

**United States Department of the Interior  
Bureau of Land Management  
Royal Gorge Field Office  
3028 E. Main Street  
Cañon City, CO 81212**

## **Environmental Assessment**

North Platte F-22 and Antelope T-18 APDs

DOI-BLM-CO-F02-2014-035 EA

March, 2014



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[Attachment A](#) - Comment Summaries and Responses

## **CHAPTER 1 - INTRODUCTION**

### **1.1 IDENTIFYING INFORMATION**

CASEFILE/PROJECT NUMBER (optional): Lease # COC 63737 COC 76041

PROJECT TITLE: North Platte K-22 and Antelope T-18 Applications for Permits to Drill

PLANNING UNIT: Northeast

LEGAL DESCRIPTION: Weld County, T5N R63W S 22 and T5N R62W S 18

APPLICANT: Bonanza Creek Energy

### **1.2 INTRODUCTION AND BACKGROUND**

BACKGROUND: This EA has been prepared by the BLM to analyze environmental impacts of the construction of two well pads and the drilling of ten horizontal oil wells on private surface estates/over private mineral estates (fee/fee) for the Antelope wells, and private surface estate over federal mineral estate for the North Platte wells. The projects are located on rangeland in Northeast Weld County approximately 10 miles east of the town of Kersey, Colorado. The Federal mineral estate that will be accessed by the wells is leased and subject to oil and gas development. 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 their leases for the production of oil and gas. The need for the action is to develop oil and gas resources on Federal Lease COC63737 and COC 76041 consistent with existing Federal lease rights provided for in the Mineral Leasing Act of 1920, as amended.

### **1.4 DECISION TO BE MADE**

The BLM will decide whether to approve the North Platte F-22 and Antelope T-18 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 two well pads, install production facilities, and drill wells in order to develop federal and private minerals from a private surface. 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:** 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**

**1.5.1 Scoping:** 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:** The federal mineral estate parcels being accessed with this action were scoped and made available for public comment during the leasing process. Scoping for the current action occurred through posting on the BLM NEPA website.

**Issues Identified:**

No issues were identified during public scoping.

The draft EA was posted on the RGFO’s website from 11/13/14 to 11/28/14, and public comments on the draft were accepted during that time. Wild Earth Guardians, who was the only commenter, provided various comments. The comment summaries and responses are in [Attachment A](#).

# **CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES**

## **2.1 INTRODUCTION**

The BLM RGFO has received six Application Permits to Drill (APDs) for the North Platte F-22 wells proposing the construction of one well pad, the drilling of six horizontal oil wells, and installation of production facilities in order to produce federal minerals, on private surface over federal minerals (split estate).

Bonanza Creek has already drilled four horizontal oil wells on the Antelope T-18 pad on private surface over private mineral estate (fee/fee), and is currently producing fee and federal minerals from these wells. All construction and drilling activities have taken place for these four wells. All four horizontal wells extend into federal mineral estate from private mineral estate in the production zone of the wellbores. BLM regulations require an approved APD before a well is drilled into federal minerals to produce them in this manner, even if the surface location is off lease and the wells also produce fee minerals, but Bonanza Creek mistakenly drilled the wells first, not knowing they needed APDs for this case. Bonanza Creek holds the lease to the federal minerals they are developing, and are putting royalties in an escrow account that will be transferred to the government once a communitization agreement is in place. Bonanza has recently submitted APDs for these trespass wells, and paid a \$5,000 fine (in addition to the \$6,500 permit fee) for each of the four wells they already drilled.

In the case of the Antelope wells, all surface activity and related disturbance has taken place on private surface, and private minerals are targeted along with federal minerals. Because of this, 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. BLM can order plugging of the BLM portion of the well bores, which would stop production of the federal minerals, but has no authority over the actions on the surface or the fee portion of these wells. BLM will, however, analyze the impacts to applicable resources, including some that BLM has no authority to affect. The majority of these impacts have already occurred.

The projects are in Weld County, approximately 10 miles east of the Town of Kersey, on the 70 Ranch, which is used for cattle grazing and heavily developed for oil and gas production. The federal mineral estate is leased and subject to oil and gas development.

The general area description would be defined as rural rangeland located in the northeastern plains of Colorado, used primarily for livestock production and oil and gas development. There are a few county roads in the project area. Access is limited to private or petroleum field roads, over private surface. The roadways vary in development but most are dirt/primitive roads. There is no public land or public roads or other 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.

## **2.2 ALTERNATIVES ANALYZED IN DETAIL**

### **2.2.1 Proposed Action**

The proposed action is to approve six (North Platte F-22) APDs proposing to construct one well pad (F-22) and drill six horizontal wells in order to develop federal minerals from a private surface over federal minerals, and to approve four (Antelope T-18) APDs allowing the continued production federal minerals along with the fee minerals from the four Antelope fee/fee/fed wells that were previously drilled without BLM approval.

Access to the proposed projects would be gained by traveling on existing highways, county and oil field roads.

### **Proposed Pad Details:**

#### **North Platte F-22:**

##### **Access Road and Pipeline:**

No production facilities will be installed on the proposed F-22 pad. If the wells are productive, additional production facilities will be placed on the nearby, existing North Platte K-22 pad, if necessary. This will reduce truck traffic and increase the amount of interim reclamation possible on the F-22 pad, reducing long term surface disturbance. This arrangement will require the installation buried flowlines from the proposed F-22 to the K-22 pad.

The access road for the proposed F-22 pad will connect to the existing access to the K-22 pad, sharing the same corridor with the proposed flowline. This corridor will be approximately 1,000' in length and 30' in width, resulting in approximately .75 acres in disturbance. Any portions of the pipeline that are not under the road will be permanently re-seeded after installation.

##### **Pad**

The proposed North Platte F-22 pad would have a maximum cut of 6.2 feet and a maximum fill of 15.7 feet, which would allow cut and fill to balance, resulting in no excess spoil material. The top 6" of topsoil will be stripped, segregated and stockpiled for interim reclamation. Construction of the well pad would result in approximately 8.26 acres of new surface disturbance, which would be reduced to approximately 1.5 acres after successful interim reclamation.

#### **Antelope T-18**

The existing Antelope T-18 pad, which contains the four producing fee/fee/fed wells, is currently approximately 12.5 acres in size. The disturbance area will be reduced to 3 acres when the operator completes interim reclamation, which is scheduled to take place fall 2014. Production facilities for these wells are located on this pad.

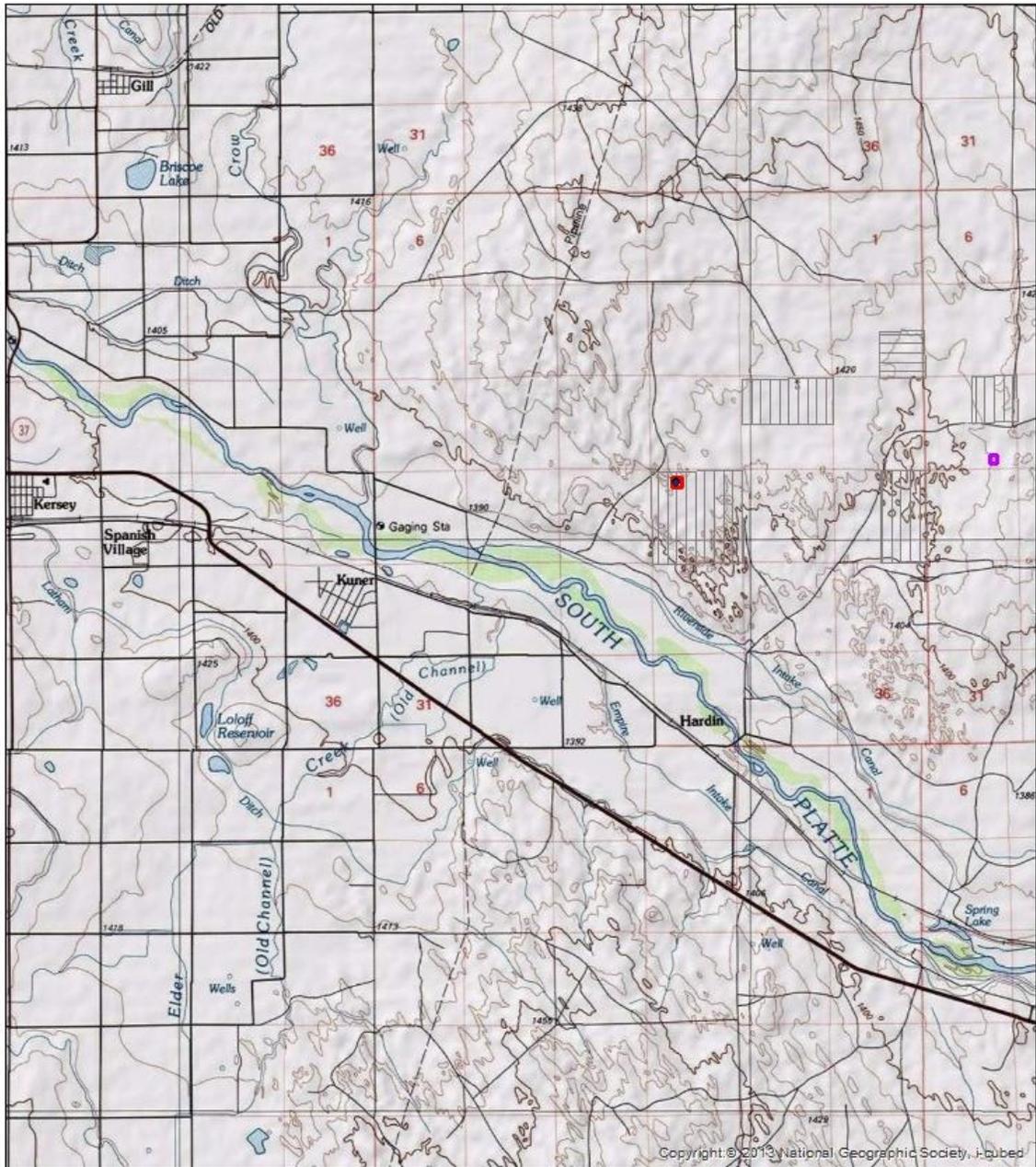
The proposed drilling and completion of all wells will utilize closed loop systems. All liquids will be stored in tanks within on the pad. No pits will be utilized. All waste materials produced during drilling, completion and operation of the well (cuttings, completion fluids, produced water, sewage and garbage) will be hauled off site and recycled or disposed of at applicable state permitted commercial treatment/disposal facilities. The duration of work on each pad is estimated to total 90 days.

Interim reclamation of each pad will begin within 6 months (weather permitting) of completion of 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 would be re-vegetated in accordance with the reclamation section of the multi-point surface operations plan.

Final reclamation of each project should 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 pipelines will be flushed, cut below ground level, 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, the applicable terms of Federal Lease COC63737, COC76061, Onshore Oil and Gas Orders, and 43 CFR §3100.

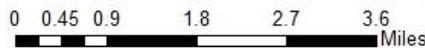
# Overview Map



## OVERVIEW MAP OF N PLATTE F-22 AND ANTELOPE T-18

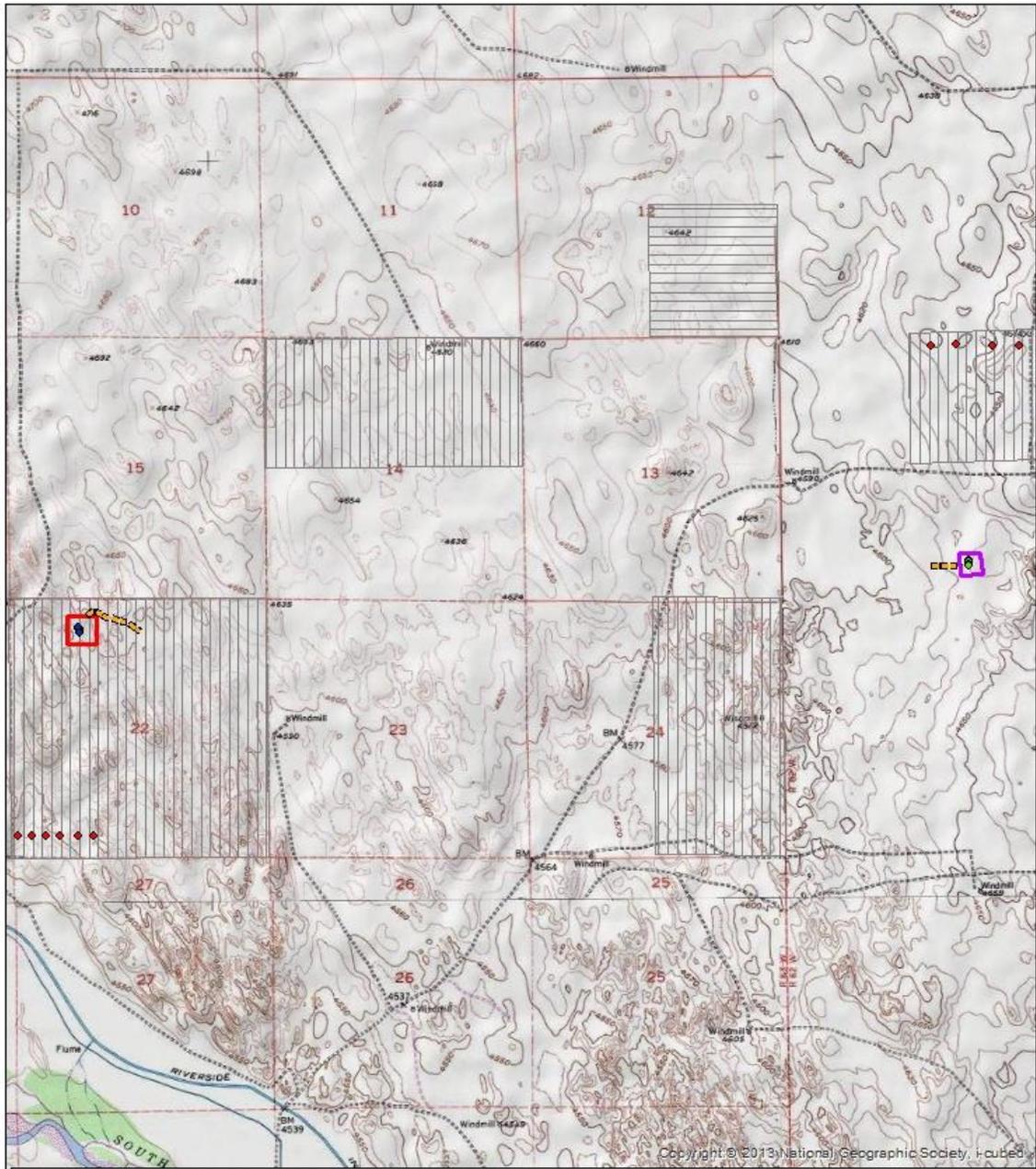
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 6th PM, T5N R63W and T5N 62W

- Proposed NP F-22 Pad
- Antelope T-18 Pad



**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.

# Topographic Project Map



## PROJECT MAP OF N PLATTE F-22 AND ANTELOPE T-18

- Proposed NP F-22 Pad
- Antelope T-18 Pad
- ◆ SHL
- ◆ BHL
- New Access Road/Pipeline

DOI-BLM-CO-F02-2014-035 EA  
**6th PM, T5N R63W and T5N 62W**

0 0.15 0.3 0.6 0.9 1.2 Miles



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# Aerial Photo of Project



## PROJECT MAP OF N PLATTE F-22 AND ANTELOPE T-18

- Proposed NP F-22 Pad
- Antelope T-18 Pad
- ◆ SHL
- ◆ BHL
- New Access Road/Pipeline

DOI-BLM-CO-F02-2014-035 EA  
**6th PM, T5N R63W and T5N 62W**

0 0.15 0.3 0.6 0.9 1.2  
 Miles



**NOTE TO MAP USERS**  
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### **2.2.2 No Action Alternative**

The proposed action involves Federal subsurface minerals that are encumbered with Federal oil and gas leases, which grant the lessee a right to explore and develop the leases. Although BLM cannot deny the right to drill and develop the leasehold, individual APDs can be denied to prevent unnecessary and undue degradation. The no action alternative constitutes denial of the APDs associated with the proposed action. Under the no action alternative, therefore, none of the proposed developments described in the proposed action would take place.

