas development and even in the same well bore.

Onshore Order #2 requires that formations containing usable water are isolated from drilling and completion fluids and hydrocarbons with proper well casing and cementing practices. Well-specific drilling plans submitted by the operator are reviewed by the BLM petroleum engineer/geologist to ensure usable water zones are protected. The BLM has the ability to attach COAs to the APD, if necessary, to assure adequate protection of usable groundwater zones. Drilling inspections insure that BLM regulations and terms in the approved APD are adhered to by the operator. The state of Colorado regulates hydraulic fracturing, requiring mitigation of existing (producing and plugged wells) within 1500' of the wells undergoing hydraulic fracture treatment, public disclosure of chemicals used in completion fluids (http://fracfocus.org/) and proper handling and disposal of used completion fluids.

If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and water wells that are sourced from the affected aquifers.

Protective/Mitigation Measures:

No additional mitigation is required to protect water resources beyond what is found in other sections of this document and federal and state regulations.

Cumulative Impacts:

Most of the watershed has been modified for agriculture and oil and gas development. With adherence to the approved APDs and federal and state mitigations, cumulative impacts to surrounding areas are expected to be minimal, with a relatively slight, incremental increase in water use for the project.

No Action Alternative:

Direct and Indirect Impacts:

It is likely that under this alternative the facilities would still be constructed and wells drilled on entirely fee (private) lands and the impacts to water resources would be the same.

Protective/Mitigation Measures:

None

3.3. Biological Resources

3.3.1. Invasive Plants*

Affected Environment: Vegetation and soils in the project area have been modified, both structurally and chemically, by long-term exposure to agricultural practices. Invasive plants are common in the area. The new roads and drilling pads are within the boundary of existing

plowed fields that have, and will continue to be, subjected to soil disturbance associated with agricultural practices.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts: Due to the long-term exposure of the project area to agricultural practices, impacts are expected to be minor.

Protective/Mitigation Measures: Adherence to state and local weed control regulations require control of Colorado list A and B weed species.

Cumulative Impacts: None.

No Action Alternative:

Direct and Indirect Impacts: None.

Protective/Mitigation Measures:

*Invasive plants are plants that are not part of (if exotic), or are a minor component of (if native), the original plant community or communities that have the potential to become a dominant or co-dominant species on the site if their future establishment and growth are not actively controlled by management interventions, or are classified as exotic or noxious plants under state or federal law. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants.

3.3.2. Threatened, Endangered and Sensitive Species

Affected Environment:

Suitable habitat for federally listed threatened, endangered or proposed species does not occur within ½ mile of this project area and no BLM-administered lands would be affected as the result of this project.

Within a ½ mile of this existing agricultural crop field and pasture, suitable but marginal habitat is found for fringed myotis (*Myotis thysanodes*), mountain plover (*Charadrius montanus)*, and black-tailed prairie dog (*Cynomys ludovicianus*), BLM sensitive species

The agricultural crop field, pasture and irrigation ponds and ditches within the action area have the potential to provide year-round foraging habitat for fringed myotis; roosting structures and hibernacula appear to be in deficit. The agricultural field and pasture has the potential to provide suitable ground nesting and foraging habitat for mountain plover. This species is also a migratory bird of concern in Colorado, which breeds from April 5 to July 10. The pasture has the potential to provide year-round breeding, hiding and foraging habitat for black-tailed prairie dog.

The proposed action may impact federally-listed species in Nebraska. The use of water in the construction, drilling and completion of the wells associated with this project will result in new depletions to the South Platte River, affecting habitat for the western prairie fringed orchid, whooping crane, interior least tern, northern Great Plains population of the piping plover , pallid sturgeon (collectively referred to as the target species), and designated critical habitat of the whooping crane.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

With this alternative, there would be minor negative effects to foraging habitat for fringed myotis from the additional infrastructure, construction activity, residual aerial environment and loss of insect prey habitat. Because this project area is already marginal habitat with low abundance of this species, these effects would be insignificant and discountable. Fringed myotis reproduction would not be affected. Viability of this species in the planning area would remain stable as the result of this alternative. No conservation measures or stipulations are necessary for this fringed mytois.

