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

Environmental Assessment

SMU 7-15-I and 8-15-D APDs

DOI-BLM-CO-F02-2014-44 EA

July, 2014

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CHAPTER 1 - INTRODUCTION

1.1 IDENTIFYING INFORMATION

CASEFILE/PROJECT NUMBER (optional): Lease # COC10488 and COC10646

PROJECT TITLE: SMU 7-15-I and 8-15-D

PLANNING UNIT: Royal Gorge

LEGAL DESCRIPTION: Huerfano County, T27S R70W S 15

APLLICANT: OXY USA

1.2 INTRODUCTION AND BACKGROUND

The BLM has received two Applications for Permits to Drill (APDs) for new CO2 wells. The proposed 7-15-I would be drilled from an existing pad which currently contains 4 producing CO2 wells and a compressor station. This pad would have to be expanded to accommodate the drilling equipment and the well head. Most of the disturbance would be short term and take place on previously disturbed ground. The proposed 8-15-D would be drilled from a new pad between two existing pads, along an existing unit road. Both projects would take place in the Sheep Mountain Unit (SMU), which was established in the late 1970's through the early 1980's. Extensive production and maintenance infrastructure was installed at that time. There are several other active CO2 wells in the unit. The surface at the proposed 7-15-I is privately owned, and the surface of the 8-15-D is managed by BLM. The target minerals associated with both wells are federally owned. The federal minerals are leased and subject to development.

The CO2 that is produced in the SMU is piped to the Permian Basin, where it is used for CO2 flooding of oil wells.

The project is in Huerfano County, approximately 6 miles south of Gardner. The general area description would be defined as mountainous forest (mixed conifer and pinion/juniper) and rangeland on the northwest side of Sheep Mountain. The proposed project is located on a ranch used for cattle grazing and CO2 production.

There was a pre-project onsite meeting attended by representatives from BLM RGFO and the operator on April 9, 2014. Access to the proposed project is limited to private roads constructed and maintained by the operator of SMU, over private surface. The only nearby structures are facilities related to the production of CO2 in the SMU. There is no easy public access to the project area.

OXY submitted a sundry notice and an APD in December, 2013, prior to submitting the APDs analyzed in this document, proposing the deepening of an existing well (SMU 6-15-I) and the drilling of a new well (4-23-L) within the SMU on an existing pad. These proposals were analyzed and approved with a separate document; DOI-BLM-CO-F02-2014-025 EA.

1.3 PURPOSE AND NEED

The purpose of the action is to provide the applicant the opportunity to develop their lease for the production of CO2. The need for the action is to develop CO2 resources on federal leases COC 10488 and COC10646 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 SMU 7-15-I and 8-15-D Applications for Permits to Drill (APDs) based on the analysis contained in this Environmental Assessment (EA). This EA will analyze the proposed action; to expand an existing well pad and construct a new pad in order to drill two new CO2 wells in order to develop federal minerals. Access to the proposed project would be on existing highway, county and private roads. The finding associated with this EA may not constitute the final approval for the APD.

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: Royal Gorge Resource Management Plan

Date Approved: 05/13/1996

Decision Number: 10-27, 10-28, 10-29, 10-30.

Decision Language: "BLM administered mineral estate will be open to fluid minerals leasing, exploration, and production subject to the lease terms and applicable lease stipulations as shown in Appendix A of this ARMP/ROD."

1.6 SCOPING, PUBLIC INVOLVEMENT AND ISSUES

1.6.1 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, and a two week public scoping period initiated by notifying Huerfano County's Oil and Gas liaison and media

and interested parties on BLM RGFO's scoping list. There were no issues were identified during public scoping.

The draft EA was made available on the BLM NEPA website for a two week public comment period initiated by notifying Huerfano County's Oil and Gas liaison and media and interested parties on BLM RGFO's scoping list.

Comments on the draft EA were received from the organization, Green Rockies Emerging Ecology Network, a group of involved citizens based in La Veta, Colorado. The group is concerned with the changing landscape in Huerfano County and the demographics of new land owners moving to the area to experience a rural quality of life and being faced with the realities of split estate lands and federal mineral rights.

Specifically the group was concerned with the term "insignificant" when used in reference to cumulative impacts with the action. This phrasing has been changed to reflect a minor but incremental change due to the action being confined to the footprint of the current operation.

An additional concern was the production and consequences of CO_2 as a greenhouse gas and the "Social Cost of Carbon". Please see Appendix A for BLMs response to this concern.
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CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

2.1 ALTERNATIVES ANALYZED IN DETAIL

2.1.1 PROPOSED ACTION

The proposed action is to expand an existing well pad on private surface and construct a new pad on BLM surface in order to drill two new directional CO2 wells to develop federal minerals in an existing federal unit.

Proposed Project Details:

7-15-I

Although drilling and completion of these activities will take place on an existing pad, the pad must be expanded in order to accommodate the drilling rig and related equipment. This pad is located on private surface over federal minerals. The temporary footprint needed for drilling the well is approximately 6 acres some of which was previously disturbed. After interim reclamation, this surface disturbance will be reduced to approximately 1 acre.

Due to the relatively steep terrain in the project area, a significant amount of dirt work is required. The drilling pad for the proposed 7-15-I will require a maximum cut of 52 feet and a maximum fill of 1 foot. This will result 123,870 cu yards of excess cut and topsoil. The spoils

will be segregated from the topsoil, which will be stripped from the location before construction begins. The stockpiles will be placed where they can be retrieved and redistributed over the project area for interim reclamation.

All access roads, pipelines, power lines, compressors and other necessary infrastructure are already in place and servicing the existing wells. If the well is a producer, only a short run of flowline from the wellhead to the existing compressor station will be installed, entirely within the previously disturbed footprint of the drillpad.

8-15-D

A new pad is proposed on BLM managed surface within the SMU in order to drill the 8-15-D well. This proposed pad will be located adjacent to an existing well pad, which contains the producing SMU 12-15 CO2 well. The proposed 8-15-D well will be located approximately 400 feet from the 12-15 well.

Access to this pad would be through existing unit roads, no new roads would be constructed. The temporary footprint needed for drilling the well is approximately 6 acres, some of which was previously disturbed. After interim reclamation, this surface disturbance will be reduced to approximately 1 acre.

Due to the relatively steep terrain in the project area, a significant amount of dirt work is required. The drilling pad for the proposed 8-15-D will require a maximum cut of 30.4 feet and a maximum fill of 27.7 feet. This will result 3,600 cu yards of excess cut and topsoil. The spoils will be segregated from the topsoil, which will be stripped from the location before construction begins. The stockpiles will be placed where they can be retrieved and redistributed over the project area for interim reclamation.

In order to transport CO2 produced by the proposed 8-15-D to the existing compressor station (which is located on the same pad as the proposed 7-15-I), approximately one-half mile of new pipeline will be installed underground; if this well is a producer. The first 400 feet of pipeline would be contained within the footprint of the proposed 8-15-D pad and the previously disturbed footprint of the existing 12-15 pad, where the pipeline would join the previously disturbed pipeline corridor containing the existing flowine from the 12-15 well. The new flowline will be buried alongside the existing flowline, sharing the same corridor until it reaches the existing compressor station located on the 7-15 pad. The width of this existing corridor is approximately 30 feet, and all new disturbance related to the pipeline will be within this corridor.

There are multiple sources of water available for purchase for the drilling and completion of the wells. A spring owned by the surface owner, located in NE, NE of S 22, 27S 70W, is approved for drilling water supply, and will be the primary source of water for the project. Weber drilling is a commercial water transport and supply service who could provide additional water, as well as the Huerfano River, which Oxy has secured approval for drilling use for this project. Oxy has reached an agreement with the Huerfano County Water Conservancy District, and is covered under their Substitute Water Supply plan for the use of the spring and river sources. Water will be stored in portable, temporary tanks to reduce truck traffic and allow for the reuse of the water.