### **2.3 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.

## **CHAPTER 3 - AFFECTED ENVIRONMENT AND EFFECTS**

### **3.1 INTRODUCTION**

This section provides a description of the human and natural environmental resources that could be affected by the Proposed Action and presents comparative analyses of the direct, indirect and cumulative effects on the affected environment stemming from the implementation of the actions under the Proposed Action and other alternatives analyzed.

#### **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 potentially impacted will be brought forward for analysis.

| <b><u>Resource</u></b>  | <b><u>Initial and date</u></b> | <b><u>Comment or Reason for Dismissal from Analysis</u></b>   |
|---|--------------------------------|---|
| <b><u>Air Quality</u></b><br><i>Chad Meister, Forrest Cook</i>                        | CM,<br>10/22/14                | See affected environment  |
| <b><u>Geology/Minerals</u></b><br><i>Stephanie Carter, Melissa Smeins</i>             | MJS,<br>9/12/2014              | See affected environment  |
| <b><u>Soils</u></b><br><i>John Smeins</i>   | JS, 10/09/14                   | All infrastructure (roads, drill pads, etc.) being proposed, would be built and reclaimed according to BLM Gold Book standards unless otherwise stipulated by the surface owner. See more in Soils section. |
| <b><u>Water Quality</u></b><br><b><u>Surface and Ground</u></b><br><i>John Smeins</i> | JS, 10/09/14                   | See Water Quality section.  |

| <u>Resource</u>  | <u>Initial and date</u> | <u>Comment or Reason for Dismissal from Analysis</u>  |
|--|-------------------------|---|
| <b><u>Invasive Plants</u></b><br><i>John Lamman</i>                            | JL,<br>09/22/2014       | See affected environment.   |
| <b><u>T&amp;E and Sensitive Species</u></b><br><i>Matt Rustand</i>             | MR,<br>8/21/2014        | No T&E species or habitats are located within the action area. BLM sensitive species ferruginous hawk, mountain plover, black-tailed prairie dog, burrowing owl, swift fox, and milk snake may be found in this habitat type. See affected environment.   |
| <b><u>Vegetation</u></b><br><i>Jeff Williams, Chris Cloninger, John Lamman</i> | JL,<br>09/22/2014       | See affected environment  |
| <b><u>Wetlands and Riparian</u></b><br><i>Dave Gilbert</i>                     | DG, 8/21/14             | The Proposed Action's drill pad activity is in an upland setting and surrounded by upland rangelands.   |
| <b><u>Wildlife Aquatic</u></b><br><i>Dave Gilbert</i>                          | DG, 8/21/14             | The Proposed Action's drill pad activity is in an upland setting and surrounded by upland rangelands.   |
| <b><u>Wildlife Terrestrial</u></b><br><i>Matt Rustand</i>                      | MR,<br>8/21/2014        | See affected environment  |
| <b><u>Migratory Birds</u></b><br><i>Matt Rustand</i>                           | MR,<br>8/21/2014        | See affected environment.   |
| <b><u>Cultural Resources</u></b><br><i>Monica Weimer</i>                       | MMW,<br>8/25/14         | No concerns. See Reports CR-RG-14-75 N and CR-RG-14-135 N.  |
| <b><u>Native American Religious Concerns</u></b><br><i>Monica Weimer</i>       | MMW,<br>8/25/14         | No concerns, per Tribal Consultation CR-RG-14-34 NA.  |
| <b><u>Economics</u></b>  | AR, 7/28/14             | See affected environment  |
| <b><u>Paleontology</u></b><br><i>Melissa Smeins, Stephanie Carter</i>          | MJS,<br>9/12/2014       | See affected environment  |
| <b><u>Visual Resources</u></b><br><i>Kalem Lenard</i>                          | KL, 9/9/2014            | The project would add contrasts to the landscape that are similar to structures already present and would therefore not additionally impact visual resources.   |
| <b><u>Environmental Justice</u></b><br><i>Martin Weimer</i>                    | AR, 10/22/14            | The proposed action affects areas that are rural in nature. The land adjacent to the well site is short grass prairie with oil and gas development as its primary use, as a result, there are no minority or low-income populations in or near the project area. As such, the proposal will not have a disproportionately high or adverse environmental effect on minority or low-income populations. |
| <b><u>Wastes Hazardous or Solid</u></b><br><i>Stephanie Carter</i>             | MJS,<br>9/12/2014       | See affected environment  |
| <b><u>Recreation</u></b><br><i>Kalem Lenard</i>                                | KL,<br>9/09/2014        | Not Present   |

| <u>Resource</u>  | <u>Initial and date</u> | <u>Comment or Reason for Dismissal from Analysis</u>   |
|--|-------------------------|--|
| <b><u>Farmlands Prime and Unique</u></b><br><i>Jeff Williams, Chris Cloninger, John Lamman</i> | JL,<br>09/22/2014       | Not Present  |
| <b><u>Lands and Realty</u></b>   |                         | N/A  |
| <b><u>Wilderness, WSAs, ACECs, Wild &amp; Scenic Rivers</u></b><br><i>Kalem Lenard</i>         | KL,<br>9/09/2014        | Not Present  |
| <b><u>Wilderness Characteristics</u></b><br><i>Kalem Lenard</i>                                | KL,<br>9/09/2014        | Not Present  |
| <b><u>Range Management</u></b><br><i>Jeff Williams, Chris Cloninger, John Lamman</i>           | JL,<br>09/22/2014       | Surface estate is private  |
| <b><u>Forest Management</u></b><br><i>Ken Reed</i>   | AR,<br>7/28/14          | Not Present  |
| <b><u>Cadastral Survey</u></b><br><i>Jeff Covington</i>  | JC, 5/5/14              | COS is attached in the project folder.   |
| <b><u>Noise</u></b><br><i>Martin Weimer</i>  | AR, 10/22/14            | The project area is located in grassland. Certain levels of noise are associated with drilling operations, these include drill rig operation, compressors/generators and general machine and vehicle operation. These impacts are temporary and terminate when drilling operations are complete. |
| <b><u>Fire</u></b>   |                         | N/A  |
| <b><u>Law Enforcement</u></b><br><i>Steve Cunningham</i>                                       |                         | N/A  |

The affected resources brought forward for analysis include:

- Air quality
- Geology/Minerals
- Water Quality
- Soils
- Invasive Plants
- Vegetation
- Wildlife Terrestrial
- Migratory Birds
- Paleontology

- Economics
- 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 (SO<sub>2</sub>), particulate matter smaller than 10 and 2.5 microns (PM<sub>10</sub> and PM<sub>2.5</sub>, respectively), ozone (O<sub>3</sub>), and nitrogen dioxide (NO<sub>2</sub>). 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**

| <b>Pollutant<br/>[final rule citation]</b>   | <b>Standard<br/>Type</b>    | <b>Averaging<br/>Period</b>    | <b>Level <sup>a</sup></b> | <b>Form</b>  |
|--|-----------------------------|--------------------------------|---------------------------|--|
| <u>Carbon Monoxide</u><br>[76 FR 54294, Aug 31,<br>2011]                                 | Primary                     | 8-hour                         | 9 ppm                     | Not to be exceeded more<br>than once per year <sup>c</sup> |
|  |                             | 1-hour                         | 35 ppm                    |  |
| <u>Lead</u><br>[73 FR 66964, Nov 12,<br>2008]  | Primary<br>and<br>secondary | Rolling 3-<br>month<br>average | 0.15<br>µg/m <sup>3</sup> | Not to be exceeded   |
| <u>Nitrogen Dioxide</u><br>[75 FR 6474, Feb 9,<br>2010]<br>[61 FR 52852, Oct 8,<br>1996] | Primary                     | 1-hour                         | 100 ppb                   | 98th percentile, averaged<br>over 3 years                  |
|  | Primary<br>and<br>secondary | Annual                         | 53 ppb                    | Annual mean  |

| Pollutant<br>[final rule citation]  |                   | Standard Type         | Averaging Period | Level <sup>a</sup>    | Form  |
|---|-------------------|-----------------------|------------------|-----------------------|---|
| Ozone<br>[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<br>[73 FR 3086, Jan 15, 2013]                              | PM <sub>2.5</sub> | Primary               | Annual           | 12 µg/m <sup>3</sup>  | Annual mean, averaged over 3 years  |
|   |                   | Secondary             | Annual           | 15 µg/m <sup>3</sup>  | Annual mean, averaged over 3 years  |
|   |                   | Primary and secondary | 24-hour          | 35 µg/m <sup>3</sup>  | 98th percentile, averaged over 3 years  |
|   | PM <sub>10</sub>  | Primary and secondary | 24-hour          | 150 µg/m <sup>3</sup> | Not to be exceeded more than once per year on average over 3 years            |
| Sulfur Dioxide<br>[75 FR 35520, Jun 22, 2010]<br>[38 FR 25678, Sept 14, 1973] |                   | Primary               | 1-hour           | 75 ppb                | 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
|   |                   | Secondary             | 3-hour           | 0.5 ppm <sup>b</sup>  | Not to be exceeded more than once per year                                    |

<sup>a</sup> mg/m<sup>3</sup> = milligrams per cubic meter, µg/m<sup>3</sup> = micrograms per cubic meter, ppb = parts per billion, ppm = parts per million.

<sup>b</sup> Colorado Ambient Air Quality Standard for 3-hour SO<sub>2</sub> is 0.267 ppm.

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

<sup>c</sup> 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.

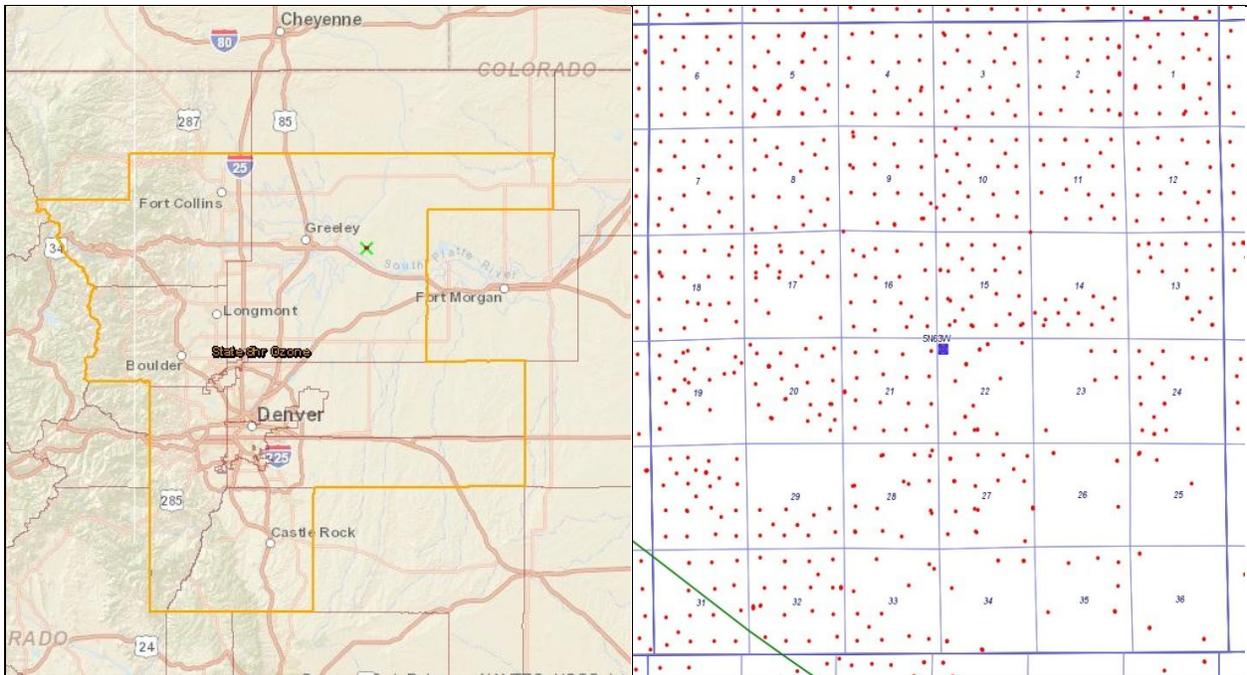
In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs). HAPs are chemicals that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. EPA 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 proposed action (i.e. the approval of 6 applications for permit to drill (APDs), and 4 trespass APDs), must demonstrate that the proposed action(s) meet(s) the requirements of the General Conformity rule.

The proposed North Platte wells and the trespass Antelope wells 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 red dots indicating existing well locations.

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

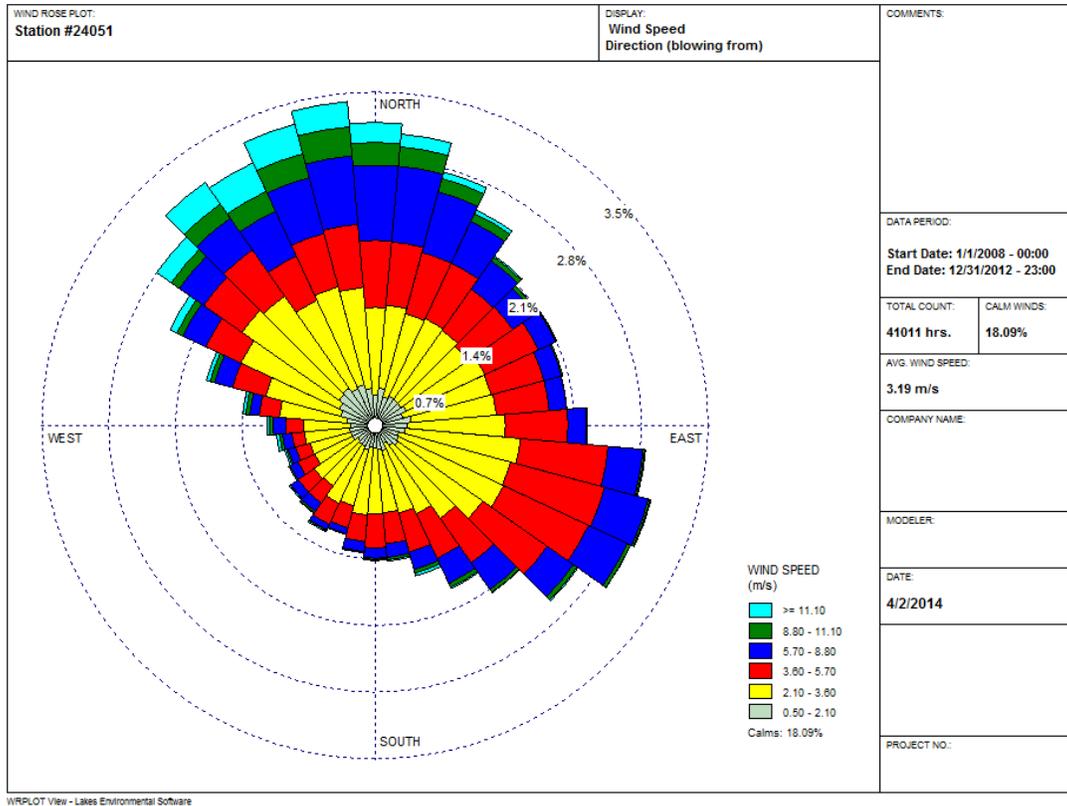


The Prevention of Significant Deterioration (PSD) provision of the CAA established Class I areas in which very little degradation of air quality is allowed (e.g., national parks and large wilderness areas) and Class II areas (all non-Class I areas). The PSD Class II designation allows for moderate degradation 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 North Platte and Antelope 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 75 miles to the west.