Negative effects to black-tailed prairie dog and mountain plover breeding habitat and reproductive success could occur with this alternative. Loss of habitat, disturbance during reproduction, and loss of hiding habitat could be expected, but to a minor degree given the limited amount of land that would be disturbed.. Viability of these species in the planning area would likely remain stable as the result of this alternative.

Given that the proposed action would result in the depletion of approximately 198 acre-feet of water from within the Platte River basin, this project falls under BLM Colorado's Programmatic Biological Assessment (PBA) for water depleting activities associated with BLM's fluid minerals program in the Platte River basin in Colorado (BLM 2015).

In response to BLM's PBA, the U.S. Fish and Wildlife Service (FWS) issued a Programmatic Biological Opinion (PBO)(06E-24000-2014-F-0671) on February 2, 2015, which concurred with BLM's determination that water depletions are "Likely to Adversely Affect" the whooping crane, interior least tern, northern Great Plains population of the piping plover, pallid sturgeon (collectively referred to as the target species), and designated critical habitat of the whooping crane. However, the FWS also determined that BLM water depletions from the Platte River Basin are not likely to jeopardize the continued existence of the whooping crane, interior least tern, northern Great Plains population of the piping plover, and the pallid sturgeon, and that BLM water depletions are not likely to destroy or adversely modify designated critical habitat for the whooping crane.

The Platte River Recovery Implementation Program (PRRIP), established in 2006, is implementing actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the States of Colorado, Nebraska, and Wyoming and the U.S. Department of the Interior. The PRRIP addresses the adverse impacts of existing and certain new water related activities on the Platte target species and associated habitats, and provides ESA compliance for effects to the target species and whooping crane critical habitat from such activities including avoidance of any prohibited take of such species. The PRRIP serves as the reasonable and prudent alternative to offset the effects of

water related activities that FWS found were likely to cause jeopardy to one or more of the target species or to adversely modify critical habitat.

The PBO addresses water depletions associated with fluid minerals development on BLM lands, including water used for well drilling, hydrostatic testing of pipelines, dust abatement on roads, and seismic activity. The PBO includes reasonable and prudent alternatives developed by the FWS which allow BLM to authorize oil and gas wells that result in water depletion while avoiding the likelihood of jeopardy to the endangered species and avoiding destruction or adverse modification of their critical habitat. The PBO confirms ESA compliance for water-related activities of oil and gas producers that elect to rely on the PRRIP through maintaining membership in good standing in the South Platte Water Related Activities Program, Inc. (SPWRAP) organization.

The SPWRAP organization is formally charged with certifying to the U.S. Fish and Wildlife Service that water users in Colorado are meeting the requirements to support reliance on the PRRIP for ESA compliance purposes. Among other things, SPWRAP assists the State of Colorado in complying with its financial and water requirements under the PRRIP. This includes implementation of groundwater recharge operations at times when South Platte River flows are in excess of the needs of endangered species and allowing the return of water to the river when flows are less than needed by endangered species.

PDC has provided proof of current membership in SPWRAP and therefore is considered to be in compliance with the ESA as to the depletive effects of their activities on federally listed species and designated critical habitat associated with the Platte River in Nebraska.

This project has been entered into the Royal Gorge Field Office fluid minerals water depletion log which will be submitted to the Colorado State Office at the end of the Fiscal Year.

Protective/Mitigation Measures:

Conservation measures would be necessary for mountain plover. Refer to the conservation measures described in the Migratory Bird section for details.

Cumulative Impacts:

When the effects of this project are added to federal and non-federal actions, the cumulative effects of habitat loss for fringed myotis and black-tailed prairie dog would be relatively minor due to the limited amount of land that would be affected relative to the known distributions of these species and the marginal quality of the habitat present in the project area. Loss of habitat and disturbance during breeding for mountain plover, when added to other federal and non-federal actions is a concern for mountain plover given its species status and declining population trend in Colorado.

No Action Alternative:

Direct and Indirect Impacts:

The no action alternative effect may be similar to the proposed action effect due to the ownership status of surface lands and mineral estate. The pads may be constructed and fee/fee wells may be drilled without approval from the Bureau of Land Management while yielding an impact similar to the proposed action.