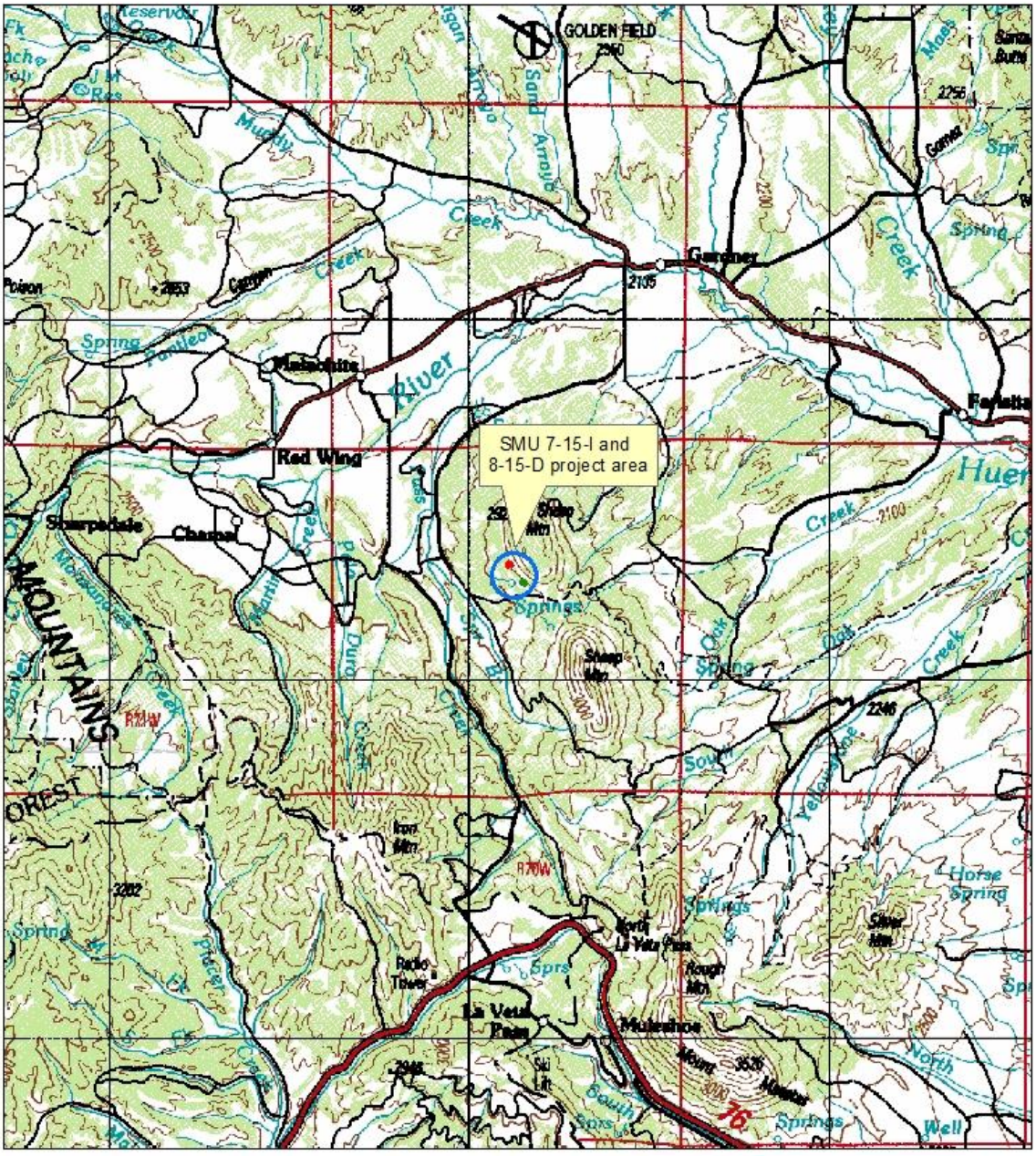
A closed loop system will be used for drilling and completion activities. Cuttings will be placed in a steel container; from there they will be hauled offsite to an appropriately state permitted landfill. Drilling, completion and any produced fluids will be contained in steel tanks and removed from the site where they will be re-used, or disposed of in accordance with all State and Federal laws.

Interim reclamation of the pad, and reclamation of the pipeline corridor 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 with a seed mix and saplings approved by the surface owner. During the life of the project, the area will be monitored for presence of weeds, which if present, will be controlled by a licensed applicator.

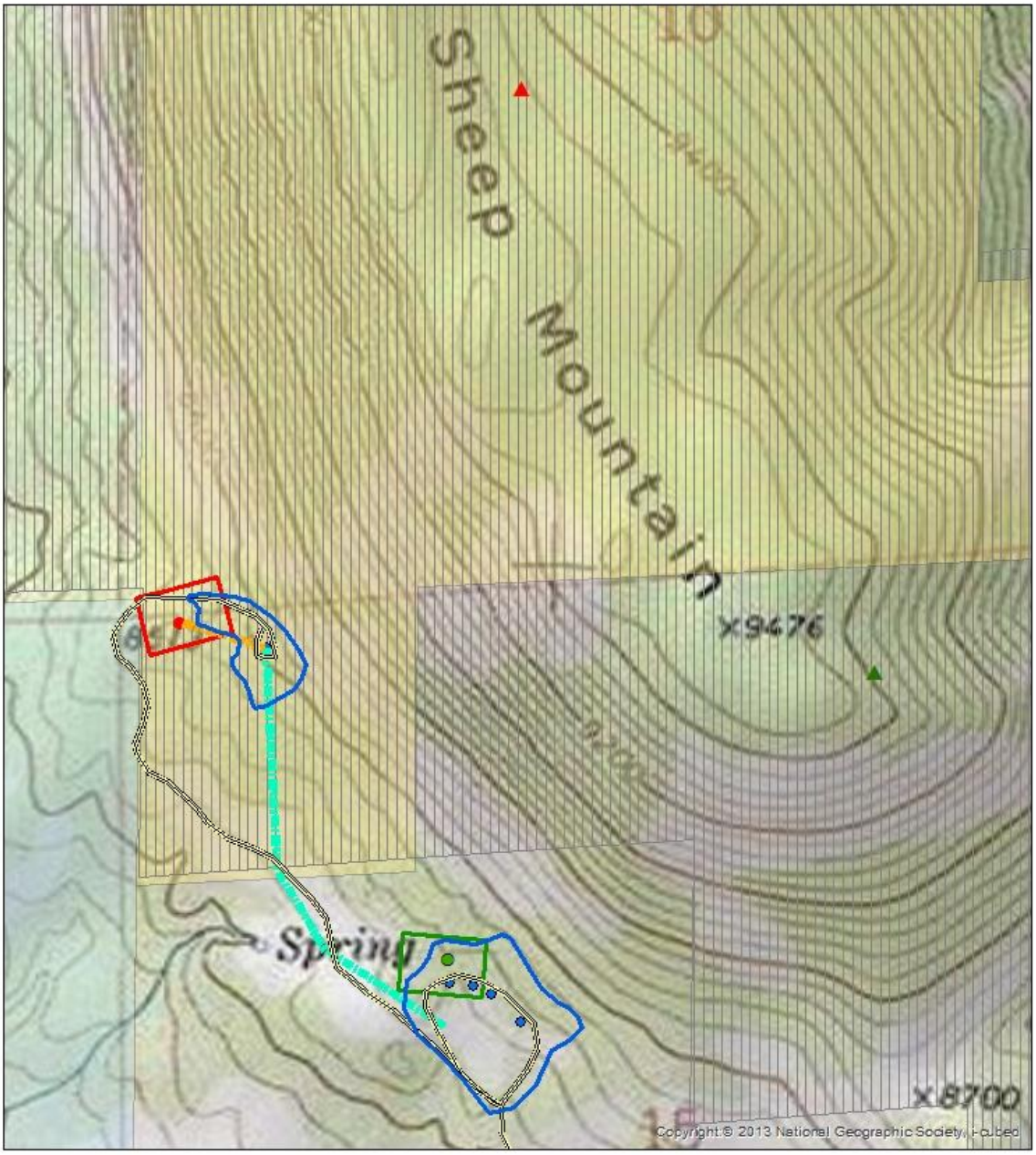
Final reclamation of the project will begin within 6 months (weather permitting) of well plugging. Final abandonment will be completed in accordance with approved APD, which consists of proper plugging of wells, removal of all facilities and related equipment from the surface of the site. All areas will be returned to their original contour, reserve topsoil berm spread over the surface, and entire area reseeded with seed mix specified by the surface owner who uses this surface for cattle grazing.

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 Leases COC 10488 and 1064 , Onshore Oil and Gas Orders, and 43 CFR §3100.