**Land Use in the Project Region:** The vicinity of the Project Area (northern 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 some 25,000 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 (O<sub>3</sub>), and Hospital (PM<sub>10</sub> and PM<sub>2.5</sub>) sites located in Greeley, and one site in Briggsdale (O<sub>3</sub>). Table 3-2 provides the measured concentrations of criteria pollutants at these monitors for the most recent three years. There are no lead, NO<sub>2</sub>, or SO<sub>2</sub> 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, (O<sub>3</sub> 3 yr. ave. = 74.6 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 |       |       |
|--|---|------------------------|-------|-------|
|  |   | 2011                   | 2012  | 2013  |
| Weld County West Annex, Greeley              | CO (1 Hour – ppm, maximum)  | 2.7                    | 3.2   | 2.6   |
|  | CO (8 Hour – ppm, maximum)  | 1.5                    | 1.6   | 1.4   |
| Weld County Tower, Greeley                   | O <sub>3</sub> (8 Hour – ppm, 4 <sup>th</sup> maximum)                        | 0.077                  | 0.074 | 0.073 |
| Briggsdale                                   | O <sub>3</sub> (8 Hour – ppm, 4 <sup>th</sup> maximum)                        | 0.066                  | –     | –     |
| Weld County Health Dept. (Hospital), Greeley | PM <sub>10</sub> (24 Hour - µg/m <sup>3</sup> , maximum)                      | 46                     | 91    | 47    |
|  | PM <sub>2.5</sub> (24 Hour - µg/m <sup>3</sup> , 98 <sup>th</sup> percentile) | 23                     | 32    | 18    |
|  | PM <sub>2.5</sub> (Annual - µg/m <sup>3</sup> , annual mean)                  | 6.7                    | 7.9   | 7     |

Source: EPA 2013

**Table 3-3: 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           |
| <b>Sum Totals:</b>      | <b>27,959.7</b> | <b>6,194.28</b> | <b>137,717.5</b> | <b>68,222.23</b> | <b>25,663.02</b> | <b>574.52</b> | <b>1,782,316.18</b> | <b>266.48</b> | <b>59.45</b> | <b>16,080.26</b> | <b>7,885.87</b> |

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 (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), 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 CO<sub>2</sub> monitor in Hawaii that documents atmospheric concentrations of CO<sub>2</sub> going back to 1960, at which point the average annual CO<sub>2</sub> concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO<sub>2</sub> concentration since pre-industrial times occurred within the last 54 years.

### **Environmental Effects:**

**Proposed Action (Direct and Indirect Impacts):** The proposed action will have a temporary negative 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 contain 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 (see tables 3-4 & 3-5 below) have been compiled for each well pad based on the levels of activities required to implement the proposed action (North Platte), or disclose what has likely already occurred (Antelope – trespass). 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, NO<sub>x</sub> (includes NO<sub>2</sub>), PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>, VOCs, HAPs, CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. 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.

**Table 3-4: North Platte Emissions Inventory**

**Emissions Summary (tons)**

Total Wells to be Developed = 6      Total Well-Pads to be Developed = 1      Federal Factor (1\* = 100%) = 1.00

| Activity                             | Criteria Pollutants |             |              |              |              |             | GHGs            |               |             |                  | HAPs        |
|--------------------------------------|---------------------|-------------|--------------|--------------|--------------|-------------|-----------------|---------------|-------------|------------------|-------------|
|                                      | PM10                | PM2.5       | VOC          | NOx          | CO           | SO2         | CO2             | CH4           | N2O         | CO2eq            | All         |
| <b>Construction</b>                  |                     |             |              |              |              |             |                 |               |             |                  |             |
| Construction Activities              | 0.39                | 0.09        | 0.02         | 0.14         | 0.07         | 0.00        | 24.66           | 0.00          | 0.00        | 24.85            | 0.00        |
| Rig & Drilling Ops                   | 0.28                | 0.08        | 0.20         | 1.75         | 1.75         | 0.10        | 342.79          | 5.53          | 1.11        | 801.88           | 0.00        |
| Completion                           | 1.68                | 0.31        | 0.27         | 4.16         | 3.08         | 0.14        | 618.54          | 4.29          | 0.86        | 975.46           | 0.00        |
| Initial Reclamation                  | 0.20                | 0.04        | 0.01         | 0.07         | 0.03         | 0.00        | 11.76           | 0.00          | 0.00        | 11.85            | 0.00        |
| <b>Sub-total: Construction</b>       | <b>2.56</b>         | <b>0.52</b> | <b>0.49</b>  | <b>6.12</b>  | <b>4.93</b>  | <b>0.25</b> | <b>997.74</b>   | <b>9.82</b>   | <b>1.97</b> | <b>1,814.03</b>  | <b>0.00</b> |
| <b>Operations</b>                    |                     |             |              |              |              |             |                 |               |             |                  |             |
| Fugitive Dust                        | 6.51                | 0.73        | NA           | NA           | NA           | NA          | NA              | NA            | NA          | NA               | NA          |
| On-Road Mobile                       | 0.10                | 0.08        | 0.07         | 1.27         | 0.47         | 0.00        | 310.76          | 0.01          | 0.00        | 311.13           | 0.00        |
| Off-Road Mobile                      | 0.00                | 0.00        | 0.00         | 0.01         | 0.00         | 0.00        | 0.72            | 0.00          | 0.00        | 0.72             | 0.00        |
| Non-Road Portable                    | 0.00                | 0.00        | 0.00         | 0.03         | 0.02         | 0.00        | 3.82            | 0.00          | 0.00        | 4.13             | 0.00        |
| Tanks                                | NA                  | NA          | 5.36         | NA           | NA           | NA          | NA              | 0.00          | NA          | 0.00             | 2.31        |
| Tank (liquids) Loadouts              | NA                  | NA          | 16.77        | NA           | NA           | NA          | NA              | 0.00          | NA          | 0.00             | 0.00        |
| Components                           | NA                  | NA          | 34.23        | NA           | NA           | NA          | 3.39            | 39.30         | NA          | 828.77           | 0.69        |
| Pneumatic Devices                    | NA                  | NA          | 16.66        | NA           | NA           | NA          | 2.59            | 30.07         | NA          | 634.13           | 0.11        |
| Heaters                              | 0.10                | 0.10        | 0.07         | 1.27         | 1.07         | 0.01        | 1526.12         | 0.03          | 0.03        | 1,535.41         | 0.00        |
| Stationary Engines / Pumps           | 0.00                | 0.00        | 7.23         | 10.33        | 20.66        | 0.03        | 4685.73         | 53.25         | 0.00        | 5,804.50         | 2.25        |
| Compression Start-up & Shutdown      | NA                  | NA          | 0.10         | NA           | NA           | NA          | NA              | 0.18          | NA          | 3.83             | 0.00        |
| 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         | 0.00         | 0.00         | 0.00        | 0.00            | 0.00          | 0.00        | 0.00             | 0.00        |
| Blowdown Venting                     | NA                  | NA          | 4.47         | NA           | NA           | NA          | 0.70            | 8.07          | NA          | 170.09           | 0.03        |
| 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           | 0.84                | 0.15        | 0.13         | 2.05         | 1.36         | 0.07        | 254.29          | 2.15          | 0.43        | 432.58           | 0.00        |
| Flares / Workovers - Re-completions  | 0.01                | 0.01        | 0.00         | 0.07         | 0.36         | 0.00        | 109.96          | 0.00          | 0.00        | 110.30           | 0.00        |
| <b>Sub-total: Operations</b>         | <b>7.55</b>         | <b>1.08</b> | <b>85.09</b> | <b>15.03</b> | <b>23.95</b> | <b>0.11</b> | <b>6,898.07</b> | <b>133.06</b> | <b>0.46</b> | <b>9,835.58</b>  | <b>5.39</b> |
| <b>Sub-total: General Conformity</b> | NA                  | NA          | <b>49.00</b> | <b>10.81</b> | NA           | NA          | NA              | NA            | NA          | NA               | NA          |
| <b>Total Emissions</b>               | <b>10.11</b>        | <b>1.60</b> | <b>85.58</b> | <b>21.15</b> | <b>28.87</b> | <b>0.36</b> | <b>7,895.81</b> | <b>142.88</b> | <b>2.43</b> | <b>11,649.62</b> | <b>5.39</b> |

Notes:

Recompletion and workover activities are unlikely to occur in the first few years of production when other production based emissions (flashing, dehy, 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 3-4: Antelope Emissions Inventory**

**Emissions Summary (tons)**

Total Wells to be Developed = 8      Total Well-Pads to be Developed = 1      Federal Factor ("1" = 100%) = 0.37

| Activity                             | Criteria Pollutants |             |              |              |              |             | GHGs            |               |              |                  | HAPs        |
|--------------------------------------|---------------------|-------------|--------------|--------------|--------------|-------------|-----------------|---------------|--------------|------------------|-------------|
|                                      | PM10                | PM2.5       | VOC          | NOx          | CO           | SO2         | CO2             | CH4           | N2O          | CO2eq            | All         |
| <b>Construction</b>                  |                     |             |              |              |              |             |                 |               |              |                  |             |
| Construction Activities              | 0.14                | 0.03        | 0.00         | 0.04         | 0.03         | 0.00        | 6.30            | 0.00          | 0.00         | 6.34             | 0.00        |
| Rig & Drilling Ops                   | 0.32                | 0.13        | 0.12         | 1.70         | 1.52         | 0.07        | 264.72          | 1.43          | 0.29         | 383.26           | 0.00        |
| Completion                           | 1.03                | 0.25        | 0.23         | 4.40         | 2.75         | 0.14        | 681.12          | 50.73         | 10.15        | 4,891.70         | 0.00        |
| Initial Reclamation                  | 0.07                | 0.02        | 0.00         | 0.02         | 0.01         | 0.00        | 2.76            | 0.00          | 0.00         | 2.79             | 0.00        |
| <b>Sub-total: Construction</b>       | <b>1.57</b>         | <b>0.42</b> | <b>0.35</b>  | <b>6.15</b>  | <b>4.31</b>  | <b>0.22</b> | <b>954.90</b>   | <b>52.15</b>  | <b>10.43</b> | <b>5,284.09</b>  | <b>0.00</b> |
| <b>Operations</b>                    |                     |             |              |              |              |             |                 |               |              |                  |             |
| Fugitive Dust                        | 0.87                | 0.13        | NA           | NA           | NA           | NA          | NA              | NA            | NA           | NA               | NA          |
| On-Road Mobile                       | 0.01                | 0.01        | 0.01         | 0.15         | 0.09         | 0.00        | 38.45           | 0.00          | 0.00         | 38.52            | 0.00        |
| Off-Road Mobile                      | 0.00                | 0.00        | 0.00         | 0.03         | 0.01         | 0.00        | 3.69            | 0.00          | 0.00         | 3.72             | 0.00        |
| Non-Road Portable                    | 0.00                | 0.00        | 0.00         | 0.02         | 0.02         | 0.00        | 2.53            | 0.00          | 0.00         | 2.74             | 0.00        |
| Tanks                                | NA                  | NA          | 2.02         | NA           | NA           | NA          | NA              | 0.00          | NA           | 0.00             | 0.91        |
| Tank (liquids) Loadouts              | NA                  | NA          | 18.57        | NA           | NA           | NA          | NA              | 0.00          | NA           | 0.00             | 0.00        |
| Components                           | NA                  | NA          | 7.21         | NA           | NA           | NA          | 0.77            | 8.97          | NA           | 189.06           | 0.10        |
| Pneumatic Devices                    | NA                  | NA          | 7.07         | NA           | NA           | NA          | 1.10            | 12.76         | NA           | 269.07           | 0.04        |
| Heaters                              | 0.05                | 0.05        | 0.03         | 0.62         | 0.52         | 0.00        | 746.78          | 0.01          | 0.01         | 751.33           | 0.00        |
| Stationary Engines / Pumps           | 0.03                | 0.03        | 2.35         | 2.32         | 5.93         | 0.01        | 1048.19         | 11.91         | 0.00         | 1,298.46         | 0.00        |
| Compression Start-up & Shutdown      | NA                  | NA          | 0.03         | NA           | NA           | NA          | NA              | 0.05          | NA           | 1.02             | 0.00        |
| 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         | 0.00         | 0.00         | 0.00        | 0.00            | 0.00          | 0.00         | 0.00             | 0.00        |
| Blowdown Venting                     | NA                  | NA          | 4.37         | NA           | NA           | NA          | 0.68            | 7.89          | NA           | 166.46           | 0.02        |
| 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           | 0.51                | 0.12        | 0.11         | 2.16         | 1.19         | 0.07        | 282.53          | 25.36         | 5.07         | 2,387.65         | 0.00        |
| Flares / Workovers - Re-completions  | 0.01                | 0.01        | 0.00         | 0.07         | 0.38         | 0.00        | 116.07          | 0.00          | 0.00         | 116.40           | 0.00        |
| <b>Sub-total: Operations</b>         | <b>1.47</b>         | <b>0.34</b> | <b>41.78</b> | <b>5.38</b>  | <b>8.14</b>  | <b>0.08</b> | <b>2,240.79</b> | <b>66.96</b>  | <b>5.09</b>  | <b>5,224.42</b>  | <b>1.07</b> |
| <b>Sub-total: General Conformity</b> | NA                  | NA          | <b>34.06</b> | <b>6.30</b>  | NA           | NA          | NA              | NA            | NA           | NA               | NA          |
| <b>Total Emissions</b>               | <b>3.03</b>         | <b>0.77</b> | <b>42.13</b> | <b>11.54</b> | <b>12.45</b> | <b>0.30</b> | <b>3,195.69</b> | <b>119.12</b> | <b>15.52</b> | <b>10,508.51</b> | <b>1.07</b> |

Notes:

Recompletion and workover activities are unlikely to occur in the first few years of production when other production based emissions (flashing, dehy, 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 EI 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 (NO<sub>x</sub>) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO<sub>x</sub> and VOCs are ozone precursors). Ozone formation and prediction is complex, non-linear, generally results from a combination of significant quantities of VOCs and NO<sub>x</sub> 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 has initiated 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. At this time, only the CARMMS high / RFD modeling scenario is complete, and thus only those results will be used to describe potential air quality impacts of future federal oil and gas development within the RGFO Planning Area. See the results / more information within the cumulative impacts section below.

The General Conformity Rule at 40 CFR 93.153 defines the *de minimis* thresholds for NO<sub>x</sub> 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 two well pads have been grouped for the convenience of the government with in this single EA, we do NOT consider them to be connected actions under NEPA. Further, we should be clear that the federal action triggering the general conformity rule applicability analysis is the approval of a single APD, which is required for each proposed well. The BLM, for its convenience, may choose to group APD emissions for disclosure purposes.