Protective/Mitigation Measures: None

3.3.3. Wildlife Terrestrial

Affected Environment:

Within a ½ mile of this existing disturbed agricultural crop field, suitable habitat is found predominantly for native wildlife species that prefer highly disturbed or agricultural environment, such as deer mice, coyote, raccoon, and rabbits.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

Selection of this alternative could result in small loss of foraging habitat for these wildlife species; these effects would be insignificant and discountable. Construction activity during the breeding season for these species could have a short term negative effect on the reproductive success of these species to an insignificant and discountable degree. No mitigations would be necessary for these species.

Protective/Mitigation Measures:

None.

Cumulative Impacts:

Cumulative effects to these species from this alternative when combined with other federal and none federal actions would be insignificant and discountable due to the limited area that would be affected by this alternative.

No Action Alternative:

Direct and Indirect Impacts: May be similar to Proposed Action.

Protective/Mitigation Measures: None

3.3.4. Migratory Birds

Affected Environment:

Within a ½ mile of this existing disturbed agricultural crop field, suitable habitat is found for the following BLM priority migratory birds (BLM 2013)and migratory birds of conservation concern for Colorado (Colorado Partners in Flight 2000):

- horned lark (*Eremophila alpestris*)- breeding and winter habitat, ground nesting, in Colorado breeds from March 1 to August 20, prefers bare ground, short vegetation, crop fields, feedlots, heavily grazed pasture; project area provides excellent breeding and winter habitat, Breeding Bird Atlas II confirmed breeding in immediate vicinity of project area
- lark bunting (*Calamospiza melanocorys*)- breeding habitat, ground nesting, in Colorado breeds from May 5 to August 5, prefers open short with tall patches of grasses, shrubs, sagebrush less than 15% bare ground, lightly grazed pasture, some tall vegetation for shading nests; project area provides moderate breeding habitat, Breeding Bird Atlas II reports possible breeding activity in immediate vicinity of project area
- Swainson's hawk (*Buteo swainsoni*)- breeding habitat, tree nesting, in Colorado breeds from April 14 to August 20, chicks fledge in July, prefers riparian corridors near grasslands with large trees, large shrubs and croplands; project area provides moderate breeding habitat, Breeding Bird Atlas II confirmed breeding in immediate vicinity of project area

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

Selection of this alternative could result in the loss of a small amount of breeding and winter habitat for horned lark and breeding habitat for lark bunting. No loss of breeding habitat would be expected for Swainson's hawk. Construction activity during the breeding season for these three species could have a negative impact on the reproductive success of these birds, including nest abandonment by Swainson's hawk.

This project would

Protective/Mitigation Measures:

To be in compliance with the Migratory Bird Treaty Act (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186, BLM must avoid actions, where possible, that result in a "take" of migratory birds. Under the MBTA, "take" means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. All mortality or injury to species protected by the MBTA shall be reported immediately to the BLM project lead and to the USFWS representative

Pursuant to BLM Instruction Memorandum 2008-050, to reduce impacts to Birds of Conservation Concern (BCC), no habitat disturbance (removal of vegetation such as timber, brush, or grass) is allowed during the periods of May 15 - July 15, during the breeding and brood rearing season for most Colorado migratory birds. An exception to this timing limitation will be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate no nesting within 30 meters (100 feet) of the area to be disturbed. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 a.m. under favorable conditions. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 15 and continue into the 60-day period.

Any secondary containment system will be covered in a manner to prevent access by migratory birds. The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, and in-line units. Any action that may result in a "take" of individual migratory birds or nests that are protected by MBTA will not be allowed.

Cumulative Impacts:

Loss of habitat and disturbance during breeding for these migratory birds, when added to other federal and non-federal actions is a concern given their species' status and declining population trends in Colorado (Colorado Partners in Flight 2000).

No Action Alternative:

Direct and Indirect Impacts:

May be similar to Proposed Action.