Overview Map



Topographic Project Map



Previously Disturbed Area
Existing Lease Road
Existing Flowline Corridor
Proposed Flowline Corridor
Proposed 7-15-I Pad
Proposed 7-15-I Well
Proposed 7-15-I BHL
Proposed 8-15-D Pad
Proposed 8-15-D Well
Proposed 8-15-D BHL

PROJECT TOPO OF SMU 7-15-I AND 8-15-D

DOI-BLM-CO-F02-2014-044 EA

6th PM, T27S R70W

0 0.0375 0.075 0.15 0.225 0.3 Miles

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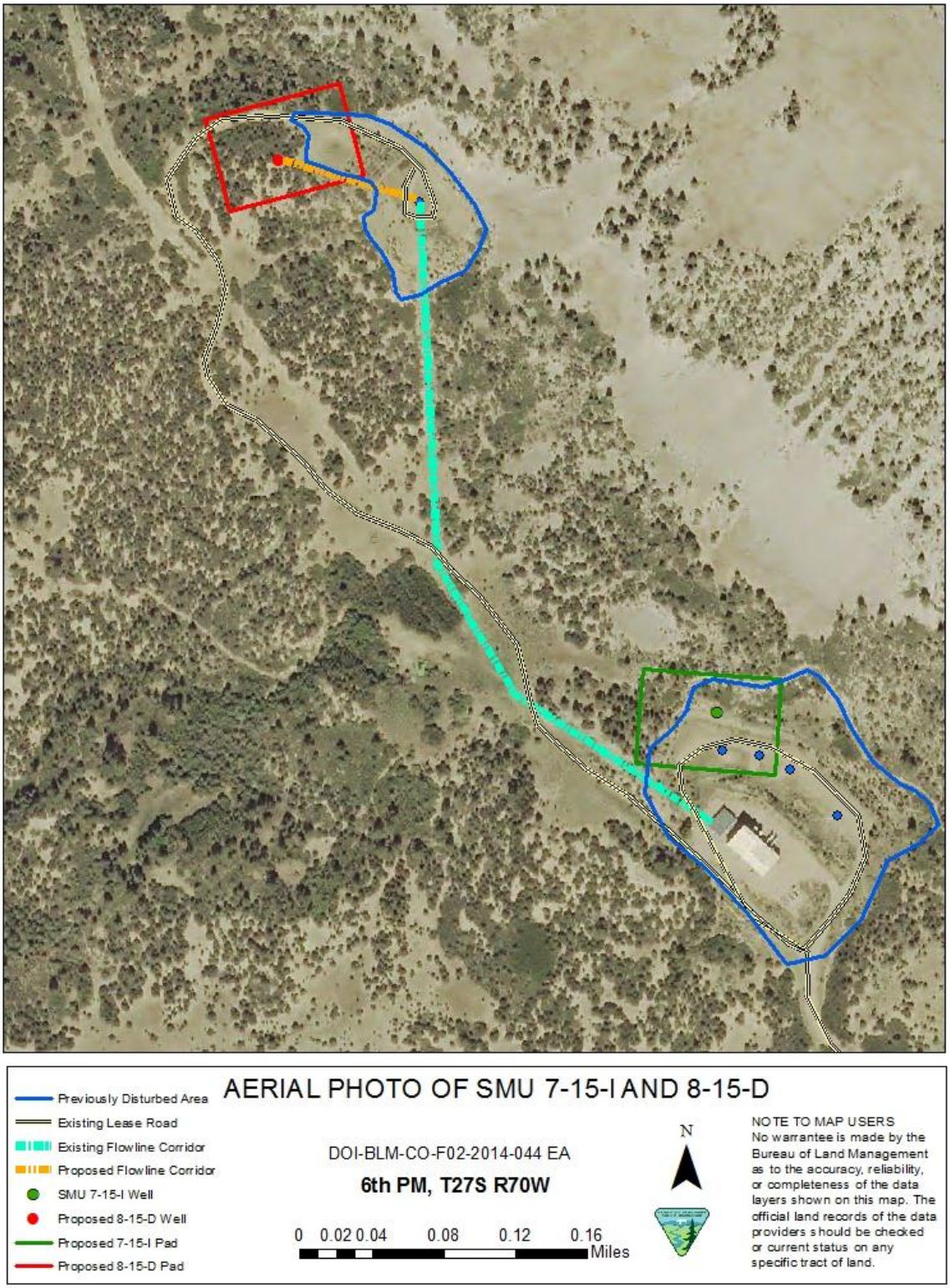
NOTE TO MAP USERS
No warrantee is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of the data layers shown on this map. The official land records of the data providers should be checked or current status on any specific tract of land.

Aerial Photo of Project



2.1.2 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 APD associated with the proposed action.

2.2 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.

Resource	Initial and date	Comment or Reason for Dismissal from Analysis
Air Quality *Ty Webb, Chad Meister, Forrest Cook*	FC, 8/4/14	See affected environment
Soils *John Smeins*	JS, 8/4/14	All infrastructure is already in place and consists of expanding the existing pad. All disturbances would be constructed and reclaimed according to BLM Gold Book standards unless otherwise stipulated by the surface owner.
Water Quality Surface and Ground *John Smeins*	JS, 8/4/14	See Water Quality section.
Invasive Plants *John Lamman*	JL, 07/31/2014	See affected environment.
T&E and Sensitive Species *Matt Rustand*	MR, 7/15/2014	None present.

Resource	Initial and date	Comment or Reason for Dismissal from Analysis
Vegetation *John Lamman*	JL, 07/31/2014	See affected environment
Wetlands and Riparian *Dave Gilbert*	DG, 8/4/14	Proposed action is within upland habitat. Public or private land wetlands are not directly affected.
Wildlife Aquatic *Dave Gilbert*	DG, 8/4/14	Proposed action is within upland habitat. Public land aquatic habitat is not affected.
Wildlife Terrestrial *Matt Rustand*	MR, 7/15/2014	See affected environment
Migratory Birds *Matt Rustand*	MR, 7/15/2014	See affected environment.
Cultural Resources *Monica Weimer*	MMW, 7/16/14	Cultural Resources: No historic properties were found in the area of potential effect (see report CR-RG-14-92 N). Therefore, the proposed undertaking will have no effect on any historic properties (those eligible for the NRHP).
Native American Religious Concerns *Monica Weimer*	MMW, 7/16/14	No possible traditional cultural properties were located during the cultural resources inventory (see above). There is no other known evidence that suggests the project area holds special significance for Native Americans.
Economics *Dave Epstein, Martin Weimer*	AR, 8/6/14	Project is located in an established federal unit, with all infrastructure currently in place. Economic impacts would be limited to a slight temporary increase in demand for local services during drilling/construction, and slight increase in royalties to the federal government and severance taxes to state and local governments.
Geologic and Mineral Resources *Melissa Smeins, Stephanie Carter*	MJS, 8/05/2014	See affected environment
Paleontology *Melissa Smeins, Stephanie Carter*	MJS, 8/05/2014	Paleontologic resources not likely to be present but if they are found during the course of any construction activities, Operations shall be immediately suspended and the BLM authorized officer must be contacted. Operations may not resume in the area of the discovery until written authorization to proceed has been issued by the BLM.
Visual Resources *Kalem Lenard*	KL, 8/4/2014	The project would introduce additional landscape modifications that are similar to existing disturbances. This would not result in noticeable changes to the visual resources of the area and therefore there would be insignificant impacts.
Environmental Justice *Martin Weimer*	AR, 8/6/14	The proposed action affects areas that are rural in nature. The land adjacent to the well site is a privately owned ranch, 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.
Wastes Hazardous or Solid *Melissa Smeins*	MJS, 8/05/2014	See affected environment
Recreation *Kalem Lenard*	KL, 8/4/2014	The project would not alter the settings of the area to the level that recreation use would be impacted. The area receives very little. If any, recreation use due to limited public access.