The proposed action(s) under NEPA (6 North Platte wells) is scheduled to commence in 2015, with the construction phase lasting approximately 6 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). As previously discussed the 4 Antelope wells (trespass) are already complete and producing. For general conformity purposes the BLM will consider the Antelope emissions to determine if future emissions offsets are required, since we were only made aware of the trespass issue after the fact.

The 6 North Platte APD well project, as designed and submitted, have 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 (NO<sub>x</sub>): 10.81 tpy in 2015 (maximum year, combined construction and production)
  - Ozone (VOC): 49.00 tpy in 2015 (maximum year, combined construction and production)

The 4 Antelope APD well project (4 of the 8 wells produce federal minerals), as designed and

submitted, have 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 (NO<sub>x</sub>): 6.3 tpy in 2014 (maximum year, combined construction and production)

Ozone (VOC): 34.06 tpy in 2014 (maximum year, combined construction and production)

A screening-level near-field ambient air quality impact assessment was performed to quantify and evaluate maximum pollutant impacts at sensitive ambient receptors in the immediate area of the proposed North Platte 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 (non-combustion) and combustion related emissions sources, respectively). Using aerial images and GIS, the nearest ambient receptor (location of residence, business, school, hospital or public road) was determined to be approximately 1,250 meters from the proposed site. The screening tool was run for the maximum emissions rate as determined from the emissions inventory for all of the estimated processes / activities. Table 3-5 presents the results of the screening analysis.

**Table 3-5 Screening Model Results**

| Pollutant         | Ave. Period | Modeled Parameter(s)                    | Concentration (ug/m <sup>3</sup> ) |            | Standard (ug/m <sup>3</sup> ) | Percent of NAAQS |
|-------------------|-------------|---|------------------------------------|------------|-------------------------------|------------------|
|                   |             |   | Modeled                            | Background |                               |                  |
| CO                | 1 hour      | production, point source (engines)      | 433.01                             | 5.0        | 40,000                        | 1%               |
| NO <sub>2</sub>   | 1 hour      | construction, point source (completion) | 26.44                              | 112.8      | 189                           | 74%              |
| NO <sub>2</sub>   | Annual      | construction, point source (completion) | 1.82                               | 20.7       | 100                           | 22%              |
| PM <sub>10</sub>  | 24 hour     | production, volume (fugitive dust)      | 77.80                              | 41         | 150                           | 79%              |
| PM <sub>2.5</sub> | 24 hour     | production, volume (fugitive dust)      | 2.41                               | 22         | 35                            | 70%              |
| PM <sub>2.5</sub> | Annual      | production, volume (fugitive dust)      | 0.32                               | 7          | 12                            | 61%              |

\* Percent of NAAQS is the modeled concentration plus the background divided by the standard. All backgrounds provided by CDPHE with the exception of CO, which was estimated from the 1<sup>st</sup> maximum monitored value within the area.

As shown in the Table above, the maximum modeled impacts at the ambient receptors distance from

proposed Project well-pad emissions are below the applicable NAAQS. In order to achieve compliance with the PM NAAQS for the well-pad facility modeling, the construction activity dust emissions were controlled to levels attained by continuous watering. A 50% control assumption is a standard practice where daily watering of the disturbed surfaces is employed to control dust emissions. This control value is reflected in the emissions inventory.

Secondary PM<sub>2.5</sub> was not evaluated since the project related emissions are below the EPA significant emissions rate (SER) thresholds (10 tpy direct PM<sub>2.5</sub> and 40 tpy of NO<sub>x</sub> and SO<sub>2</sub> respectively). The SER thresholds apply to major sources for the purpose of PSD increment consumption analysis, and while not directly applicable to the numerous source types described in the EI, the SER provide a conservative basis for dismissing secondary formation of PM<sub>2.5</sub> as an issue requiring further analysis.

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 could represent all non-Project near-field emissions sources impacts and be added to the near-field modeled 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 less than 10% 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 50% 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 (0.42 <= 10) of the Q/d analysis (NO<sub>x</sub> + PM<sub>10</sub> + SO<sub>2</sub> / 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 Proposed Action is estimated to contribute 22,158 tons of carbon dioxide equivalent (CO<sub>2e</sub>) in the maximum year (2015). Annual operating GHG emissions will be approximately 68% 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 376,500 tons of CO<sub>2</sub>e. 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<sup>1</sup>. The proposed action's GHG emissions represent about 0.0077% of the state of Colorado's GHG emissions on an annual basis. The relative magnitude of greenhouse gas emissions associated with the development of the 6 wells as compared to the state's GHG 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 CO<sub>2</sub>, 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 uncertainty 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 EPA's 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.

### **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 results shown below are for the high RFD scenario. The data is presented for four quasi cumulative source groups that range from the RGFO source apportionment (SA) area #1, i.e. where the North Platte and Antelope projects are occurring (Note: the RGFO was broken up into 4 distinct geographical regions due to its size and varying levels and types of oil and gas development), to the full one atmosphere model domain that CAMx has the capability to simulate. The full

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<sup>1</sup> Colorado Greenhouse Gas Inventory—2014 Update Including Projections to 2020 & 2030, <https://www.colorado.gov/pacific/sites/default/files/AP-COGHGInventory2014Update.pdf>

CARMMS report is available to the public via the BLM Colorado website ([http://www.blm.gov/co/st/en/BLM\\_Information/nepa/air\\_quality/carmms.html](http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality/carmms.html)).

**Table 3-6 CARMMS High Emissions (2021 – tons/year)**

| SA Area (Group) | CARMMS High Scenario SA Area Name          | PM <sub>10</sub> | PM <sub>2.5</sub> | NO <sub>x</sub> | VOC       |
|-----------------|--|------------------|-------------------|-----------------|-----------|
| I + J           | RGFO O&G Federal                           | 914              | 119               | 1,233           | 3,557     |
| R               | All BLM CO Federal O&G                     | 7,856            | 1,430             | 29,245          | 67,929    |
| S               | All Colorado O&G (federal and non-federal) | 37,842           | 6,888             | 131,649         | 313,464   |
| W               | CAMx Cumulative (4km)                      | 2,025,594        | 339,768           | 814,425         | 2,140,889 |

\*Data missing from draft CARMMS report

**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 PM<sub>10</sub> and PM<sub>2.5</sub> yielded significant data for RGFO Area 1. The increments for SO<sub>2</sub> (all averaging times), annual PM<sub>10</sub>, annual PM<sub>2.5</sub>, and annual NO<sub>2</sub> 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/m<sup>3</sup>) were removed from table 3-7 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 3-7 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 |
|--------------------------------|-----------------------|------------------------|----------------------------------|---------------------------------|------------------------|-------------------------|-----------------------------------|----------------------------------|
| <b>NO<sub>2</sub> Annual</b>   |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| 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                        |
| W                              | 2.5                   | 2.371                  | 94.8%                            | Petrified_Forest                | 25                     | 25.466                  | 101.9%                            | Aztec_Ruins                      |
| <b>PM<sub>10</sub> 24-hour</b> |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| I                              | 8                     | 0.003                  | 0.0%                             | Rocky_Mountain                  | 30                     | 0.002                   | 0.0%                              | Mount_Evans                      |
| J                              | 8                     | 0.011                  | 0.1%                             | Rocky_Mountain                  | 30                     | 0.008                   | 0.0%                              | Mount_Evans                      |

| 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 |
|---------------------------------|-----------------------|------------------------|----------------------------------|---------------------------------|------------------------|-------------------------|-----------------------------------|----------------------------------|
| 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                      |
| W                               | 8                     | 217.661                | 2720.8%                          | Bandelier                       | 30                     | 191.183                 | 637.3%                            | Dome                             |
| <b>PM<sub>10</sub> Annual</b>   |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| 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                      |
| W                               | 4                     | 15.409                 | 385.2%                           | Salt_Creek                      | 17                     | 65.226                  | 383.7%                            | Valle_De_Oro_NWR                 |
| <b>PM<sub>2.5</sub> 24-hour</b> |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| I                               | 2                     | 0.001                  | 0.1%                             | Rocky_Mountain                  | 9                      | 0.001                   | 0.0%                              | Mount_Evans                      |
| J                               | 2                     | 0.006                  | 0.3%                             | Rocky_Mountain                  | 9                      | 0.004                   | 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                         |
| W                               | 2                     | 193.166                | 9658.3%                          | Bandelier                       | 9                      | 171.269                 | 1903.0%                           | Dome                             |
| <b>PM<sub>2.5</sub> Annual</b>  |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| 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                          |
| W                               | 1                     | 7.359                  | 735.9%                           | Bandelier                       | 4                      | 14.039                  | 351.0%                            | Valle_De_Oro_NWR                 |
| <b>SO<sub>2</sub> 3-hour</b>    |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| 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                     |
| W                               | 25                    | 27.514                 | 110.1%                           | Bandelier                       | 512                    | 29.993                  | 5.9%                              | Dome                             |
| <b>SO<sub>2</sub> 24-hour</b>   |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| R                               | 5                     | 0.135                  | 2.7%                             | Dinosaur_CO                     | 91                     | 0.108                   | 0.1%                              | Dinosaur_all                     |

| 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 |
|------------------------------|-----------------------|------------------------|----------------------------------|---------------------------------|------------------------|-------------------------|-----------------------------------|----------------------------------|
| S                            | 5                     | 0.154                  | 3.1%                             | Dinosaur_CO                     | 91                     | 0.123                   | 0.1%                              | Dinosaur_all                     |
| W                            | 5                     | 8.620                  | 172.4%                           | Bandelier                       | 91                     | 7.531                   | 8.3%                              | Dome                             |
| <b>SO<sub>2</sub> Annual</b> |                       |                        |                                  |                                 |                        |                         |                                   |                                  |
| 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                     |
| W                            | 2                     | 1.805                  | 90.3%                            | Galiuro                         | 20                     | 0.863                   | 4.3%                              | Bitter_Lake_NWR                  |

**Visibility Impacts:** Table 3-8 displays the Class I and II areas where the maximum number of days  $\Delta dv$  ( $dv =$  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  $\Delta dv$  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 3-9) were selected based on the individual source group impact areas within Table 3-8.

**Table 3-8 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  |
|------------------------------|--|-------------------------------|--|-------------------------------|------------------------|-------------------|
| <b>Class I Area Impacts</b>  |  |                               |  |                               |                        |                   |
| I                            | 0                                      | NA                            | 0                                      | NA                            | 0.02253                | CI_Rocky_Mountain |
| J                            | 0                                      | NA                            | 0                                      | NA                            | 0.12545                | 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 |
| W                            | 365                                    | Multiple Areas                | 365                                    | Multiple Areas                | 81.23828               | CI_Pecos          |
| <b>Class II Area Impacts</b> |  |                               |  |                               |                        |                   |

| 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 |
|--------------|--------------------------------------|-----------------------------|--------------------------------------|-----------------------------|----------------------|------------------|
| I            | 0                                    | NA                          | 0                                    | NA                          | 0.01337              | CII_Mount_Evans  |
| J            | 0                                    | NA                          | 0                                    | NA                          | 0.05321              | 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     |
| W            | 365                                  | Multiple Areas              | 365                                  | Multiple Areas              | 57.91427             | CII_Dome         |

**Table 3-9 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 |
|----------------------------------|------------|-------|-----------|-----------|------------|------------|---------------------------------|-----------|-----------|
| <b>Worst 20% Visibility (dv)</b> |            |       |           |           |            |            |                                 |           |           |
| Flat Tops Wilderness             | I          | CO    | 8.68      | 8.07      | 8.06       | 7.89       | 0.61                            | 0.01      | 0.18      |
| Mesa Verde NP                    | I          | CO    | 11.20     | 10.82     | 10.79      | 10.77      | 0.38                            | 0.03      | 0.05      |
| Mount Zirkel Wilderness          | I          | CO    | 9.36      | 8.54      | 8.53       | 8.45       | 0.82                            | 0.01      | 0.09      |
| Pecos Wilderness                 | I          | NM    | 11.33     | 10.86     | 10.80      | 10.76      | 0.47                            | 0.06      | 0.10      |
| 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      |
| Dome Wilderness                  | II         | NM    | 11.33     | 11.17     | 10.95      | 10.75      | 0.16                            | 0.22      | 0.42      |
| Mount Evans Wilderness           | II         | CO    | 8.68      | 8.02      | 8.01       | 7.95       | 0.66                            | 0.01      | 0.07      |
| South San Juan Wilderness        | II         | CO    | 9.95      | 9.28      | 9.24       | 9.23       | 0.67                            | 0.04      | 0.05      |
| <b>Best 20% Visibility (dv)</b>  |            |       |           |           |            |            |                                 |           |           |
| Flat Tops                        | I          | CO    | 0.69      | 0.55      | 0.53       | 0.41       | 0.14                            | 0.02      | 0.14      |

| 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 |
|---------------------------|------------|-------|-----------|-----------|------------|------------|---------------------------------|-----------|-----------|
| Wilderness                |            |       |           |           |            |            |                                 |           |           |
| Mesa Verde NP             | I          | CO    | 3.12      | 3.28      | 3.24       | 3.21       | -0.16                           | 0.04      | 0.07      |
| Mount Zirkel Wilderness   | I          | CO    | 0.95      | 0.84      | 0.83       | 0.72       | 0.11                            | 0.01      | 0.12      |
| Pecos Wilderness          | I          | NM    | 4.54      | 4.65      | 4.60       | 4.57       | -0.11                           | 0.05      | 0.08      |
| 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      |
| Dome Wilderness           | II         | NM    | 4.01      | 4.64      | 4.41       | 4.19       | -0.63                           | 0.23      | 0.45      |
| Mount Evans Wilderness    | II         | CO    | 0.69      | 0.57      | 0.56       | 0.52       | 0.12                            | 0.01      | 0.05      |
| South San Juan Wilderness | II         | CO    | 2.25      | 2.28      | 2.23       | 2.21       | -0.03                           | 0.05      | 0.07      |

**Deposition Impacts:** Table 3-10 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 3-10 the future cumulative deposition values (source group W) 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 3-11). 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 3-10 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     | 0.0001                                 | Rocky_Mountain                  | 0.0002                                  | Lost_Creek                       |
| J     | 0.0006                                 | Rocky_Mountain                  | 0.0007                                  | Lost_Creek                       |
| R     | 0.1454                                 | Flat_Tops                       | 0.1160                                  | Colorado                         |
| S     | 0.2550                                 | Flat_Tops                       | 0.2191                                  | Colorado                         |
| W     | 3.1160                                 | Mount_Zirkel                    | 8.8528                                  | Valle_De_Oro_NWR                 |

**Table 3-11 CARMMS High Scenario – Class I Cumulative Nitrogen Deposition Change (Average)**

| Area | Class | 2008 | 2021 | 2021 – 2008 | % 2021 |
|------|-------|------|------|-------------|--------|
|------|-------|------|------|-------------|--------|