Protective/Mitigation Measures:

3.4. Heritage Resources and Human Environment

3.4.1. Cultural Resources

Affected Environment

Environmental Effects

Proposed Action: A total of 14 historic sites are present in the vicinity of the area of potential effect (see Report CR-RG-15–122 P). Sites 5WL1969.86, 5WL1969.87, 5WL2589.7, 5WL6867.10 and 5WL7753 are eligible for the National Register of Historic Places, and but will not be affected by the proposed undertaking. Therefore, no further work is necessary.

Direct and Indirect Impacts: None.

Protective/Mitigation Measures: None.

Cumulative Impacts: None.

No Action Alternative:

Direct and Indirect Impacts: None.

Protective/Mitigation Measures: None.

3.4.2. Native American Religious Concerns

Affected Environment

Environmental Effects

Proposed Action: Although aboriginal sites are present in the vicinity of the area of potential effect, no possible traditional cultural properties were located during the cultural resources inventory (see Cultural Resources section, above). There is no other known evidence that suggests the project area holds special significance for Native Americans.

Direct and Indirect Impacts: None.

Protective/Mitigation Measures: None.

Cumulative Impacts: None.

No Action Alternative:

Direct and Indirect Impacts: None.

Protective/Mitigation Measures: None.

3.4.3. Paleontological Resources

Affected Environment:

The proposed wells are located in grassland overlying part of the eastern flank of the Denver Basin. The Basin consists of a large asymmetric syncline of Paleozoic, Mesozoic, and Cenozoic sedimentary rock layers, trending north to south along the east side of the Front Range from about Pueblo north to Wyoming. The basin is deepest near Denver and ascends gradually to its eastern outcrop in central Kansas. Quaternary gravels and eolian sands underlie the proposed well locations. These are Class 3 geologic formations, according to the BLM's Potential Fossil Yield Classification (PFYC) System, which was created to assist in determining proper mitigation approaches for surface disturbing activities (WO IM2008-009). These Class 3 formations have moderate potential to contain vertebrate fossils or scientifically significant invertebrate fossils, but these occurrences are widely scattered. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils. .

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

Potential impacts to fossil localities would be both direct and indirect. Direct impacts to or destruction of fossils would occur from unmitigated activities conducted on formations with high potential for important scientific fossil resources. Indirect impacts would involve damage or loss of fossil resources due to the unauthorized collection of scientifically important fossils by workers or the public due to increased access to fossil localities in the Project Area. Adverse impacts to important fossil resources would be long-term and significant since fossils removed or destroyed would be lost to science. Adverse significant impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the proposed project

would have the beneficial impact that ground disturbance activities might result in the discovery of important fossil resources.

Protective/Mitigation Measures:

In many instances where the surface estate is not owned by the federal government, the mineral estate is, and is administered by the BLM. Paleontological resources are considered to be part of the surface estate. If the BLM is going to approve an action involving the mineral estate that may affect the paleontological resources, the action should be conditioned with appropriate paleontological mitigation recommendations to protect the interests of the surface owner. The surface owner may elect to waive these recommendations; such a waiver must be documented in the casefile.

Cumulative Impacts:

None

No Action Alternative:

None.

Direct and Indirect Impacts:

May be similar to the proposed action.

Protective/Mitigation Measures:

None.

3.4.4. Wastes, Hazardous or Solid

Affected Environment:

It is assumed that conditions associated with the proposed project site, both surface and subsurface, are currently clean and that there is no known contamination. A determination will be made by the operator prior to initiating the project, if there is evidence that demonstrates otherwise (such as solid or hazardous wastes have been previously used, stored, or disposed of at the project site).

Nothing in the analysis or approval of this action by BLM authorizes or in any way permits a release or threat of a release of hazardous materials (as defined under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq., and its regulations) into the environment that will require a response action or result in the incurrence of response costs.

Environmental Effects

Proposed Action:

Direct and Indirect Impacts:

Possible contaminant sources associated with the drilling operations are: Storage, use and transfer of petroleum, oil and lubricants, produced fluids general hazardous substances, chemicals and/or wastes, Concrete washout water, drilling water,

mud and cuttings. Operators are required to follow state and federal regulations for the handling and disposal of chemicals and spill cleanup. In addition, PDC submitted its material handling and spill prevention plan that will become part of the approved APDs.