Resource	Initial and date	Comment or Reason for Dismissal from Analysis
Farmlands Prime and Unique *John Smeins*	JS, 8/04/2014	Not Present
Lands and Realty	AR, 8/6/14	Not Present, all authorizations are covered under existing SMU plan of development
Wilderness, WSAs, ACECs, Wild & Scenic Rivers *Kalem Lenard*	KL, 8/4/2014	Not Present
Wilderness Characteristics *Kalem Lenard*	KL, 8/4/2014	The lands with wilderness characteristics inventory was updated in 2013. This parcel was found to not possess wilderness characteristics because it was not of sufficient size. This resource is not present and would not be affected by the proposed action.
Range Management *John Lamman*	JL, 07/31/2014	Surface estate is private for well 7-15-I. Little or no grazing takes place on proposed well site 8-15-D due to topography, dense woody vegetation, and scree field. Livestock grazing on BLM will not be affected by project.
Forest Management *Ken Reed*	KR7/21/14	See affected environment
Cadastral Survey *Jeff Covington*	JC 7/15/14	Chain of Survey located in the project folder.
Noise *Martin Weimer*	AR, 8/6/14	The project area is located in woodlands. 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.
Fire		N/A
Law Enforcement *Steve Cunningham*		N/A

The affected resources brought forward for analysis include:

- Air quality
- Geology/Minerals
- Water Quality
- Soils
- Invasive Plants
- Vegetation
- Wildlife Terrestrial
- Migratory Birds
- Wastes Hazardous or Solid
- Forestry

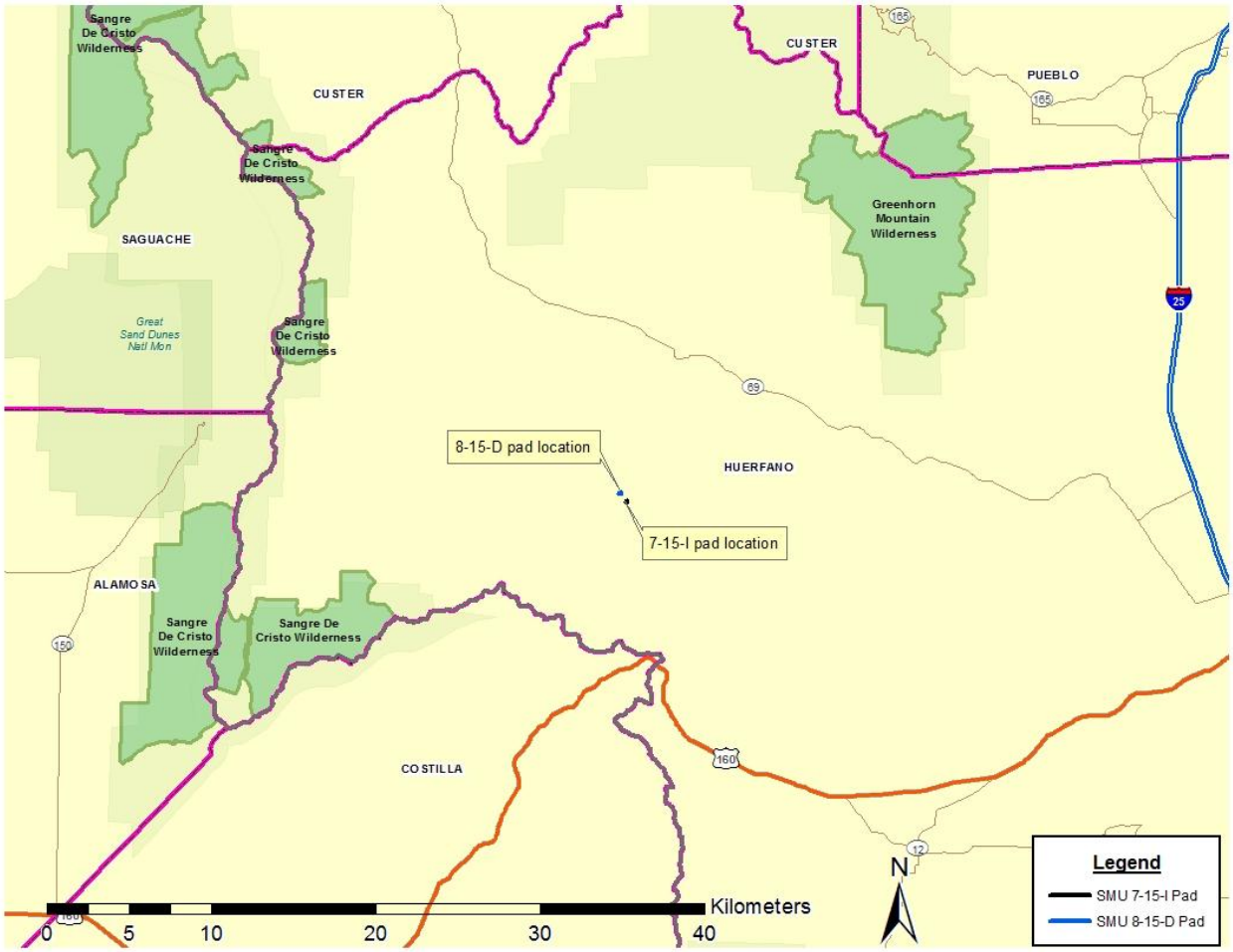
3.2 PHYSICAL RESOURCES

3.2.1 AIR QUALITY AND CLIMATE

Affected Environment: The proposed action is located in a very rural area of Huerfano County, Colorado about 20 miles west of Interstate 25. Mean temperatures in the area range from 22.3 degrees F in January to 87.7 degrees F in July. The area receives average annual precipitation of approximately 17.8 inches. Frequent winds in the area provide excellent dispersion characteristics for distributing anthropogenic emissions.

Activities occurring within the area that affect air quality include emissions from activities associated with nearby active wells, exhaust emissions from general traffic as well as fugitive emissions from roads and agriculture (including biogenic sources). The following figure shows the proposed project location along with nearby Wildernesses and National Parks.

Figure 3-1. Project Location



Regulatory Framework: 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) (40 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_2), particulate matter smaller than 10 & 2.5 microns (PM_{10} & $PM_{2.5}$), ozone (O_3), and nitrogen dioxide (NO_2).

The CAA established 2 types of NAAQS:

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

Secondary standards: – Secondary standards set limits in order 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 incidence rates are evaluated in order to re-propose any NAAQS to a lower limit if the data supports the finding. The Colorado Air Pollution Control Commission, by means of an approved State Implementation Plan (SIP) and/or delegation by EPA, can established state ambient air quality standards for any criteria pollutant that is at least as stringent as, or more so, than the federal standards. Ambient air quality standards must not be exceeded in areas where the general public has access. Table 3.1 lists the federal and state ambient air quality standards.

Table 3-1. Ambient Air Quality Standards (EPA 2014)

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution [Dec 14, 2012]	$PM_{2.5}$	primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years

	PM_{10}	primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [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	Not to be exceeded more than once per year

Very few "online" (currently operating) air quality monitors exist in the region. The next several tables provide air quality monitored values that could be used to assess the air quality in the region.

The following table shows concentrations for APCD air monitors Weld County West Annex (CO), County Tower (O_3), and Hospital (PM_{10} & $PM_{2.5}$) sites located in Greely, Colorado and the Platteville Middle School site ($PM_{2.5}$).

Table 3-2. Ambient Air Quality Monitoring Data Trends (CDPHE 2007 – 2010, EPA Forms)

Monitor	Pollutant (Standard)	2007	2008	2009	2010
West Annex	CO (1 Hour - ppm)	4.0	5.0	4.3	2.3
	CO (8 Hour - ppm)	2.5	2.3	2.3	1.8
County Tower	O_3 (8 Hour - ppm)	0.078	0.076	0.075	0.074
Hospital	PM_{10} (24 Hour - µg/m^3)	89	68	63.0	44.0
	$PM_{2.5}$ (24 Hour - µg/m^3)	24.0	25.2	24.7	22.0
	$PM_{2.5}$ (Annual - µg/m^3)	9.5	7.67	8.36	7.6
Platteville	$PM_{2.5}$ (24 Hour - µg/m^3)	24.0	25.2	25.7	21.1
	$PM_{2.5}$ (Annual - µg/m^3)	10.3	8.23	8.24	7.8

Table 3-3. Additional Ambient Background Concentrations

Pollutant / Units	Non-Particulate Matter Background Monitored Concentrations (Year 2012)			Monitoring Station Information
	1-Hour	1-Hour	1-Hour	
NO_2 (µg/m^3)	9.97[a]	67.37[b]	120.44[c]	a.Rio Blanco County 98th percentile NO_2 1-hour. b.Cheyenne, Wyoming 98th percentile NO_2 1-hour. c.North Denver, Colorado 98th percentile NO_2 1-hour.