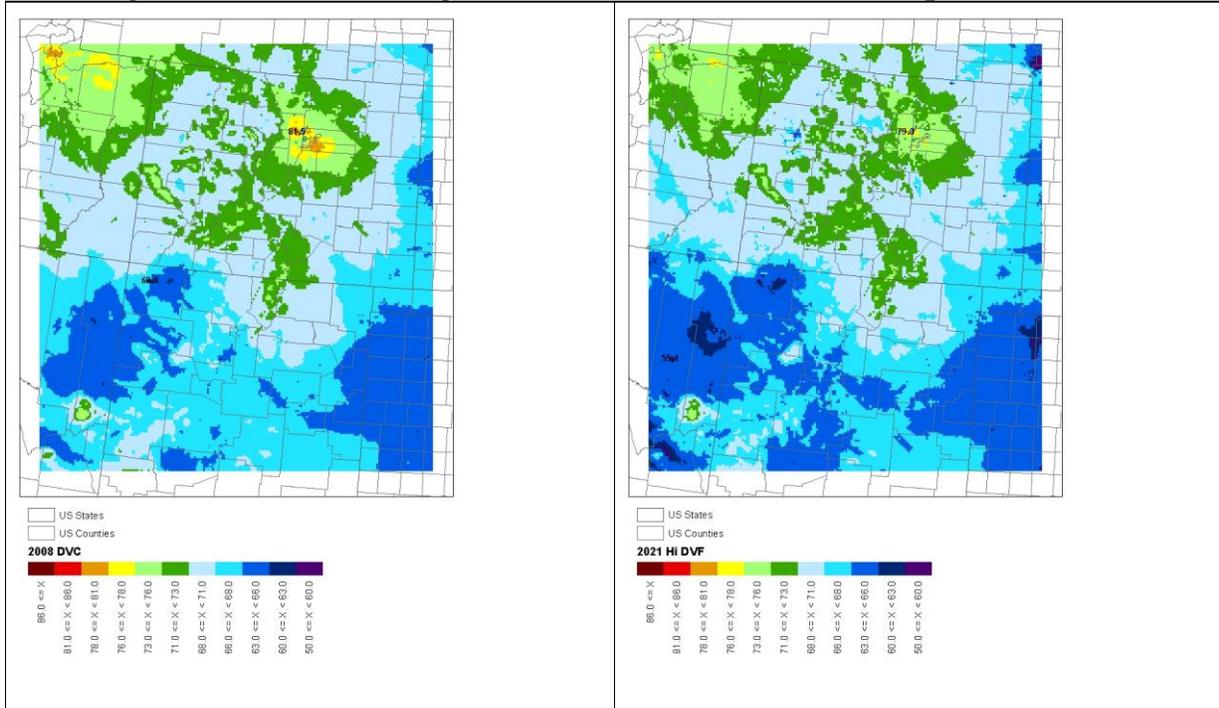
|                | Type | (kg/ha-yr) | (kg/ha-yr) |       | Reduction |
|----------------|------|------------|------------|-------|-----------|
| Rocky_Mountain | I    | 3.50       | 2.58       | -0.92 | 26.3      |
| Flat_Tops      | I    | 3.09       | 2.39       | -0.70 | 22.6      |
| Mount_Zirkel   | I    | 3.95       | 3.12       | -0.84 | 21.0      |

**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. 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 3-11 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.

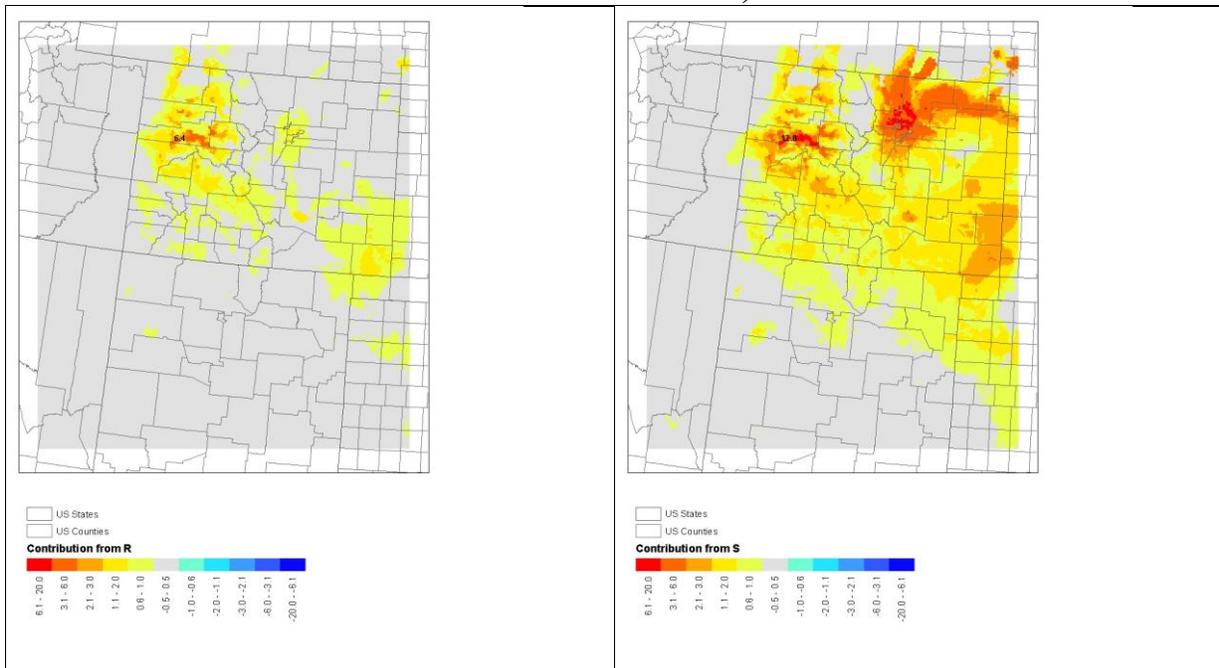
**Table 3-11 CARMMS High Scenario –Cumulative Ozone Impacts**

| 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     |

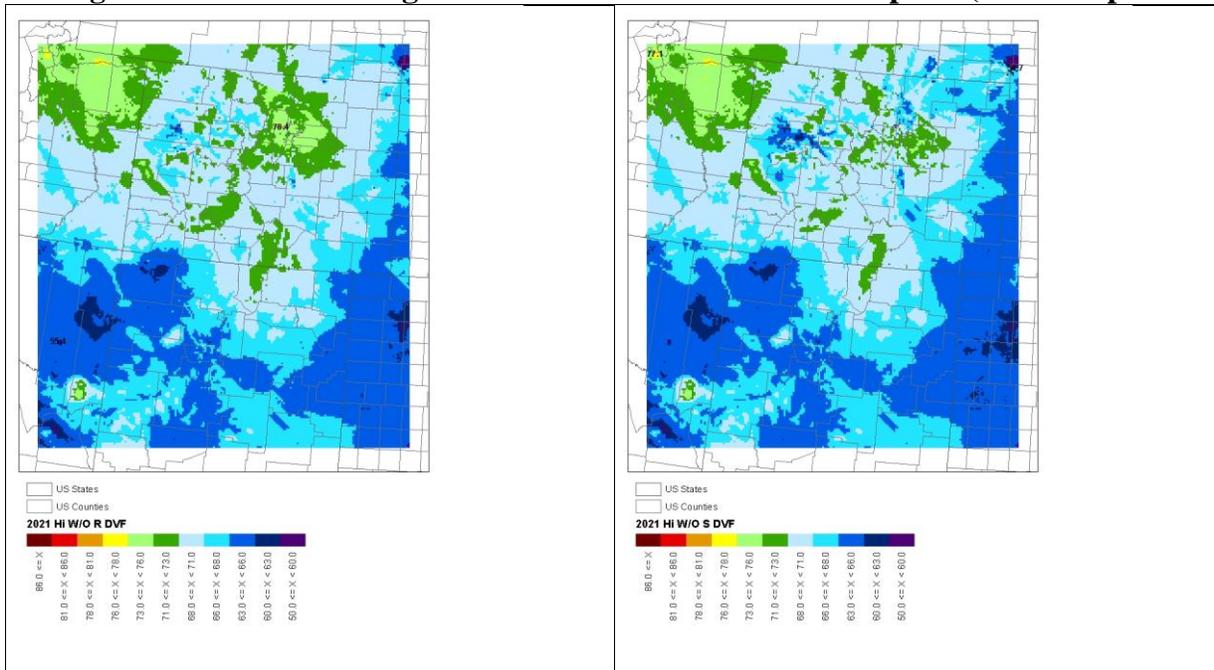
**Figure 3-3 CARMMS High Scenario –Cumulative Ozone Impacts (DVC & DVF)**



**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 proposed action elements would be authorized and therefore none of the potential emissions causing activities would occur, with the exception of the Antelope impacts since they have already occurred as described above. No impacts to air quality would occur. The incremental increase to global GHG burden would not happen, however it is entirely likely the predicted cumulative climatic changes will occur regardless. **Protective/Mitigation Measures:** Bonanza Creek 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.

- COA – Bonanza Creek Energy, Inc. will use industry best practices, including watering, graveling, and reseeded 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.

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

### **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.

### 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

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.

### **3.2.3 SOILS**

#### Affected Environment:

The Proposed wells would be located in a dry upland setting mainly used as open rangeland. The Weld county soil survey has identified the soil series in the proposed project area as:  
Existing Antelope pad:

The entire pad is on Valent sand, 0 to 3 percent slopes. The soil is derived from Eolian deposits, with root restrictive layers being greater than 80 inches deep, and typically located in the plains. The calcium carbonate equivalent within 40 inches is 0 percent. The natural drainage class is excessively well drained, with low runoff potential, and no frequency of ponding. This soil does not meet hydric criteria. The Valent sand is in the Deep Sand (R067BY015CO) Ecological site, and is of local farmland importance.

#### Proposed F-22 Pad:

The entire pad is on Valent sand, 3 to 9 percent slopes. The soil is derived from Eolian deposits, with root restrictive layers being greater than 80 inches deep, and typically located in the plains. The calcium carbonate equivalent within 40 inches is 0 percent. The natural drainage class is excessively well drained, with low runoff potential, and no frequency of ponding. This soil does not meet hydric criteria. The Valent sand is in the Deep Sand (R067BY015CO) Ecological site, however, unlike the Valent sand 0 to 3 percent slope, the 3 to 9 percent slope is not of local farmland importance.

The access road for the pad will disturb 1000' by 30' (0.75 acre) of Valent Sand, 3 to 9 percent

slope.

### Environmental Effects

The proposed development of the F-22 pad could result in a small percent of increased wind erosion during initial operations of associated with construction and drilling. A high risk of windblown erosion will continue until those disturbed lands are hardened, reclaimed by vegetation cover, protected by tackifier, straw, or manure, or protected by other methods. Overall-negative effects to soil resources, such as loss of top soil resulting from wind erosion should be reduced significantly through the correct implementation of interim and final reclamation measures and the implementation of BMPs during the construction. Continued monitoring and maintenance of the Antelope pad would be required to limit any further or unnecessary impacts to soil resources.

#### Proposed Action

**Direct and Indirect Impacts:** The Action would result in up to 20.8 acres of total combined new and previously disturbed surface disturbance. 12.5 acres have already been disturbed for the Antelope pad, while the proposed F-22 pad would disturb the remaining 8.3. Post reclamation, 3 acres would remain disturbed for the Antelope and 1.5 for the F-22, not including the access road. This is assuming successful interim reclamation including re-contouring, seeding, and necessary stabilization. The proposed action would have a moderate to major direct impact to soils present at the construction site. Indirectly, the increased runoff from the disturbed soils could result in increased erosion and gullying down gradient. Due to the gentle slopes, high infiltration rate of the native soils, and construction standards being proposed, impacts to soils off site would be minor.

**Mitigation/Residual Effects:** After completion and/or abandonment of the wells, the soils would still be irreversibly different than they originally were. Overall, with the proposed reclamation, soil productivity would not be considerably altered if the proposed areas are abandoned. All infrastructure (roads, drill pads, etc.) being proposed, would be built to BLM Gold Book standards. No additional mitigation would be required.

**Cumulative Impacts:** The area around the proposed wells has a variety factors effecting soils including roads, housing, agriculture, and livestock grazing. The addition of the infrastructure needed to drill the pads would have an additional impact to the areas soils. In the long term, if economical quantities of oil and gas are found, additional wells can be expected to be drilled. This could add a large amount of disturbance that could have a larger impact on soils in the future.

#### No Action Alternative

**Direct and Indirect Impacts:** It is likely that under this alternative the facilities would still be constructed on entirely private property and the impacts to soil resources would be approximately the same.

Protective/Mitigation Measures: N/A  
 Cumulative Impacts: N/A

Finding on the Public Land Health Standard for Upland Soils: The project location is on private surface, therefore public land health standards don't apply.

**3.2.4 WATER (SURFACE AND GROUNDWATER, FLOODPLAINS)**

Affected Environment:

The proposed wells would be located in a dry upland setting tributary to the South Platte River with no perennial surface water nearby. 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.

The Colorado Division of Water Resources AquaMap shows several known groundwater wells within the area. However, based on cattle trailing and visible stock ponds seen in aerial photos it appears there may be more water wells than shown in the state records. Within a one mile radius of the F-22 and Antelope pads are the following wells:

| F-22:      |                            |            |                           |
|------------|----------------------------|------------|---------------------------|
| Permit No. | PLSS                       | Depth [ft] | Owner                     |
| 38894      | SWNW, Section 23, T5N-R63W | 52         | Allard Cattle Co.         |
| 258972     | NWSW, Section 23, T5N-R63W | 95         | 70 Ranch LLC              |
| 274078     | SWNW, Section 22, T5N-R63W | 50         | 70 Ranch Investment Trust |
| Antelope:  |                            |            |                           |
| 494        | SWSW, Section 14 T5N-R62W  | 150        | McPherson W S             |
| 495        | NESW, Section 14 T5N-R62W  | 31         | McPherson W S             |

The map shows a duplicate of the 70 Ranch Investment Trust well. Within a one mile radius of the Antelope pad are also ten (10) monitoring wells. All wells are drilled into unnamed aquifer systems.

Environmental Effects

Proposed Action

Direct and Indirect Impacts: Surface water impacts of the proposed wells are mainly associated with the surface disturbance associated with drilling and related infrastructure after well completion. For all proposed development, 20.8 acres would be disturbed. 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, 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. Best management practices would be contained in the condition of approval that would mitigate this threat.

Based on other wells in the area along with data submitted by the proponent, the Proposed Action would consume approximately 9.9 acre-feet of water per well (1.4 for drilling, .1 for dust suppression and 8.4 for well completion including fracking). This water would be obtained from a nearby state permitted well, commercial sources or recycled from other operations. Most of this water would either be fully consumed, recycled or disposed of in another way (i.e. injected underground).

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, drilling 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. 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 also introduce chemical additives into the producing formations. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. These additives are not always used in these drilling activities and some are likely to be benign such as bentonite clay and sand. 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. 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. 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.

At this stage, geologic and engineering reviews have been done 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 insure that drilling fluids remain within the well bore and do not enter groundwater.

The proposed action is on dry, private surface where no surface water is present. The water quality of the useable aquifers that would be encountered generally meets water quality standards. The proposed drilling program is not expected to alter whether or not water quality in these aquifers meets standards.

Protective/Mitigation Measures: No additional mitigation is required to protect water resources beyond what is found in other sections of this document and other APD approval requirements.

No Action Alternative

Direct and Indirect Impacts: It is likely that under this alternative the facilities would still be constructed on entirely private property and the impacts to water resources would be the same.

Protective/Mitigation Measures: None

Cumulative Impacts: None

### **3.3 BIOLOGICAL RESOURCES**

#### **3.3.1 INVASIVE PLANTS\***

Affected Environment: Invasive plants are common in the area due to historical agricultural practices. It is likely that the native plant community has been altered due to the long-term grazing practices and crop agriculture in the area. The ecological sites that make up the project site are prone to a wide variety of weeds if severe soil surface disturbance occurs.

#### Environmental Effects

Proposed Action

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

Protective/Mitigation Measures: Equipment used to implement the proposed action should be washed prior to entering the project area to remove any plant materials, soil, or grease. Areas disturbed by project implementation will be monitored for the presence of weeds on the Colorado State Noxious Weed list. Identified noxious weeds will be treated. Monitoring is required for the life of the project and for three years following completion and/or abandonment of the wells and elimination of identified Colorado State Noxious Weeds list A and B species.