Protective/Mitigation Measures:

The following mitigation will assist in reducing potential spills resulting in groundwater and/or soil contamination: All Above Ground Storage Tanks have secondary containment and constructed in accordance with standard industry practices or an associated Spill Prevention Control and Countermeasures plan in accordance with State regulations, storage and labeling of chemical containers should will in accordance with recommendations on associated MSDS sheets, to account for chemical characteristics and compatibility, appropriate level of spill kits need to be onsite and in vehicles, concrete washout water will be contained and properly disposed of at a permitted offsite disposal facility.

Cumulative Impacts:

None.

No Action Alternative:

Direct and Indirect Impacts:

May be similar to proposed action.

Protective/Mitigation Measures:

None

3.5. Cumulative Impact Summary

The proposed project is located in southwestern Weld County, Colorado. Weld County's economy is based primarily on agriculture (farming and livestock production) and oil and gas development. Due to this, most of the natural landscape of Weld County has been modified, especially in the project area, where the majority of open space has been converted to cultivated agricultural fields. Because all surface locations for the project wells are located in active cultivated crop fields, no natural habitat will be disturbed as a result of the proposed action. Therefore the proposed action will not result in any new natural habitat loss.

Weld County has more than 22,000 active petroleum wells, more than any other county in the United States, according to Weld county commissioners. Most of these wells are located on privately owned surface and produce entirely privately owned minerals. BLM has permitted less than 5% of all petroleum wells in Weld County. Because of the comparatively small number of Federally owned mineral parcels in this area, the additive impact of Federal petroleum development is minimal in comparison to the impact of the overall petroleum development in Weld County.

Air: The area currently has a high degree of alteration in the form of agricultural fields, roads, houses, and oil and gas production. The addition of the infrastructure needed to construct and drill the additional pad and wells would have a cumulative impact to the area's air quality; however,

given the existing level of development in the area, the proposed action's impacts would be very minor. In the long term, if economical quantities of oil and gas are found and /or produced, additional wells can be expected to be drilled on Federal, State, and private lands. This could result in additional impact to air quality in the future.

Water: Most of the watershed has been modified for agriculture and oil and gas development. With adherence to the approved APDs and federal and state mitigations, cumulative impacts to surrounding areas are expected to be minimal, with a relatively slight, incremental increase in water use for the project.

T&E and Sensitive Species: When the effects of this project are added to federal and non-federal actions, the cumulative effects of habitat loss for fringed myotis and black-tailed prairie dog would be relatively minor due to the limited amount of land that would be affected relative to the known distributions of these species and the marginal quality of the habitat present in the project area. Loss of habitat and disturbance during breeding for mountain plover, when added to other federal and non-federal actions is a concern for mountain plover given its species status and declining population trend in Colorado.

Migratory Birds: Loss of habitat and disturbance during breeding for these migratory birds, when added to other federal and non-federal actions is a concern given their species' status and declining population trends in Colorado (Colorado Partners in Flight 2000).

Chapter 4 Consultation and Coordination

4.1. List of Preparers and Participants

Please see Interdisciplinary Team Review Table for BLM participants.

Table 4.1.

4.2. Tribes, Individuals, Organizations or Agencies Consulted

The following triibes were consulted at the lease stage:

Apache Tribe of Oklahoma, Cheyenne and Arapaho Tribes of Oklahoma, Cheyenne River Sioux Tribe, Comanche Nation of Oklahoma, Crow Creek Sioux, Eastern Shoshone, Jicarilla Apache Nation, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, the Ute Tribe, Oglala Sioux Tribe, Pawnee Tribe, Rosebud Sioux Tribe, Southern Ute Tribe, Standing Rock Lakota Tribe, and the Ute Mountain Ute Tribe

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Chapter 5 References

Bureau of Land Management. 1986. Northeast Resource Area Management Plan and Record of Decision. Lakewood, Colorado.

Bureau of Land Management. 1991. Colorado Oil and Gas Leasing Environmental Impact Statement. Lakewood, Colorado.

Bureau of Land Management. 2008 H-1790-1 National Environmental Policy Handbook. Washington, D.C.