Pollutant / Units	Particulate Matter Background Monitored Concentrations (Year 2012)			Monitoring Station Information
	24-Hour	24-Hour	24-Hour	
PM_{10} ($\mu g/m^3$)	91[a]	87[b]	62[c]	a.Greeley, Colorado 2nd maximum 24-hour average PM_{10} concentration. b.Denver, Colorado 2nd maximum 24-hour average PM_{10} concentration. c.Pueblo, Colorado 2nd maximum 24-hour average PM_{10} concentration (year
$PM_{2.5}$ ($\mu g/m^3$)	19[a]	28[b]	17[c]	a.Denver, Colorado 98th percentile 24-hour average $PM_{2.5}$ concentration. b.Longmont, Colorado 98th percentile 24-hour average $PM_{2.5}$ concentration. c.Pueblo, Colorado 98th percentile 24-hour average $PM_{2.5}$ concentration (year

$\mu g/m^3$ = micrograms per cubic meter

NO_2 = nitrogen dioxide

PM_{10} / $PM_{2.5}$ = particulate matter less than or equal to 10 microns / 2.5 microns in size

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)].

The subject activity construction / development phase is projected to last approximately 60 days. The life of the well, 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 during the construction phase when production is also occurring.

The lease area is designated as a Class II Area, as defined by the Federal Prevention of Significant Deterioration (PSD) provision of the CAA. The PSD Class II designation allows for moderate growth or degradation of air quality within certain limits above baseline air quality. The closest Class I area to the proposed well site locations is Great Sand Dunes National Monument, which lies approximately 16 miles to the west.

Environmental Effects - Proposed Action

Direct and Indirect Impacts: In general 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, 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 engines and operational and maintenance checks which may be as frequent as a daily visit. Production phase emissions will result from compressor engines and vehicle exhausts from the maintenance and process technician visits.

Ozone is not directly emitted like other criteria pollutants. Ozone is chemically formed in the atmosphere via interactions of oxides of nitrogen (NO_X) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO_X and VOCs are ozone precursors). Ozone formation and prediction is complex, generally results from a combination of significant quantities of VOCs and NO_X 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 minor project on potential regional ozone formation and transport. However, the State of Colorado assesses potential ozone impacts from its authorizing activities on a regional basis when an adequate amount of data is available and where such analysis has been deemed appropriate. For this reason (inappropriate scale of analysis), ozone will not be further addressed in this document beyond the related precursor discussions and an appropriate qualitative analysis/comparison to background Weld County emissions inventories.

Emission estimates from the proposed wells were calculated for this EA, and are disclosed in Table 3.4 below. The emissions inventories (EI) considered reasonably foreseeable 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_X (includes NO_2), $PM_{2.5}$, PM_{10}, SO_2, VOCs, HAPs, CO_2, CH_4, and N_2O. 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 new project wells assuming the minimum/basic legally required emissions control measures, and common practices and equipment configurations data that was provided by operators in the region.

The following assumptions were applied consistently to all potential activities:

- The EI used a disturbed surface area of six acres for initial well-pad surface disturbance and one acre for well-pad production phase (post reclamation) wind erosion calculations, and one-half mile of surface disturbance for new field pipeline installation.
- All roads and pads will be surfaced with gravel and disturbed surfaces (pads and access roads) would receive appropriate application of water during construction and

development (i.e. drilling) phase and emissions calculations assume additional dust control efficiency.

- All diesel fuel would be standard #2 grade (500 ppm sulfur) or better.
- Drill rigs, completion and fracing engines emissions are based on EPA Non-road Tier 1 emissions standards.
- CO_2 gas processing engines (compressor) for the proposed action will be powered by grid electricity.

Table 3-4 emissions account for full year of production associated with 2 new wells and also includes construction / development phase activities emissions for 2 additional new wells.

Table 3-4. Estimated Maximum Annual Emissions

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	HAPs	CO_2	CH_4	N_2O	CO_{2eq}	CO_{2eq} metric tonnes
Well Pad Construction - Fugitive Dust	0.176	0.018	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	0.709	0.688	28.595	0.472	3.691	1.410	0.141	2,447.643	0.138	0.062	2,469.683	2,241.092
Commuting Vehicles - Construction	1.552	0.156	0.013	0.000	0.021	0.008	0.001	3.230	0.000	0.000	3.312	3.006
Wind Erosion	2.432	0.365	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	**4.870**	**1.226**	**28.608**	**0.472**	**3.712**	**1.418**	**0.142**	**2,450.873**	**0.138**	**0.062**	**2,472.995**	**2,244.097**
Well Workover Operations - Fugitive Dust	0.110	0.011	---	---	---	---	---	---	---	---	---	---
Well Workover Operations - On-site Exhaust	0.000	0.000	0.005	0.002	0.046	0.002	0.000	9.340	0.000	0.000	9.376	8.508
Well Workover Operations - On-road Exhaust	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.313	0.000	0.000	0.314	0.285
Well Visits for Inspection & Repair - Operations	1.593	0.159	0.006	0.000	0.012	0.001	0.000	5.016	0.000	0.000	5.030	4.565
Station Visits - Operations	0.209	0.021	0.001	0.000	0.001	0.000	0.000	0.610	0.000	0.000	0.612	0.555
Sub-total: Operations	**1.913**	**0.192**	**0.012**	**0.002**	**0.060**	**0.003**	**0.000**	**15.280**	**0.000**	**0.000**	**15.332**	**13.913**
Road Maintenance	0.088	0.009	0.007	0.000	0.003	0.001	0.000	1.061	0.000	0.000	1.065	0.966
Sub-total: Maintenance	**0.088**	**0.009**	**0.007**	**0.000**	**0.003**	**0.001**	**0.000**	**1.061**	**0.000**	**0.000**	**1.065**	**0.966**
Road Reclamation	0.022	0.003	0.003	0.000	0.003	0.000	0.000	0.744	0.000	0.000	0.746	0.677
Well Reclamation	0.061	0.008	0.011	0.000	0.010	0.002	0.000	2.715	0.000	0.000	2.724	2.472
Sub-total: Reclamation	**0.083**	**0.011**	**0.013**	**0.001**	**0.013**	**0.002**	**0.000**	**3.458**	**0.000**	**0.000**	**3.470**	**3.149**
Total Emissions	**6.954**	**1.438**	**28.641**	**0.475**	**3.788**	**1.424**	**0.142**	**2,470.672**	**0.138**	**0.062**	**2,492.861**	**2,262.125**

As shown in Table 3-4, the bulk (~ 70%) of the particulate matter and (~ 99%) NOx emissions occur during the short-term construction / development period and production phase PM emissions are primarily related to well-pad visits unpaved road traffic.

Table 3-5 below demonstrates a relative comparison of the project emissions to Huerfano County's emissions from 2010.

Table 3-5. Proposed Action & Huerfano County Emissions Comparisons[1]

Pollutant	Emissions, Tons per year (Max)		
	2 – Project Wells	Huerfano County Total Emissions (2010)	Huerfano County Oil & Gas Point Emissions (2010)
NO_X	28.64	1,493	5.34
CO	3.79	6,849	9.26
VOC	1.42	17,428	114.17
PM_{10}	6.95	1,409	0.14
$PM_{2.5}$	1.44	No data	No data
SO_X	0.48	43	0.01
HAPs	0.14	18	3.73

[1] CDPHE 2010 APEN Online Emissions Inventory (most current available). CDPHE HAP inventory is for benzene only.

The emissions estimates for a typical well, as shown above, are below the CDPHE required minor source air quality modeling levels. The BLM COSO recently completed two near-field air quality modeling analyses for oil and gas construction and production emissions levels much higher than the levels for the Proposed Action. Predicted concentrations for those analyses were below applicable air quality standards. The nearest ambient air receptor for those analyses were less than ½ mile from the emissions sources. The nearest residence receptor from the facility / well pad for the proposed action is several miles away. For these reasons, near-field air quality modeling was not conducted for the proposed development and operations at the facility / well-pad level. For determining potential impacts associated with proposed action – related traffic on unpaved public roads, the BLM COSO near-field impacts screening tool was input with construction / development related traffic emissions for a typical well development project. The near-field modeling tool shows that dust impacts along public unpaved roads are acceptable when water (or product with equivalent control efficiency ~ 50%) is routinely applied to the unpaved roads during the construction / development phase.