No Action Alternative

Direct and Indirect Impacts: None

Protective/Mitigation Measures: None

\*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 VEGETATION**

Affected Environment: Blue grama and sand sagebrush are the dominant native species around T-18 and F-22. T-18 is in the middle of a crop circle that like other adjacent circles is not currently being used for crop agriculture. Other species that have increased in density due to historic crop agriculture and the long-term grazing practices in the area include: Sand dropseed, red threeawn, slimflower scurfpea, hairy goldaster, croton, western ragweed, stickleaf, lupine, loco, and milkvetch.

#### Environmental Effects

##### Proposed Action

Direct and Indirect Impacts: Generally oil and gas development involves complete removal of vegetation and at times re-contouring of the landscape to allow for resources to be retrieved. The type of ground activity associated with oil and gas development does result in increased susceptibility to adverse impacts such as soil compaction, weed infestations and erosion (See Soils and Invasive Plants sections). Due to these adverse impacts, establishment of native vegetation similar to adjacent undisturbed vegetation can take up to 30 years. The area around T-18 has experienced long term severe disturbance due to crop agriculture.

Protective/Mitigation Measures: See 2.2.1 Proposed Action.

##### No Action Alternative

Direct and Indirect Impacts: None

Protective/Mitigation Measures: None

### **3.3.3 THREATENED, ENDANGERED AND SENSITIVE SPECIES**

#### Affected Environment

No threatened or endangered species or habitats are located within the action area. BLM sensitive species with potential habitat include ferruginous hawk, mountain plover, black-tailed prairie dog, burrowing owl, swift fox, and milk snake.

Mountain Plover's are found throughout the Royal Gorge Field Office in suitable habitats. While the species is relatively rare they can be found generally in open, flat tablelands that display some function of disturbance such as drought, grazing, fire, etc.).

The BLM considers the black-tailed prairie dog a sensitive species. Black-tailed prairie dogs primarily occur in scattered colonies throughout the eastern plains of Colorado. In the summer of 2001, Colorado started aerial surveys for black-tailed prairie dogs throughout their historic range. Based on known locations of black-tailed prairie dogs, transects were developed for each

county to give a 95% confidence interval to the resulting data. Statewide 631,000 acres of black-tail prairie dog colonies were documented. Burrowing owls are expected to occupy the same habitat as black-tailed prairie dogs as they use the burrows for nesting a cover.

Swift foxes primarily occur in short-grass and mixed-grass prairie in the eastern plains of Colorado. The distribution of swift foxes became severely reduced in concert with conversion of mid- and shortgrass prairies to agriculture. Swift fox dens occur in ridges, slopes, hill tops, pastures, roadside ditches, fence rows and cultivated fields. Dens may be relatively close to human habitations and swift foxes occasionally den in human-made structures such as culverts. Swift foxes primarily consume animals, with leporids and rodents the most frequent prey.

The milk snake occupies a wide variety of habitats in Colorado, including shortgrass prairie, sandhills, and shrubby hillsides. Hibernation sites include rock crevices that may be shared with other snake species. The species occurs throughout most of Colorado at elevations primarily below 8,000 feet and is generally scarce or at least hard to find, but locally fairly common.

The ferruginous hawk inhabits grasslands and semi-desert shrublands, and is rare in piñon-juniper woodlands. Breeding birds nest in isolated trees, on rock outcrops, structures such as windmills and power poles, or on the ground. Winter residents concentrate around prairie dog towns. Winter numbers and distribution fluctuate greatly according to the availability of prairie dogs; when a local prairie dog population dies off due to plague, hawk numbers decrease drastically. Migrants and winter residents may also occur in shrublands and agricultural areas.

The proposed action may impact federally-listed species in Nebraska. Operation of BLM's fluid minerals program 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: This area has been well developed for energy development, both renewable and non-renewable. The action area has experienced extensive oil and gas development. In the short term, the primary direct impacts of the proposed action will be the loss of available habitat (21.5 acres due to pad construction for drilling phase, reduced to 5.25 acres after interim reclamation), and an increase in human presence and activity during the drilling phase. These effects will be reduced post drilling.

Given that the proposed action would result in the depletion of 67.2 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.

Bonanza Creek Energy 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: Due to the fee/fee and fee/fee/fed nature of the surface and mineral estate, the Bureau of Land Management does not have the authority to attach protective/mitigation measures as conditions of approval unless supported by federal law. No special status species that may be present or have habitat within in the action area are federally protected; therefore, no protective/mitigation measures will be suggested as a result of the environmental assessment.

#### No Action Alternative

Direct and Indirect Impacts: The no action alternative effect will 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.

### **3.3.4 WILDLIFE TERRESTRIAL**

#### Affected Environment

The shortgrass prairies of eastern Colorado are often used for grazing livestock. In the past they have supported an array of wildlife species including black-tailed prairie dog, American bison, elk, deer, and Pronghorn. Livestock production continues throughout much of the region where nonrenewable resource development and production is occurring. The private lands on which the wells are proposed are used for livestock grazing and oil and gas development supported by various infrastructure, including roads and well pads. Wildlife in the area is limited to species that have adapted to the increased development activity in the area; these include pronghorn, small mammals, mesocarnivores, raptors, and herpetofauna. The pad locations will exist in areas that Colorado Parks and Wildlife has delineated as pronghorn winter range.

#### Environmental Effects

##### Proposed Action

Direct and Indirect Impacts: The Proposed Action would initially result in conversion of approximately 21.5 acres of shortgrass prairie to well pads and associated infrastructure. The majority of these areas would be reclaimed and re-vegetated, with 5.25 acres of permanent surface disturbance associated with the two pads. There would be a minor direct loss of suitable wildlife habitat in the area. Indirect impacts to wildlife could result from the increase in human activity during the drilling phase, causing an increase in stress to wildlife or limiting movement throughout the Project Area. Decreased human activity during the production phase would reduce these potential indirect impacts to wildlife as well.

Protective/Mitigation Measures: Due to the fee/fee nature of the surface and mineral estate at Antelope T-18, the Bureau of Land Management does not have the authority to attach protective/mitigation measures as conditions of approval unless supported by federal law to the Antelope T-18 pad. No terrestrial wildlife species that may be present or have habitat within in

the Antelope T-18 action area are federally protected; therefore, no protective/mitigation measures will be suggested as a result of the environmental assessment.

The North Platte F-22 pad does lie above federal minerals providing the federal government some discretionary authority over actions that may occur. Lease stipulations attached to this parcel do not offer big game winter range protection. Restrictions to development activity are limited to conditions of approval attached to individual applications for permit to drill. Sixty days are the maximum timeframe that activities can be restricted through this process and exception criteria must be disclosed. Therefore, no surface use should be allowed beginning January 1 for a period of 60 days to protect big game winter ranges as delineated by Colorado Parks and Wildlife. An exception may be granted because of climatic conditions or if the winter range habitat is unsuitable or unoccupied during winter months.

#### No Action Alternative

Direct and Indirect Impacts: The no action alternative effect will 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.

### **3.3.5 MIGRATORY BIRDS**

The Migratory Bird Treaty Act (MBTA) includes guidance for the protection of native passerines (songbirds) as well as birds of prey, migratory waterbirds (waterfowl, wading birds, and shorebirds), and other species such as doves, hummingbirds, swifts, and woodpeckers. Within the context of the MBTA, “migratory” birds include non-migratory “resident” species as well as true migrants, essentially encompassing most native bird species. The nesting time period is of special importance as the ability to create a nest, incubate, and rear chicks to fledging is a vulnerable time period for birds, and disturbances to nesting activities can lead to larger consequences for individual birds. In addition, because birds are generally territorial during the nesting season, their ability to access and utilize sufficient food is limited by the quality and availability of the territory occupied. During non-breeding seasons, birds are generally non-territorial and able to feed across a larger area and wider range of habitats.

#### Affected Environment

The Proposed Action is located in the shortgrass prairie ecosystem in private fields used for livestock grazing. The following species are on the U.S. Fish and Wildlife Services “Birds of Conservation Concern-2008 List” for BCR-18 (Shortgrass Prairie) and might occur in the project area based on their habitat requirements: ferruginous hawks, prairie falcons, mountain plovers, upland sandpiper, Sprague’s pipit, lark buntings, and Cassin’s sparrow.

## Environmental Effects

### Proposed Action

Direct and Indirect Impacts: The Project Area and surrounding area is already disturbed by oil and gas development. Some birds have adapted to and currently use habitat patches within well fields for reproduction and growth. Surface disturbing activities associated with implementation of the Proposed Action would occur during the winter months of December, January, and February, which is outside nesting season for these birds. Noise generated during construction, drilling, and production phases will likely result in a larger impact footprint than the disturbance footprint alone.

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. MBTA is a federal law; therefore, it must be followed regardless of land ownership. 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.

### No Action Alternative

Direct and Indirect Impacts: The no action alternative effect will 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.

## **3.4 HERITAGE RESOURCES AND HUMAN ENVIRONMENT**

### **3.4.1 ECONOMICS**

Affected Environment: Although this project only affects the outcome of ten oil wells, the Oil and Gas industry as a whole has a significant impact on the economy. Not only does oil and gas development directly create higher than average paying jobs, it also increase demand for employees of related support fields, such as transportation, equipment fabrication, construction, gas stations, restaurants etc. Aside from the creation of jobs, the production of oil and gas directly generates revenue for federal, state and local governments through taxes, fees and royalties.

A 2013 study by the CU Leeds School of Business (Lewandowski and Wobbekind,2013) illustrated the economic benefits of oil and gas development in Colorado. It showed that the oil and gas industry directly contributed almost \$1.6 billion to state and local governments, schools and other special districts in Colorado in 2012. The study found that oil and gas development accounted for about 51,200 jobs in Colorado, most of which pay more wages than twice of the average wage in the state. In addition, it was estimated that the industry resulted in 60,245 indirect and induced jobs in Colorado, for a total of 111,476 jobs supported by the oil and gas development industry in the state in 2012. The study concluded that the oil and gas industry generated \$29.6 billion in output in Colorado's economy in 2012.

These figures don't account for the fees, royalties and lease payments made to the federal government for development of federal oil and gas estate, or take into account the positive economic impact that results from the use of affordable petroleum products for fuels and the produces manufactured with them. The production of domestic petroleum products has the added benefit of reducing the nation's dependence on foreign energy.

#### Environmental Effects

##### Proposed Action (Direct and Indirect Impacts)

The addition of the proposed wells would have an incrementally small but positive effect on those impacts as described above.

Protective/Mitigation Measures: None

##### No Action Alternative (Direct and Indirect Impacts)

Not implementing the proposed action would have the effect of not adding incrementally to the overall positive effect to economics as described above.

Protective/Mitigation Measures: None

### **3.4.2 PALEONTOLOGICAL RESOURCES**

Affected Environment: The proposed wells are geographically located in grassland overlying part of the geologic feature that is 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 eolian deposits underlie the proposed well locations. These eolian deposits are a Class 3 geologic formation, 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). This is a Class 3 formation because it has moderate potential to produce vertebrate fossils such as bison.

#### 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.

Cumulative Impacts: Past and current impacts to important fossil resources could be long-term and significant since fossils removed or destroyed would be lost to science. Impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the proposed activity would have a beneficial impact in that ground disturbing activities may result in the discovery of important fossil resources.

#### Protective/Mitigation Measures

Although the project area does not contain any known fossil resources, there is a possibility that ground disturbing work in the area may uncover fossil resources. 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.

Paleontologic resources will be protected as long as the following recommended conditions of approval are followed.

**Recommended COA:** In order to prevent potential impacts to paleontologic resources, a condition of approval will be attached to the APD that directs the holder to notify the BLM RGFO immediately if any vertebrate fossils or their traces are discovered during operations. Operations may continue as long as the fossil specimen would not be damaged or destroyed by the activity. Within 5 working days of notification, the BLM RGFO shall evaluate or have evaluated such discoveries and shall notify the operator what action shall be taken with respect to such discoveries.

#### No Action Alternative (Direct and Indirect Impacts)

Under the No Action alternative, the applicant could explore and develop the private land and private minerals and not access the federal minerals. Direct and indirect impacts to paleontological resources would be the same as those described for the Proposed Action.

#### **3.4.3 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

Protective/Mitigation Measures: 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.
- No treatment or disposal of non E&P wastes on site is allowed on Federal Lands.
- All concrete washout water needs to be contained and properly disposed of at a permitted offsite disposal facility.
- If pits are utilized they need to be lined to mitigate leaching of liquids to the subsurface, as necessary. State and/or Federal regulations may apply to pit construction and removal.

No Action Alternative

Direct and Indirect Impacts: None

Protective/Mitigation Measures: None

### **3.5 CUMULATIVE IMPACTS SUMMARY**

The proposed project is located in 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. Weld County has more than 25,000 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 is involved in 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 cumulative 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. (See section 3.2.1 of this EA for more details)

**Soils:** The area around the proposed wells has a variety factors effecting soils including roads, housing, agriculture, and livestock grazing. The addition of the infrastructure needed to drill the pads would have an additional impact to the areas soils. In the long term, if economical quantities of oil and gas are found, additional wells can be expected to be drilled. This could add a large amount of disturbance that could have a larger impact on soils in the future.

Paleontology: Past and current impacts to important fossil resources could be long-term and significant since fossils removed or destroyed would be lost to science. Impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the proposed activity would have a beneficial impact in that ground disturbing activities may result in the discovery of important fossil resources.

## **CHAPTER 4 - CONSULTATION AND COORDINATION**

### **4.1 LIST OF PREPARERS AND PARTICIPANTS**

Please see Interdisciplinary Team Review list for BLM Participants

### **4.2 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED**

*Native American Tribes were consulted at the lease stage.*

## **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.

Lewandowski, Brian, Wobbekind, Richard. July 2013. *Assessmant of Oil and Gas Industry, 2012 Industry Economic and Fiscal Contributions in Colorado*. Business Research Division, Leeds School of Business, University of Colorado Boulder.

## **Finding Of No Significant Impact (FONSI)**

### **DOI-BLM-CO-200-2014-035 EA**

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 six Application Permits to Drill (APDs) for the North Platte F-22 wells proposing the construction of one well pad, the drilling of six horizontal oil wells, and installation of production facilities in order to produce federal minerals, on private surface over federal minerals (split estate).

The RGFO recently received four additional APDs to permit the continued production of federal minerals from fee/fee/fed horizontal wells that penetrated federal mineral estate along with fee minerals. The operator mistakenly drilled these four wells before submitting BLM APDs. The operator paid a \$5,000 fine in addition to the \$6,500 permit fee for each well that was drilled without an APD.

The projects are in Weld County, approximately 10 miles east of the Town of Kersey. The federal mineral estate is leased and subject to oil and gas development.

The general area description would be defined as rural rangeland in a short grass prairie setting, located in the northeastern plains of Colorado, on the 70 ranch, which is used primarily for livestock production and oil and gas development. There are a few county roads in the project area.

There is no public land or public roads or other 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 proposed North Platte F-22 and Antelope T-18 project. Project decision relative to each of the 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 wildlife and migratory birds but would be mitigated through the use of timing stipulations and mitigations through PRIPP and SPWRAP programs. 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. If the operator is unable to sell any produced gas from the well, then gas flaring will also produce emissions of criteria, HAP, and GHG 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 on split and private mineral estate. 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. The project area having been subject to historic drilling activity will continue to experience gradual depletion of the recoverable oil and gas products. Although past cattle grazing had contributed 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:**

No historic properties were recorded during the cultural resources inventories.