Colorado Partners in Flight. 2000. Land Bird Conservation Plan. Available: http://www.rmbo.org/pif/bcp/overview/overview.htm

Wickersham, L. E. (Ed.). In prep. The Second Colorado Breeding Bird Atlas II 2007 to 2011 Results. Colorado Bird Atlas Partnership and Colorado Parks and Wildlife, Denver, CO.Available: http://bird.atlasing.org/Atlas/CO/

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6.1. Finding of No Significant Impact

Finding of No Significant Impact

Based on review of the EA and the supporting documents, I have determined that the project is not a major federal action and will not have a significant effect on the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects from any alternative assessed or evaluated meet the definition of significance in context or intensity, as defined by 43 CFR 1508.27. Therefore, an environmental impact statement is not required. This finding is based on the context and intensity of the project as described below:

RATIONALE:

Context: The BLM RGFO has received sixteen Applications for Permit to Drill (APDs), and is anticipating receiving two additional APDs in the near future, proposing the construction of four well pads, access roads, and the drilling of eighteen oil and gas wells on private surface over private minerals, developing both private and federal minerals (fee/fee/fed). The federal minerals involved with this project are limited to the what lies under the railroad right of way, which is a very small percentage of the total of minerals that will be produced by the fee/fee/fed wells. The operator plans to drill completely fee (100% private) wells from the surface of at least one of these proposed pads, regardless of the BLM's decision on the proposed federal wells. Since all surface activity and related disturbance is taking place on private surface, and private minerals are targeted along with federal minerals, BLM has limited authority over the actions that take place on the surface, including authority to impose mitigation measures (as COAs to the approved APD) pertaining to the surface management of the well site.

The projects are located on cultivated, irrigated farmland in Southwest Weld County outisdeof the town of Gilcrest, Colorado. All surface activities related to these actions will take place on privately owned surface over federal minerals (off lease), there is no public land or public access in the project area.

Extensive oil and gas development has occurred in the area, mostly on private (fee) surface and private (fee) mineral estate.

Intensity:

I have considered the potential intensity/severity of the impacts anticipated from the Weideman Trust, Weideman F, Hunt and Tarin APDs Project decision relative to each of the ten areas suggested for consideration by the CEQ. With regard to each:

Impacts that may be beneficial and adverse:

There would be minor impacts to air quality from the proposed wells. Most of this would occur during the drilling phase. Potential impacts might occur to ground water; however such impacts should not occur if strict drilling requirements are followed. Other minor impacts might occur to migratory birds but would be mitigated through the use of timing stipulations. Positive impacts include benefits in royalties and revenue generated to the federal government from productive wells. Other indirect effects could include effects due to overall employment opportunities related to the oil and gas and service support industry in the region as well as the economic benefits to state and county governments related to royalty payments and severance taxes. Other beneficial

impacts from the action would be the potential for productive wells being created that would add, albeit in a small way to national energy independence.

Public health and safety:

The proposed action will have a temporary negative impact to air quality through the generation of fugitive dust during the construction phase. Utilization of the road, surface disturbance, and construction activities such as drilling, hydraulic fracturing, well completion, and equipment installation will all impact air quality through the generation of dust related to travel, transport, and general construction. This phase will also produce short term emissions of criteria, hazardous, and greenhouse gas pollutants from vehicle and construction equipment exhausts. Once construction is complete the daily activities at the site will be reduced to operational and maintenance checks which may be as frequent as a daily visit. Emissions will result from vehicle exhausts from the maintenance and process technician visits. The pad can be expected to produce fugitive emissions of well gas, which contains mostly methane and a minor fraction of volatile organic compounds. Fugitive emissions may also result from pressure relief valves and working and breathing losses from any tanks located at the site, as well as any flanges, seals, valves, other infrastructure connections used at the site. Liquid product load-out operations will also generate fugitive emissions of VOCs and vehicular emissions.

Unique characteristics of the geographic area:

The EA evaluated the area of the proposed action and determined that no unique geographic characteristics such as: wild and scenic rivers, prime or unique farmlands, Areas of Critical Environmental Concern, designated wilderness areas, wilderness study areas or Lands with Wilderness Characteristics; were present.