Greenhouse Gas Emissions and Climate Change: According to the U.S. Global Change Research Program (2009), global warming is unequivocal, and the global warming that has occurred over the past 50 years is primarily human-caused. Standardized protocols designed to measure factors that may contribute to climate change, and to quantify climatic impacts, are presently unavailable. Moreover, specific levels of significance have not yet been established by regulatory agencies. Predicting the degree of impact any single

emitter of GHGs may have on global climate, or on the changes to biotic and abiotic systems that accompany climate change is highly complex, has considerable uncertainty, and requires intense computer modeling (i.e., super computers). As such, no readily available tools exist to predict impacts a project's emissions would have on the global, regional, or local climate. This analysis is therefore limited to comparing the context of total project GHG emissions, and to emissions recently analyzed by EPA. The analysis also discloses readily available information regarding expected changes to the global climatic system and any empirical evidence of climate change that has occurred to date (see cumulative impacts).

The implementation of the Proposed Action Alternative is estimated to contribute 2,262 metric tons of carbon dioxide equivalent (CO_2(e)) in the maximum year. Annual construction / development GHG emissions will be 99% of the total emissions shown for the maximum year (see Table 3-4). Over a 25 year timeframe, the total GHG emissions expected are approximately 2,619 metric tons CO_2(e) for the 2 new wells. The total provided 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 (also estimated at this time) could vary significantly over the life of the project, making any prediction of the quantities of GHG emitted highly speculative.

In 2007, Colorado's GHG emissions were 124,000,000 metric tons CO_2(e). The proposed action's GHG emissions represent about 0.002 % of the state of Colorado's GHG emissions. Given the relative magnitude of greenhouse gas emissions associated with the development of the 2 wells as compared to the state's GHG emission levels, the GHG contribution associated with the wells is extremely small.

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

Table 3-6. Greenhouse Gas Emission Comparisons

Inventory Description	CO_2e Emissions (10^6 mtpy)	Proposed Action Percentage
Colorado (2007)	124	0.002
Total US Greenhouse Gases[1]	6,957	0.00003

[1] *Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2008* (EPA 2010a) EPA Emissions

Cumulative Impacts: The area currently has some degree of alteration in the form of agricultural fields and roads. The addition of the infrastructure needed to construct and drill the additional proposed wells would have a minimal cumulative impact to the area's air quality given the location of the proposed action and the total cumulative emissions level for the area.

CARMMS: The following figure / plot shows a GIS layer for conventional oil and gas Reasonable Foreseeable Development (RFD) projections developed by the BLM based on oil and gas operator projections. The proposed project well pads are located in an area of "low" (1-5 new wells per township: orange shaded) oil and gas development potential over the next ~ 20 years, and are located in the middle of "AREA_3" emissions source group for the Colorado Air Resources Management Modeling Study (CARMMS). The CARMMS utilizes the Comprehensive Air-quality Model with extensions (CAMx) to assess statewide impacts to air quality and air quality related values from projected oil and gas development out to year 2021 for three oil and gas development scenarios (low, medium, and high). Projections for development are based on either the most recent BLM field office Reasonably Foreseeable Development (RFD) document (high), or by projecting the current 5 year average development paces forward to 2021 (low). The medium scenario will include the same well count projections as the high, but will assume additional emission restrictions, where the high / RFD scenario assumed current development practices and "on the books" emissions controls and regulations (2013). Each BLM field office / planning area was modeled with CAMx source apportionment technology (RGFO was broken into four development areas due to size), meaning that incremental impacts to air pollution, regional ozone and AQRVs from emissions sources in these planning areas are essentially tracked to better understand the significance of such development on impacted resources and populations. The CARMMS project leverages the work completed by the WestJumpAQMS, and the base model platform and model performance metrics are based on those products (2008). At this time, only the CARMMS high / RFD modeling scenario is complete, and thus those results will be used to describe potential air quality impacts for ~ 10 years of future projected Federal oil and gas development for RGFO Area #3 and cumulative air pollutant emissions sources.

Years 2011 and 2021 oil and gas emissions inventories were developed for RGFO "Area #3" for the CARMMS based on oil and gas RFD as shown in the following figures. The table following the figures shows the total (Federal and non-Federal) oil and gas emissions inventory estimates that were modeled for the CARMMS RFD Scenario for RGFO Area #3. It is reasonable to assume that emissions associated with the proposed

project and any other potential oil and gas developed through year 2021 are accounted for in the CARMMS projected year 2021 oil and gas emissions inventories as shown.

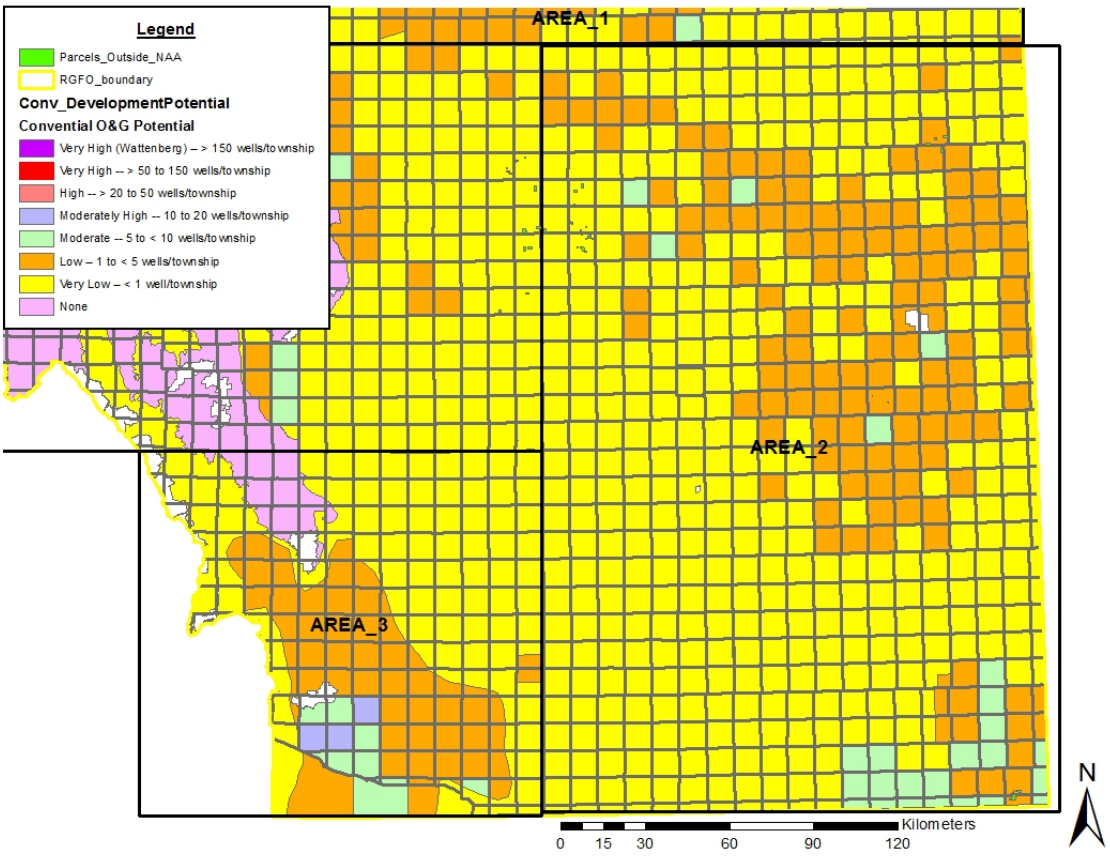


Table 3-7. RGFO Area #3 O&G Emissions (Tons) – CARMMS RFD Scenario

CARMMS - RGFO Area ID	Year	PM_{10}	$PM_{2.5}$	VOC	CO	NO_X	SO_2
Area #3	2011	363	95	2,333	10,983	8,648	4
	2021	514	125	2,924	14,101	11,206	5

The CARMMS RFD (High) modeling scenario provides an upper-bound look at impacts that would cover all potential oil and gas development based on aggressive development forecasts. The following table presents the highest PSD pollutant concentrations at any Class I area due to the projected CARMMS RFD scenario new Federal oil and gas emissions for the entire RGFO (including Area #3). All PSD pollutants contributions from the projected wells and emissions associated with the RGFO source apportioned group are less than 2% of any PSD increment and are thus exceedingly low. The PSD program is a Clean Air Act permitting program for new and modified major air pollution sources and is administered in Colorado by the CDPHE Air Pollution Control Division (APCD). In this air quality assessment, PSD increment consumption comparisons are provided to evaluate the extent of environmental effects only, and do not constitute a regulatory consumption analysis.