**Threatened and endangered species and their critical habitat:**

There are no known populations of T&E species in the action area, however the proposed action may have an indirect impact on federally-listed species in Nebraska by potentially resulting in new depletions to the South Platte River. This could affect 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.

Due to the potential depletions to the South Platte River, 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), 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 jeopardizing 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.

Bonanza Creek Energy 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.

**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: Nancy Keohane

NAME OF ENVIRONMENTAL COORDINATOR: Martin Weimer

DATE:

SIGNATURE OF AUTHORIZED OFFICIAL: \_\_\_\_\_/s/ Keith E. Berger\_\_\_\_\_  
Keith E. Berger, Field Manager

DATE SIGNED: 3/20/2015

## Attachment A

### Wild Earth Guardians Comment Summaries and Responses

#### Air related comments

1. *Summary: The BLM did not adequately apply General Conformity to the actions identified in the EA by not considering the project in whole for conformity analysis. Separating the approvals is peicemealing the activity and avoids Conformity obligations.*

**Response:** The BLM prepared a conformity analysis for the proposed federal actions as required by the regulations. In this case, the federal action is the approval of the APD consistent with the definition under 40 C.F.R. 93.152, which states: “Where the Federal action is a permit, license, or other approval for some aspect of a non-Federal undertaking,” (i.e. a private company drilling a well), “the relevant activity is the part, portion, or phase of the non-Federal undertaking that requires the Federal permit, license, or approval”. For the purpose of efficient NEPA analysis, the BLM chose to combine multiple APD actions into one EA. While conformity analysis and NEPA are not explicitly linked, here as a matter of efficiency the BLM reviewed each well pad as a “Federal action” and grouped the APDs for each pad respectively, and compared those combined direct and indirect emissions estimates with the de minimis thresholds to determine conformity applicability (in this case, below the 100 tpy threshold for VOC or NOx within the Denver Front Range Ozone Nonattainment Area). This provided a conservative estimate of the emissions associated with all of the APDs. The conformity analysis performed here is different than a formal conformity determination, which requires public notice and comment before making the determination. Here, BLM’s conformity analysis showed that total emissions from the APDs are de minimis and as such no formal conformity determination was required under the Clean Air Act.

The emissions inventory (EI) for this action was prepared consistent with the requirements of NEPA and 40 CFR 93.153(b). The analysis was based on the following process:

- BLM calculated all emissions, direct and indirect caused by approval of the APD(s) and the proposed action (NEPA).
- Direct emissions of a criteria pollutant or its precursors were calculated for activities that occur at the same time and place and are reasonably foreseeable.
- Indirect emissions of a criteria pollutant or its precursors were calculated for all activities (see definition at 40 CFR 93.152):
  - (1) That are caused or initiated by the Federal action and originate in the same area but occur at a different time or place;
  - (2) That are reasonably foreseeable, i.e. that are identified at the time of analysis, with a known location, and can be quantified.
  - (3) That the agency can practically control; and
  - (4) For which the agency has continuing program responsibility.

In exercising its normal programs and authorities the BLM cannot practically control or affect all resulting air emissions related to the APD approval. For example (but not limited to), the BLM does not have any authority to control on-road emissions resulting

from transportation of construction workers and construction materials to and from the proposed APD sites. Therefore, these direct emissions would in fact be exempted from our conformity analysis however estimates of these emissions are included within the EI for the purposes of NEPA.

2. **Summary:** *Implementation of the Royal Gorge RMP requires General Conformity Analysis. The oil and gas decisions in the RMP and subsequent Oil and Gas EIS constitute federal actions requiring conformity. The BLM is obligated to ensure its programmatic decision conform to the Clean Air Act prior to approving APDs.*

**Response:** This comment does not directly address a deficiency (apparent or otherwise) within the EA itself. BLM RMPs do not require conformity assessments or determinations because: 1) an RMP does not authorize emissions generating activities that would not be otherwise exempt under the general conformity provisions of 40 C.F.R. 93.153(c), and 2) emissions contemplated for an RMP for the purposes of NEPA analysis are not reasonably foreseeable in accordance with the term as described under 40 C.F.R. 93.152, and thus conformity cannot be analyzed. For NEPA analysis of an RMP, BLM uses only estimated development rates, since predicting when APDs will be submitted over the entire life of an RMP is speculative. Further, nowhere in the air quality analysis do we mention that we rely on the 1991 O&G EIS for making this particular decision with respect to air resources.

3. **Summary:** *BLM's emissions inventory is underestimated because it accounts for controls that aren't enforceable under the Clean Air Act.*

**Response:** The BLM adequately analyzed emissions for the proposed activities. BLM's Air Resource Specialists developed a comprehensive EI using standard practices for air quality analyses, including the use of appropriate emissions factors and equations from AP-42, as well as reliance on EPA's MOVES and Nonroad2008a emissions factor models for on road, off road and non-road source emissions factors. Operator committed measures, or "design features", are a common and accepted element under NEPA for analyzing project impacts. The BLM approval of each APD will include these design features or operator controls as Conditions of Approval, which are enforceable measures. Other federally enforceable measures, such as rules to control tank emissions promulgated at NSPS OOOO are also considered. Owners and operators are also subject to providing for compliance with the federal provisions applicable to a source and on February 23, 2014, the Colorado Air Quality Control Commission; 1) fully adopted the U.S. Environmental Protection Agency's (EPA) Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution found in 40 C.F.R. Part 60, Subpart OOOO ("NSPS OOOO") into Regulation No. 6, Part A, 2) adopted corresponding revisions to its emissions reporting and permitting framework in Regulation No. 3, parts A, B and C, and 3) adopted complimentary oil and gas control measures in Regulation No. 7. Because of these controls are enforceable measures, BLM's EI did not underestimate emissions and properly accounted control measures to reduce potential future emissions.

4. **Summary:** *The BLM analysis did not account for gas flaring and dehydration units, and the BLM should consider that recent studies have shown that estimations for direct emissions from oil and gas operations are at least 50% too low.*

**Response:** Here, flaring was proposed only during completion operations, and only as a backup for any upset condition that could not be handled by green completion equipment. Emissions from all other potential on site production units (such as storage tanks, etc...) are controlled by vapor recovery devices, and no flaring emissions are associated with these production related activities. This was incorrectly described in the draft FONSI and has now been corrected for the final FONSI. The operator has indicated that apart from upset conditions during completion activities, flaring will not be used. Further, there are no dehydration units being proposed at the sites, and thus no emissions within the EI for this line item. The EA has been updated with a brief description of the EI tool, the data it captures to quantify emissions from the proposed action activities, and how the data is used in analysis.

The BLM EI tool has line item placeholders for all types of emissions sources regardless if they are applicable or reasonably foreseeable for a particular project. Simply because a particular line item is included in the EI, without an associated quantity, does not mean BLM did not account for such emissions. The emissions from any applicable process or activity are rolled up such they are only shown to two decimal places. This means that processes, units, or activities with negligible emissions will be shown as “zeros” within the summary table line item. However, this is nothing more than a formatting issue (the summary tables are created by spreadsheets), and all emissions greater than zero are summed within the bottom line totals regardless of the apparent value in any individual line item.

All direct emissions are accounted for within BLM’s EI. The various inventory elements for construction emissions (on-road, off-road, and non-road sources) are combined for the associated processes, such as: earth disturbing activities (well-pad, pipeline, and access road construction), drilling operations, and completion operations, . These are all distinct phases of development where different resources combinations are brought to bare for a proposed project, and thus they are accounted for as such. Production-related emissions are more a function of equipment sets and estimated mineral production rates, and so they appear more broken out within the inventory with more distinct entries. As for Emissions related to downstream or indirect oil and gas production, processing, and pipeline operations, the BLM has no continuing program of responsibility for these facilities, and that they are in fact regulated by CDPHE. To be clear, the BLM does not have practical control for these indirect emissions sources, . and as such they are not calculated for general conformity purposes.

5. **Summary:** *The BLM fails to adequately analyze all reasonably foreseeable air quality impacts from the proposed actions.*

**Response:** Tables 3-3 and 3-4 are the federal cumulative total emissions for the project for the worst case emission year. This data is conservative as it assumes all of the construction emissions, a full year’s worth of production related emissions, and any

work-over and re-completions emissions will occur for all the wells within a single calendar year. This is highly unlikely since wells will not be simultaneously drilled, completed, go into production and undergo workover operations. However, this method of disclosing emissions allows for effectively comparing the relative impacts from various projects in any given resource area.

Using the total cumulative emissions data ad hoc and dividing the total annual emissions (tons per year) by the release rate timeframes considered by the screening and modeling tools (grams per second) would grossly underestimate the instantaneous release rates for several activities considered by the emissions tool. Instead, BLM examines each process during construction to determine the maximum instantaneous rate that could occur from all the sources from those processes for each pollutant of concern. Production related emissions units are all assumed to occur simultaneously (even seasonal sources) such that we find the total worst case instantaneous release rates for all of these units. These emission formats (g/sec) are not presented in the EA. These worst case rates were analyzed in the EA, and are the basis of the impacts described in the EA. Further, the “Federal Factor” used to account for the federal portion of the total project emissions (see definition of “Federal action” under the general conformity rule) is not applied to the calculated instantaneous rates. Therefore, the BLM is not scaling down these rates to provide for lower impacts to air quality and has adequately analyzed all of the reasonably foreseeable air quality impacts associated with approving these APDs.

**6. *Summary: The EA fails to disclose emissions from flaring and accurate background pollutant concentrations.***

**Response:** Please see comment response 4 above explaining why the EA adequately analyzed emissions associated with flaring.

Background pollutant concentrations in this EA were provided by the CDPHE Air Quality Control Division. The CDPHE uses a website form<sup>2</sup> to provide background concentrations for permit modeling. BLM considers this to be the best available information and relies on CDPHE to comply with all applicable regulations and guidance, such as 40 CFR Part 51, Appendix W when providing this information. . Given that CDPHE provided background pollutant concentrations included in the EA, there is no basis to believe that this background information is not accurate.

**7. *Summary: The EA fails to analyze secondary PM<sub>2.5</sub>.***

**Response:** Secondary PM<sub>2.5</sub> is not a pollutant of concern for these projects. While AERMOD does not estimate secondary formation of PM<sub>2.5</sub> from its precursors, scientific literature explains that secondary PM<sub>2.5</sub> formation is highly variable and dependent on site specific atmospheric parameters. Full atmospheric meteorology and chemistry would be needed to model secondary PM<sub>2.5</sub> formation . Given the EI associated with these APDs, a photochemical grid model (ex: CAMx - CARMMS) is neither appropriate nor

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<sup>2</sup> <http://www.colorado.gov/airquality/permits/AmbientBackgroundConcentrationExcelMacroForm.xlsm>

warranted. EPA guidance<sup>3</sup> on the subject of assessing secondary PM<sub>2.5</sub> impacts for sources subject to NSR/PSD suggests that the emissions from each well pad would be below the Significant Emissions Rate (SER) threshold of 10 and 40 tpy for direct emissions of PM<sub>2.5</sub> and NO<sub>x</sub> respectively. Although the guidance is not applicable to the sources located at the project sites (they are not major sources or ‘subject to’ sources under 40 C.F.R. Part 51, Subpart I), the SER limits are conservative enough to ensure all potentially significant emissions are considered.

BLM provided a cumulative analysis of these emissions in the CARMMS model used to evaluate overall air quality for the entire state. The CARMMS is a regional scale photochemical grid model with the capability to simulate secondary PM<sub>2.5</sub> formation for each source apportionment area. It is not possible at this time to distinguish the CARMMS modeled concentrations for PM<sub>2.5</sub> between the primary and secondary components, and thus the values are for total PM.

8. *Summary: The EA fails to adequately disclose cumulative impacts of air quality by not going beyond disclosure of an emissions inventory.*

**Response:** Cumulative impacts were disclosed for the proposed project through discussion of the CARMMS high development model scenario (see EA pg. 27). The BLM initiated the CARMMS study to address cumulative impacts from oil and gas development on a statewide basis, and incorporated preliminary results of the study (where available) into this EA. The CARMMS study discloses air quality impacts from oil and gas impacts in the RGFO area as well as the other quasi-cumulative source groups described below). All of the current standards referenced in the comment were used in both the CARMMS and in the project specific EA analysis. As discussed in the EA, the CARMMS model and associated scenarios provide information on cumulative impacts as well as where the final report is located for public access.

The EA disclosed the PSD pollutant increments - including PM<sub>2.5</sub> - and explained that this was not an increment analysis, which the State of Colorado has authority to perform), and AQRVs (visibility and deposition) impacts at nearby or maximally impacted Class I and sensitive Class II areas. The EA also disclosed the preliminary DVF ozone impacts at RRF monitors within the region. Further, where we had data for source apportionment groups we provided the relative contributions to these results from; 1) new oil and gas sources with the RGFO Area 1, such as Weld County in northern Colorado; 2) cumulative new federal oil and gas in Colorado; 3) cumulative new federal and non-federal oil and gas in Colorado; and, 4) all cumulative sources (not just oil and gas, but also other sources such as EGUs, mobile, etc...) within the 4km CARMMS modeling domain. This data provides an adequate basis for a FONSI for the North Platte and Antelope projects, given that the disclosed impacts are for the year 2021, and that the contemporaneous, present-day cumulative impacts from oil and gas are much less than the projected oil and gas emissions increases and the associated results modeled by CARMMS.

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<sup>3</sup> Letter from Stephen D. Page, to Regional Air Directors 1-10, March 20, 2014

9. **Summary:** *The BLM has not used accurate global warming potential factors in the analysis.*

**Response:** According to EPA's website<sup>4</sup> (Dec. 2, 2014), the global warming potential (GWP) of methane is 21 times that of carbon dioxide. EPA used a GWP factor of 25 in its proposed Greenhouse Gas Reporting Rule (40 CFR Table A-1 to Subpart A of Part 98). The BLM updated EI factors to reflect this higher GWP value. The factor, and new calculated value for total project CO<sub>2</sub>e is not a significant change in relation to the total global GHG emissions that were used to predict global climate change impacts. This new level of project level CO<sub>2</sub>e emissions is not significant when compared to global emissions (total EA = 22.1 x 10<sup>3</sup> vs. global (2013) 38 x 10<sup>9</sup>). Ultimately, total global emissions drive the climate models and those results are interpreted to forecast climate impacts for the region, which were disclosed in the EA (pg 35). To clarify, the predicted impacts disclosed in the EA would remain the same regardless of the GWP figure used to estimate project level CO<sub>2</sub>e, and the EA adequately discussed climate change, global warming and the associated predicted climate impacts.

10. **Summary:** *The EA fails to adequately address methane emissions associated with several sources including tanks, dehydration units, flares/controls equipment, flares/blowdowns and flares/workovers-recompletions.*

**Response:** See comment response 4 for a discussion of flaring and dehydration units.

BLM's current inventory model identifies but does not quantify methane emissions from specific tanks. These emissions are identified, but not quantified because the tank emissions equations are currently dependent on CDPHE county specific emissions factors (ex: volatile organic compounds and hazardous air pollutants), or specific process modeling outputs (ex: Promax) the project proponent would provide. These emissions factors are in units of lbs of pollutant/bbl of production. No such equivalent emissions factor unit exists for methane emissions. The BLM has been contemplating a change to the front end of the calculation tool to collect gas / oil ratio (cf/bbl) data that will allow us to calculate tank methane emissions from gas profile data as is currently done for components and pneumatic devices. The current tool front end configuration and calculation methodology does not currently allow for this, but the next version release will.