Degree to which effects are likely to be highly controversial:

The potential for controversy associated with the effects of the proposed action is low. There is no disagreement or controversy among ID team members or reviewers over the nature of the effects on the resource values on public land by the proposed action.

Degree to which effects are highly uncertain or involve unique or unknown risks:

The drilling of oil and gas wells has occurred historically over the past century and although the potential risks involved can be controversial, they are neither unique nor unknown. There is low potential of unknown or unique risks associated with this project due to numerous other well locations having been successfully drilled in this area of Weld County.

Consideration of whether the action may establish a precedent for future actions with significant impacts:

The proposed APDs will be limited to standard construction procedures associated with pad/road construction and drilling in Weld County and have occurred historically. There are no aspects of the current proposal that are precedent setting.

Consideration of whether the action is related to other actions with cumulatively significant impacts:

The action is a continuation of oil and gas activities that have historically occurred in the area. Continued oil and gas activity in the area will have minor but additive impacts to air and the production greenhouse gas emissions, and will result in a minor amount of water use compared with other water uses in the area such as agriculture. The project area having been subject to historic drilling activity will continue to experience gradual depletion of the recoverable oil and gas products. Although farming contributes to cumulative impacts, there have been no other recent activities besides oil and gas that has contributed to cumulative impacts.

Scientific, cultural or historical resources, including those listed in or eligible for listing in the National Register of Historic Places:

A total of 14 historic sites are present in the vicinity of the area of potential effect (see Report CR-RG-15–122 P). Sites 5WL1969.86, 5WL1969.87, 5WL2589.7, 5WL6867.10 and 5WL7753 are eligible for the National Register of Historic Places, and but will not be affected by the proposed undertaking.

Threatened and endangered species and their critical habitat:

There are no known populations of T&E species in the action area.

Any effects that threaten a violation of Federal, State or local law or requirements imposed for the protection of the environment: The proposed action conforms with the provisions of NEPA (U.S.C. 4321-4346) and FLPMA (43 U.S.C. 1701 et seq.) and is compliant with the Clean Water Act and The Clean Air Act, the National Historic Preservation Act, Migratory Bird Treaty Act (MBTA) and the Endangered Species Act.

NAME OF PREPARER: Aaron Richter

SUPERVISORY REVIEW: Jay Raiford

NAME OF ENVIRONMENTAL COORDINATOR: Martin Weimer

DATE: 8/25/15

SIGNATURE OF AUTHORIZED OFFICIAL: /s/ Keith E. Berger

Keith E. Berger, Field Manager

DATE SIGNED:8/26/15

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7.1. Weideman Trust, Weideman F, Hunt and Tarin APDs

DECISION RECORD

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ROYAL GORGE FIELD OFFICE

NEPA Number: DOI-BLM-CO-F02-2015-0023-EA

7.1.1. Weideman Trust, Weideman F, Hunt and Tarin APDs

DECISION: It is my decision to authorize the Proposed Action as described in the attached EA. The proposed action is the construction of 4 well pads and infrastructure, and the drilling and completion of up to 18 horizontal oil wells on private surface over private minerals, developing both private and federal minerals (fee/fee/fed).

The projects are located on rangeland in Southeast Weld County outside of the town of Gilcrest, Colorado. All surface activities related to these actions will take place on privately owned surface over federal minerals (off lease), there is no public land or public access in the project area.

The proposed action was analyzed in the Environmental Assessment (EA) DOI-BLM-CO-F02-2014-0074 and a Finding of No Significant Impact was reached and an EIS will not be prepared.

The project area currently has a high degree of alteration in the form of agricultural fields, roads, houses and other building, and oil and gas production. The addition of the infrastructure needed to construct and drill the 18 proposed wells would have mostly temporary and overall minor impacts on resources present in the project area.

7.1.2. Rationale:

This project will develop federal oil and gas resources consistent with existing Federal lease rights provided for in the Railroad Act of 1930, as amended. Extensive oil and gas development has occurred throughout the project area, mostly on private mineral estate.