Table 3-8: CARMMS RFD Year 2021- RGFO New Federal O&G – Max PSD Consumption at Any Domain Class I Area

Source Group	PSD Class I Increment	Max @ any Class I Area	Percent of PSD Class I Increment	Class I Area where Max occurred
NO2 Annual	2.5	0.004	0.1%	Great_Sand_Dunes
PM10, 24-hour	8	0.044	0.6%	Rocky_Mountain
PM10, Annual	4	0.002	0.0%	Rocky_Mountain
PM2.5, 24-hour	2	0.023	1.1%	Rocky_Mountain
PM2.5, Annual	1	0.001	0.1%	Rocky_Mountain
SO2, 3-hour	25	0.001	0.0%	Rocky_Mountain
SO2, 24-hour	5	0.000	0.0%	Rocky_Mountain
SO2, Annual	2	0.000	0.0%	Rocky_Mountain

The following table provides a quasi-cumulative summary of ozone, visibility and nitrogen deposition impacts for new projected RGFO Federal oil and gas emissions (since year 2011) in CARMMS Area #3 associated with the RFD (High) modeling scenario. These impacts show the relative contribution to full cumulative (all world-wide emissions sources) impacts for the projected year 2021 RGFO Area #3 oil and gas emissions associated with the RFD (high) modeling scenario.

Table 3-9: CARMMS RFD Year 2021- RGFO New Federal O&G Contribution to Modeled AQRV Impacts

Source Group	Number of Annual Days Above 0.5 dv Change	Maximum Modeled Annual Nitrogen Deposition (kg/ha-yr)	Maximum 4th High Daily 8-hour Ozone Contribution (ppb)
RGFO Area # 3	0	0.0272 (Greenhorn Mtns.)	0.2

* maximum modeled concentrations / values for any Class I / sensitive Class II area (AQRV) or grid cell (ozone) within the CARMMS 4km modeling domain (includes all of Colorado).

As shown in the table above, there are no days that the projected new RGFO Area #3 year 2021 Federal oil and gas emissions (since year 2011) have a significant (~ 0.5 dv) visibility change impact at any Class I or sensitive Class II area and the maximum modeled nitrogen deposition contributions are minimal with respect to the cumulative critical nitrogen deposition load of 1.5 kg/ha-yr value. The maximum contribution to the 4th high daily maximum 8-hour concentrations is minimal with respect to the 75 ppb 8-hour ozone standard. The information above shows that the predicted air quality impact contributions associated with an aggressive 10-year oil and gas development scenario for

the RGFO Area #3 are minimal, and it is reasonable to conclude that the proposed project would have much lower contributions to the overall cumulative air quality.

For a Project, the ANC Level of Acceptable Change (LAC) threshold is no change greater than 10% for lakes with base ANC > 25 μeq/l and no change greater than 1 μeq/l for lakes with base ANC values < 25 μeq/l. The ANC calculations due to nitrogen and sulfur deposition from the RGFO Federal O&G RFD scenario is shown in Table 3-10 below. Specifically, the table shows all of the lakes where the delta in ANC % showed a change as a result of the new projected RGFO Federal oil and gas emissions (since year 2011) associated with the CARMMS RFD modeling scenario. All of the values are below the USFS ANC LAC threshold at all sensitive lakes. The USDA Forest Service methodology reports both Delta ANC calculations and LAC thresholds as positive quantities; however they reflect a decrease in lake ANC.

Table 3-10: CARMMS RFD Year 2021- RGFO New Federal O&G – ANC Changes

National Forest	Wilderness Area - Lake	10th Percentile Lowest ANC Value (μeq/L)	Delta ANC (%)	Delta ANC (meq/L)	USFS LAC Threshold	Below Threshold?
Arapaho and Roosevelt	Indian Peaks - Blue	19.3	0.0299%	0.0058	<1(μeq/L)	Yes
Arapaho and Roosevelt	Mount Evans – Upper Middle Beartrack	50.9	0.0309%	0.0157	<10%	Yes
San Juan-Rio Grande	Weminuche – White Dome Lake	2.1	0.0304%	0.0006	<1(μeq/L)	Yes

*Highest impacts (associated with CARMMS RFD Scenario new RGFO Federal O&G) for top three lakes (with respect to highest Delta ANC percent change) for all sensitive lakes within CARMMS 4km modeling domain.

The following table provides a full cumulative summary of ozone, visibility and nitrogen deposition impacts for all (i.e. world-wide) new and existing emissions sources associated with the CARMMS RFD (High) year 2021 modeling scenario.

Table 3-11: CARMMS Modeled AQRV Impacts - High 2021 Scenario - Full Cumulative Emissions Inventory

Class I Area	Best 20% Days Visibility Metric (dv) - 2021 High Improvement from 2008	Worst 20% Days Visibility Metric (dv) - 2021 High Improvement from 2008	Modeled Annual Nitrogen Deposition (kg/ha-yr)
Rocky	-0.09	0.86	2.57

Mountain NP			
Great Sand Dunes NP	-0.06	0.42	2.08

* positive visibility related values mean overall visibility improvement and deposition values are average for all grid cells making up the Class I area.

As shown in the table above, the model predicted that the highest impacted Class I areas (relative to potential RGFO oil and gas development) would see improvements for worst visibility days and could see slight (< 0.1 dv) degradation for best visibility days. Modeled year 2021 annual nitrogen deposition for Rocky Mtn. NP compares well to the total actual observed nitrogen deposition values for years 2008-2012, suggesting little change in cumulative deposition from baseline years to future year 2021. Using the baseline / current years monitored nitrogen and sulfur deposition rates data with year 2021 CARMMS cumulative modeling results, it is reasonable to conclude that the ANC of Lakes within the immediate area in year 2021 would be similar to baseline / current ANC conditions.

For full cumulative ozone design value projections at regional ozone monitoring sites, the maximum current year 8-hour ozone design concentration (DVC; based on 2006-2010 observations) is 82.0 ppb at the Rocky Flats North (CO_Jefferson_006) monitor that is projected to be reduced to 79.5 ppb for the CARMMS 2021 High Development Scenario. With the exception of the Larimer County, Colorado monitors, modeled ozone predictions at all monitors within the modeling domain result in lower future 2021 values. For the ozone design value projection unmonitored area analysis (analysis for areas with no monitors), the geographical extent (i.e. size) of the overall area of ozone design value exceedances is reduced (from year 2008 to 2021) and CARMMS plots show the largest ozone reductions in the Denver and Salt Lake City areas and ozone increases in Garfield County, Colorado.

The CARMMS incremental modeling results for each source group (i.e. RGFO Area #3) are applicable for the amount of additional emissions that were modeled in the Study. Annual oil and gas completions / development inventories (post year 2011) are being compiled to ensure that current and future oil and gas development does not exceed the acceptable rates as modeled in CARMMS. Since year 2011, it appears that there have been approximately ~ 10 new Federal wells developed in RGFO Area #3 for years 2012-2014 (including three approved / processed year 2014 APDs); and this total is much lower than the ~ 60 new Federal wells for RGFO Area #3 as modeled for CARMMS year 2021 RFD scenario (new development for years 2012 through 2021). In addition, as future oil and gas development occurs (including the proposed project) in the RGFO, project-specific emissions (based on approved APDs) are being added to the total regional emissions estimates (all emissions sources: oil and gas emissions and more) to compare regional emissions rates modeled in cumulative air quality modeling studies (CARMMS) along with the corresponding modeling results to confirm that activities approved by the BLM Colorado are within the modeled emissions analyzed in the cumulative analyses.

Greenhouse Gas Emissions and Climate Change: With respect to Climate Change, 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 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, however, so longer growing season in theory would result in more forage production provided there is sufficient precipitation. Drier conditions could have severe impacts on forests and woodlands. This could leave these forests and woodlands more susceptible to insect damage and at higher risk of

catastrophic wildfires. Increased fire activity and intensity would increase greenhouse gas emissions.