According to BLM data, methane within the tank flash gas is less than 1% by weight compared to that of the VOC gases. Any flashing that may occur in the project's storage tanks is controlled by a vapor recovery unit, as mentioned above. A quick ratio calculation of the uncontrolled VOC mass emissions from tanks (EA 7.38 tons) vs. the VOC gas wt. % from the gas analysis profile (99%) as compared to the methane wt. % (< 1 %) provides that methane emissions from tanks would be approx. 0.074 tons per year (tpy). Even with the GWP of 25 applied to the mass of the methane, the CO<sub>2</sub>e is still less than 2 tpy. Because the tank methane emissions are exceedingly small or negligible, BLM has determined that they would not result in any changes to the disclosed potential

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<sup>4</sup> <http://www.epa.gov/climatechange/ghgemissions/gases/ch4.html>

climate impacts. Please note the EA emissions tables have not been updated with this information due to the fact that this is not our preferred methodology for making these calculations. While reasonable and technically defensible, our preferred method will be based on the EI tool changes described above.

BLM considered your exhibit 10 at 6851 and your request to use these methods to account for fugitive emissions. BLM has already accounted for project related fugitive emissions within the EI, and determined that tank methane emissions are not significant. The rdocument you provided in exhibit 10 at 6851 is a peer review level journal article based on two days of observation in May of 2012 and does not represent a settled or appropriate scientific method. . There is nothing in the article or your comment to suggest a methodology for applying the results or methods to a project scale analysis. The article is based on a top down methodology capturing emissions from literally thousands of older wells, exempted equipment (from regulation & control), and potentially poorly maintained and/or aging infrastructure existing within the region. It is not applicable to the sources identified in the EA. Those sources are not exempt from regulation and control requirements. Because of these differences, the information you provided does not provide a useful method that can be used in the EA's analysis of methane emissions.

- 11.** *Summary: Before the BLM can approve further oil and gas development, including the proposed APDs, BLM must analyze impacts as they pertain to the social cost of carbon.*

**Response:** The social cost of carbon protocol (SCC) was developed by an Interagency Working Group (IWG), including the Environmental Protection Agency (EPA) and others, for use in cost-benefit analyses of proposed regulations that could impact cumulative global emissions (Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, available at: <http://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf>). The SCC is used to estimate the monetized damages associated with an incremental increase in carbon emissions in a given year. It includes (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change. The SCC was developed to assist agencies in meeting Executive Order (EO) 12866's requirement to assess costs and benefits during the development of regulations.

Uncertainty of production rates, volumes, and end uses from the proposed action and alternatives would seriously limit application of the SCC protocol. The Agency does not know whether the fuel would be used in vehicles, power plants, or other consumptive use with varying emission rates; or what changes in technology or climate affecting end-uses may occur. The speculative nature and high variability of such an analysis is of little use in making a determination of whether these specific APDs should be approved.

EO 12866 requires cost-benefit analyses when developing regulations, and the IWG encourages the use of the SCC protocol in those cases. The North Platte F-22 and Antelope T-18 APD EA was not prepared to support the promulgation of a regulation.

Rather, the analysis was prepared to inform the BLM's decisions as to whether or not to approve specific APDs.

Unlike EO 12866 (which is not applicable here), NEPA does not require a quantitative cost-benefit analysis. (40 CFR 1502.23). As contemplated in the CEQ regulations, the analysis recognizes that there are environmental costs associated with the development and use of fossil fuels. The analysis appropriately weighs the merits and the drawbacks of the proposed action and alternatives, without reduction to a monetary or quantitative cost-benefit analysis that would likely be so imprecise as to be misleading.

The North Platte F-22 and Antelope T-18 APD EA does not include a cost-benefit analysis. A cost-benefit analysis examines the economic efficiency of a proposed action—the net change in social welfare resulting from the costs and benefits of a proposal, including consideration of market and non-market values. Presenting the SCC cost estimates quantitatively, without a complete monetary cost-benefit analysis which includes the social benefits of energy production, would be misleading.

The fact that the effects or costs of carbon emissions were not quantified does not mean that they were ignored. The EA evaluated the climate change impacts of the proposed action in qualitative terms. The EA quantified the estimated greenhouse gas emissions 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 for the project. The EA qualitatively describes the potential increases in GHG emissions on the environment using climate projections specific to Colorado. This information is at a scale that is relevant and useful to the decision-maker and meets the requirements of NEPA (p. 21-39).

### **Water related comments**

- 12. *Summary:*** *Water consumption impacts, comment states that more than 50 acre feet of water are required to drill and fracture one horizontal well in the Niobrara formation, resulting in the permanent loss of 50 acre feet of water for each well..*

**Response:** Based on information gathered from several operators in the DJ basin, BLM estimates the average amount of water used to drill and fracture treat a typical horizontal well in the region takes about 11.2 acre feet of water. Although many of the wells recently drilled in the region are horizontal in nature, some of the leases may be developed with vertical and directional wells, which BLM estimates require 1.8 and 2 acre feet of water, respectively, to drill and fracture treat. Recycling of water is common, so not all of the water required to drill and complete a well is first use water, nor is it all permanently lost.

- 13. *Summary:*** *Water quality impacts, risk of groundwater and surface water contamination due to horizontal drilling and fracturing, including contamination due to spills.*

**Response:** The majority of spills take place inside secondary containment berms, and many others never leave the surface of the oil and gas location. Federal and State regulations require operators to clean up all spills regardless of where they take place. Clean up must meet requirements of federal and state regulations before operators are released from liability.

The fracturing process involves pressuring up the formation with a fluid at a pressure high enough to break down and fracture the formation, yet low enough to be within the design of the cement and casings making up the well. In addition, the rock strata above the producing formations provide a natural barrier to vertical migration of fluids. These barriers created the reservoir in the first place by forming a trap where fluids could accumulate. There are strong incentives to keep the fractures from encroaching into these natural barriers as the target zone is only the oil and gas zone. Hydraulic fracturing programs are designed for the target formation, using knowledge of in-situ properties and modeling of the formation. The target Niobrara zone to be fractured in the Bonanza Creek wells occurs at a depth of approximately 6330' TVD. The fresh and usable water zones occur from 1500' to the surface. The target zone is isolated from the fresh and usable water zones by over 4000' of shale, siltstones and sandstones with the majority of the rock being shale. The fracturing will not produce fissures to reach the water zones through over 4000' of rock.

In accordance with 43 CFR 3162.3-1, Drilling Applications and Plans, the well is approved only after appropriate environmental and technical reviews by the authorized officer (AO) of the BLM. Permitting is a site-specific process. A thorough review of submitted materials for each individual well by BLM resource specialists is completed. The geologist performs independent review utilizing Colorado Division of Water Resources data, Colorado Geological Survey maps and publications and Colorado Oil & Gas Conservation Commission records to generate a geological report. The geologist identifies usable ground water and mineral-bearing zones that require protection. The petroleum engineer reviews the casing and cementing portions of the drilling plan to ensure the protection of those zones identified by the geologic report. Conditions of approval (COAs) are attached to the APD as necessary.

Usable ground water resources are protected during drilling in accordance with BLM Onshore Oil and Gas Order No. 2, Drilling Operations. Onshore Order No. 2 requires that all formations containing usable quality water ( $\leq 10,000$  mg/L total dissolved solids) be isolated and protected utilizing cement. "If encountered while drilling, usable quality water requires protection by bringing the cement at least +/- 200' above the usable water quality zone". BLM petroleum engineers (PEs) and petroleum engineering technicians (PETs) conduct inspections to ensure that the operator's plans have successfully avoided environmental impacts. PETs inspect well sites during drilling, completion and production for technical and safety compliance.

In accordance with 43 CFR 3162.4-2, Samples, Tests and Surveys, "during the completion of a well, the operator shall, when required by the authorized officer (AO), conduct, test, run logs and make other surveys reasonably necessary to determine the

presence, quantity, and quality of oil, gas, other minerals, or the presence or quality of water.” These tests and logs are reviewed and correlated with geologic and hydrologic data. “When needed, the operator shall conduct reasonable tests which will demonstrate the mechanical integrity of the down-hole equipment” (43 CFR 3162.4-2(b)). In order to protect fresh water and other minerals, “tests and surveys of the effectiveness of such measures (to isolate and protect usable water) shall be conducted by the operator using such procedures and practices approved or prescribed by the AO”. The BLM has the authority to require companies to do reasonable testing if deemed necessary. The BLM AO may require an operator to conduct cement bond log surveys to verify cement adequacy.

#### **NEPA related comments**

- 14.** *Summary: The Resource Management Plan (RMP) and the 1991 Oil and Gas EIS does not address or analyze impacts of fracking and horizontal drilling.*

**Response:** While the RMP or the Oil and Gas EIS do not specifically analyze fracking and horizontal drilling, they likewise do not preclude such technologies being analyzed in leasing and APD EAs and even discuss horizontal drilling as a newly developed method that could reduce environmental impacts by accessing much more of the producing formation while reducing surface impacts with fewer drilling pads and infrastructure. The potential impacts of fracking and developmental design features to safeguard the environment from these potential impacts are discussed on page 41 in the water quality section of the EA and discussed in detail in item 13 of these comment responses. 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.

- 15.** *Summary: The 1994 Resource Management Plan (RMP) and the 1991 Oil and Gas EIS are of sufficient age that they no longer sufficiently disclose potentially significant impacts related to oil and gas development and cannot reasonably reach FONSI.*

**Response:** The 1991 Oil and Gas EIS, and the EIS for the 1994 RMP provided analysis of management decisions that provided for oil and gas development and set conditions for that development by analyzing existing conditions and impacts to individual resources and applying relevant stipulations the environment and analyze the current environment through leasing and development EAs. New conditions, development techniques and impacts are analyzed and stringent Conditions of Approval (COAs) that are developed from lease stipulations and oil and gas Best Management Practices (BMPs) are applied at the development stage.

- 16.** *Summary: In accordance with 40 CFR § 1502.9(c)(1)(ii) the BLM should revise or supplement 1994 RMP FEIS and/or the 1991 oil and gas FEIS to address the Field Office-wide impacts of horizontal drilling and fracking.*

**Response:** The 1994 RMP EIS is in the initial stages of revision. The revision will address and analyze fracking and horizontal drilling on a planning level. The 1991 Oil

and Gas EIS does address horizontal drilling as a potential method of reducing environmental impacts:

“The recent development of horizontal drilling holds promise of further reductions in disturbance of surface resources and values. Use of directional drilling, horizontal and multiple completion drilling technology could further reduce the number of surface locations and provide greater flexibility in siting locations.”

The Water section of the EA analyzes the potential for contamination of ground water and the environment and describes prevention and mitigation through current industry requirements and practices that require rigorous cementing and casing programs that virtually eliminate any potential subsurface contamination.

**Wildlife related comment:**

17. *Summary: BLM has not adequately analyzed potential impacts caused by water depletions to the South Platte River caused by oil and gas development to federally listed species dependent on wetlands habitat downstream on the Platte in Nebraska.*

**Response:** BLM has completed consultation under Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). The BLM prepared and submitted a programmatic biological assessment that acknowledged new depletions to the South Platte River and required oil and gas operators to become members of the South Platte Water Related Activities Program, Inc. (SPWRAP) to provide ESA compliance for potential impact to target species.<sup>5</sup> This Programmatic Biological Assessment addresses potential impacts from operation of fluid minerals program on lands administered by the BLM on federally-listed species in Nebraska. In response to this assessment, the United States Fish and Wildlife Service issued a Programmatic Biological Opinion stating " . . . the [BLM's Fluid Minerals Program], as described, is not likely to jeopardize the continued existence of the federally endangered whooping crane, interior least tern, and pallid sturgeon, or the federally threatened northern Great Plains population of the piping plover, or western prairie fringed orchid in the central and lower Platte River.<sup>6</sup> The Federal Action is also not likely to destroy or adversely modify designated critical habitat for the whooping crane (FWS 2015)." The T&E section of the environmental assessment has been amended to reflect the completion of this process.

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<sup>5</sup> United States Department of Interior Bureau of Land Management (BLM), 2015. Programmatic Biological Assessment for BLM's Fluid Minerals Program in Platte River Basin in Colorado. Bureau of Land Management Colorado State Office, Lakewood, Colorado.

<sup>6</sup> United States Department of Interior Fish and Wildlife Service (FWS), 2015. Programmatic Biological Opinion for the BLM's Fluid Mineral Program in the [South] Platte River Basin, Colorado. United States Fish and Wildlife Service Colorado Ecological Services Office, Denver, Colorado.

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

**DECISION RECORD**

Project Name

**DOI-BLM-CO-F02-2014-035-EA**

DECISION: It is my decision to authorize the Proposed Action as described in the attached EA. The proposed action is to approve six (North Platte F-22) APDs proposing to construct one well pad (F-22) and drill six horizontal wells in order to develop federal minerals from a private surface over private minerals, and to approve four (Antelope T-18) APDs allowing the continued production federal minerals along with the fee minerals from the four Antelope fee/fee/fed wells that were previously drilled without BLM approval.

The projects are in Weld County, approximately 10 miles east of the town of Kersey, Colorado. The federal mineral estate is leased and subject to oil and gas development.

The proposed action was analyzed in the Environmental Assessment (EA) DOI-BLM-CO-F02-2014-035 and a Finding of No Significant Impact was reached and an EIS will not be prepared.

RATIONALE: This APD will develop oil and gas resources on Federal minerals Lease COC #63737 and 76041 consistent with existing Federal lease rights provided for in the Mineral Leasing Act of 1920, 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 oil and gas production. The addition of the infrastructure needed to develop these ten wells would have mostly temporary and overall minor impacts on resources present in the project area.

MITIGATION MEASURES\MONITORING:

**Air Quality:**

Bonanza Creek 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.

- Bonanza Creek Energy, Inc. will use industry best practices, including watering, graveling, and reseeded 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.

**Geology and Mineral Resources** 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.

**Invasive Plants:** Equipment used to implement the proposed action should be washed prior to entering the project area to remove any plant materials, soil, or grease. Areas disturbed by project implementation will be monitored for the presence of weeds on the Colorado State Noxious Weed list. Identified noxious weeds will be treated. Monitoring is required for the life of the project and for three years following completion and/or abandonment of the wells and elimination of identified Colorado State Noxious Weeds list A and B species.

**Wildlife Terrestrial:** No surface use should be allowed beginning January 1 for a period of 60 days to protect big game winter ranges as delineated by Colorado Parks and Wildlife. An exception may be granted because of climatic conditions or if the winter range habitat is unsuitable or unoccupied during winter months.

**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.

**Paleontologic Resources** In order to prevent potential impacts to paleontologic resources, a condition of approval will be attached to the APD that directs the holder to notify the BLM RGFO immediately if any vertebrate fossils or their traces are discovered during operations. Operations may continue as long as the fossil specimen would not be damaged or destroyed by the activity. Within 5 working days of notification, the BLM RGFO shall evaluate or have evaluated such discoveries and shall notify the operator what action shall be taken with respect to such discoveries.

**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.
- No treatment or disposal of non E&P wastes on site is allowed on Federal Lands.
- All concrete washout water needs to be contained and properly disposed of at a permitted offsite disposal facility.
- If pits are utilized they need to be lined to mitigate leaching of liquids to the subsurface, as necessary. State and/or Federal regulations may apply to pit construction and removal.

**PROTEST/APPEALS:** 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.

SIGNATURE OF AUTHORIZED OFFICIAL:

/s/ Keith E. Berger  
Keith E. Berger, Field Manager

DATE SIGNED:

3/20/2015