The project area currently has a high degree of alteration in the form of agricultural fields, roads, houses and other buildings, and oil and gas production. The addition of the infrastructure needed to construct and drill the 18 proposed wells would have mostly temporary and overall minor impacts on resources present in the project area.

7.1.3. Mitigation Measures and Monitoring:

Air Quality: PDC Energy, Inc. will comply with the following requirements and make every effort to minimize emissions through good engineering and operating practices to the maximum extent practical.

- PDC Energy, Inc. will use industry best practices, including watering, graveling, and reseeding to reduce fugitive dust emissions from vehicular traffic and disturbed surfaces. Interim

reclamation and any existing agricultural practices will be implemented in order to stabilize the site and prevent fugitive dust from being generated. No visible dust plumes should be observed leaving the site.

- Process equipment will be permitted by CDPHE in accordance with applicable requirements and required emissions standards to limit the facility's potential to emit and provide appropriate operating, monitoring, and recordkeeping requirements.
- All FRAC Pump engines will be required to meet EPA Non-Road Tier II Emissions Standards or better.
- 'Green Completions' will be performed for all authorized wells.
- All Drill Rigs will be required to meet EPA Non-Road Tier II Emissions Standards, or better, for all drilling and completion operations.

Migratory Birds: To be in compliance with the Migratory Bird Treaty Act (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186, BLM must avoid actions, where possible, that result in a "take" of migratory birds. Under the MBTA, "take" means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. All mortality or injury to species protected by the MBTA shall be reported immediately to the BLM project lead and to the USFWS representative.

Pursuant to BLM Instruction Memorandum 2008-050, to reduce impacts to Birds of Conservation Concern (BCC), no habitat disturbance (removal of vegetation such as timber, brush, or grass) is allowed during the periods of May 15 - July 15, during the breeding and brood rearing season for most Colorado migratory birds. An exception to this TL will be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate no nesting within 30 meters (100 feet) of the area to be disturbed. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 a.m. under favorable conditions. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 15 and continue into the 60-day period.

Any secondary containment system will be covered in a manner to prevent access by migratory birds. The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, and in-line units. Any action that may result in a "take" of individual migratory birds or nests that are protected by MBTA will not be allowed.

Paleontological Resources:.

In many instances where the surface estate is not owned by the federal government, the mineral estate is, and is administered by the BLM. Paleontological resources are considered to be part of the surface estate. If the BLM is going to approve an action involving the mineral estate that may affect the paleontological resources, the action should be conditioned with appropriate paleontological mitigation recommendations to protect the interests of the surface owner. The surface owner may elect to waive these recommendations; such a waiver must be documented in the casefile.

Wastes, Hazardous or Solid: The following mitigation will assist in reducing potential spills resulting in groundwater and/or soil contamination:

- All Above Ground Storage Tanks will need to have secondary containment and constructed in accordance with standard industry practices or an associated Spill Prevention Control and Countermeasures plan in accordance with State regulations (if applicable).
- If drums are used, secondary containment constructed in accordance with standard industry practices or governing regulations is required. Storage and labeling of drums should be in accordance with recommendations on associated MSDS sheets, to account for chemical characteristics and compatibility.
- Appropriate level of spill kits need to be onsite and in vehicles.
- All spill reporting needs to follow the reporting requirements outlined in NTL-3A.

7.1.4. Appeal or Protest Opportunities:

This decision shall take effect immediately upon the date it is signed by the Authorized Officer, and shall remain in effect while any appeal is pending unless the Interior Board of Land Appeals issues a stay (43 CFR 2801.10(b)). Any appeal of this decision must follow the procedures set forth in 43 CFR Part 4. Within 30 days of the decision, a notice of appeal must be filed in the office of the Authorized Officer at the Royal Gorge Field Office, 3028 E. Main, Cañon City, Colorado, 81212. If a statement of reasons for the appeal is not included with the notice, it must be filed with the Interior Board of Land Appeals, Office of Hearings and Appeals, U.S. Department of the Interior, 801 North Quincy St., Suite 300, Arlington, VA 22203 within 30 days after the notice of appeal is filed with the Authorized Officer.

7.1.5. Authorizing Official:

/s/ Keith E. Berger 8/26/15

Keith E. Berger Date
Field Office Manager