Protective / Mitigation Measures Multiple near-field modeling assessments (including application of BLM COSO near-field impacts screening tool as described earlier) performed by the BLM Colorado for Colorado-based oil and gas air quality assessments indicate that routine water (or product with equivalent dust control efficiency) application to unpaved surfaces is necessary during the oil and gas development / construction phase to achieve air quality compliance even though construction phases last just a few weeks. The short-term particulate matter air quality standards do not allow for many exceedances per year and therefore could be exceeded multiple times with only a couple of weeks of construction activities emissions not controlled.

It is anticipated that the operator would apply for either an APCD air permit for the site as a whole, or cover individual equipment under one of Colorado's general permits for oil and gas operations. The state as the regulatory authority for oil and gas actions requires controls of emissions and standards for compliance that the operator will be subject to. It is expected that the operator will comply with the requirements and make every effort to minimize emissions through good engineering and operating practices to the maximum extent practical.

In addition to the existing state and federal requirements, the following BLM requirements will apply:

- Applicant will continuously apply water or dust-suppressant to public unpaved surfaces that access the new well pad / facility likely to be disturbed during construction / well development phase.

No Action Alternative

Direct and Indirect Impacts: None
Cumulative Impacts: None
Mitigation/Residual Effects: None

3.2.2 GEOLOGIC AND MINERAL RESOURCES

Affected Environment: The proposed wells are located within the Sheep Mountain Unit located on the eastern margin of the Sangre de Cristo range. Sheep Mountain is a natural CO2 production area. Geology of the area consists of incomplete Mesozoic and Paleozoic sections of various marine to non-marine limestones, sandstones, conglomerates and shales. In addition to sedimentary rocks, numerous dikes and sills are also present. The geologic structure is complex with numerous folds and faulting. The reservoir rocks are Cretaceous Dakota and Jurassic Entrada sandstones capped by cretaceous marine sediments and a laccolith. Thrust faulting causes this section to repeat several times. Repeat sections of both the Dakota and Entrada may have the same reservoir pressures in the deeper sections as the first set of sections above the

fault, resulting in lost circulation. Total cumulative production is 34 billion m^3. Gas composition is 97% CO_2. Most of the CO_2 gas produced at this location is transported to West Texas to support oil and gas production.

Groundwater resources in the proposed project area include the Purgatoire, Dakota and Entrada Sandstones and the Poison Canyon sandstone.

In addition to Carbon Dioxide, uranium resources may be found in the Poison Canyon Formation of Huerfano County, although uranium prospecting operations in the 1960s did not locate any resources in the Sheep Mountain area. Several sand and gravel pits have also been developed within five miles of the proposed wells.

References:

Detailed report on the geology and possible hazards of drilling in the Sheep Mountain Unit, Huerfano County; BLM EA No. CO-050-0-30, Sheep Mountain CO_2 Unit EA

Environmental Effects

Proposed Action (Direct and Indirect Impacts)

The Proposed Action would drill through the several groundwater aquifer units to produce carbon dioxide from underlying formations. During drilling operations on parcels, loss of circulation or problems cementing the surface casing could directly affect freshwater aquifer and mineral zones encountered. Known water-bearing zones in the APD areas would be protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely.

Protective/Mitigation Measures

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

No Action Alternative (Direct and Indirect Impacts)

Under the No Action alternative, the APDs would be denied, and no federal action would occur even though the minerals are encumbered with a Federal lease. Not approving the APDs would likely result in the proponent developing private minerals only. The applicant could explore and develop the private land and private minerals and not access the federal minerals.

3.2.3 WATER (SURFACE AND GROUNDWATER, FLOODPLAINS)

Affected Environment: The proposed wells would be located on a relatively high elevation bench at approximately 8800' in the Huerfano River watershed. Groundwater in this area consists mainly of shallow alluvial or valley-fill aquifers tributary to the Huerfano River. These aquifers are used for domestic and agricultural purposes. A spring is located very nearby indicating groundwater is close to the surface in this location. Based on state records, there is one potential water well within a one mile radius of the proposed wells, however based on aerial photographs it appears this well is misplaced in the database.

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, 12 acres would be temporarily disturbed with 2.0 acres long term. Much of this disturbance would be located on an existing well pad that is already heavily 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, previous disturbance, 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.

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.

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

3.3 BIOLOGICAL RESOURCES

3.3.1 INVASIVE PLANTS*

Affected Environment: Vegetation and soils in the project area have been modified structurally by exposure to previous drilling projects. Invasive plants within 5 miles of the project site include: Scotch thistle, Canada thistle, Diffuse and Spotted knapweed, and leafy spurge. The project sites are prone to a wide variety of weeds if severe soil surface disturbance occurs.

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.

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: The area consists of a conifer habitat type containing Douglas-fir, and ponderosa pine. The understory is usually sparse in this type and is dominated by Arizona fescue. Other plant species include Gambel oak, white fir, kinnikinnick, and Parry's oatgrass.

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.

Protective/Mitigation Measures: See 2.1.1 Proposed Action.

No Action Alternative
Direct and Indirect Impacts: None
Protective/Mitigation Measures: None

3.3.3 WILDLIFE TERRESTRIAL

Affected Environment

The Sheep Mountain CO2 Field was developed between 1981 and 1985. The infrastructure (roads, pipelines pads, facilities, etc.) needed to facilitate the minor expansion project proposed were installed at that time and have been active for more than 30 years. The area consists of a conifer habitat type containing Douglas-fir, and ponderosa pine. The understory is usually sparse in this type and is dominated by Arizona fescue. The project area is a well-known elk production area and provides severe winter range for both elk and mule deer. Other big game animals common to the area include mountain lion and black bear although use by these species is dispersed and sporadic.

Environmental Effects

Proposed Action (Direct and Indirect Impacts)

The Proposed Action would authorize the creation of a pad and drilling of one well on BLM managed surface while also authorizing pad expansion and the drilling of one additional well on private surface. The immediate impact is the removal of vegetation caused by the creation and expansion of well pads and the act of drilling two new wells. The long term impacts of the additional wells will be negligible because the existing setting for terrestrial wildlife will not be altered. Impacts to wildlife would derive from the increase in human activity during the drilling phase, causing an increase in stress to wildlife and disturbing movement patterns throughout the impact area.

A research project conducted by BLM at the time the field was initially developed in the 1980's identified the adjacent wildlife habitat an important elk production area. The peak calving period occurred from May 20 to July 1. Radio collared elk demonstrated a significant change in distribution (approximately 0.75 miles) when a drill rig and subsequent pad was present during this time period, often moving to less desirable calving habitat (Brekke 1988). Displacement during calving may cause increase mortality in calves, calf development, disease, accidents, and increased competition. The activity at the sites has been occurring for an extended period time and wildlife that may be present have likely acclimated to the field. However, the introduction of a short-term drilling operation may elicit a similar avoidance behavior until project completion. Once drilling is completed and production occurs, a decrease human activity will reduce impacts to the current setting.

Protective/Mitigation Measures: Recommendations developed as a result of the elk research project remain valid and will provide the necessary protections to terrestrial species.

- Development of drill sites, roads and other facilities necessary to support the operation should be completed in the shortest possible time, and during periods of the year elk are absent.
- A timing limitation prohibiting development activity (pad/road construction, hauling of cut/fill material, well drilling, etc.) will be enforced from May 1 through July 1 to protect calving elk.
- On all service roads through the calving area, travel is to be restricted during the hours of 4 am – 8 am and 4 pm – 8 pm during the calving period.
- Speed limits of 25 mph will be enforced and no stopping or standing is allowed while traveling through elk use areas.
- Firearms and pets are to be prohibited in the project area.
- A timing limitation restricting development activity will be in place from January 1 to March 1 to reduce impact to wintering big game animals (mule deer and elk). An exception may be granted if climatic conditions warrant.

No Action Alternative (Direct and Indirect Impacts)

Under the No Action alternative, no ground disturbing activities would occur resulting in no impact to terrestrial wildlife species.

Protective/Mitigation Measures:

N/A.

3.3.4 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

Ponderosa pine, mixed conifer and mountain shrubland habitats are found at higher elevations in the project area. In Huerfano County these sites are very dry and warm areas, with less than 25 inches of precipitation annually. Mature ponderosa pine forests on dry sites are open, with mature trees achieving wide separation as they compete for limited soil moisture. Grassy ground cover is maintained by frequent low-intensity fires. Ponderosa pines are the largest conifers in Colorado and Gambel oak is a common component of the understory, typically in a shrubby form. Other common understory shrubs include mountain mahogany and wax currant. Tree species sometimes found mixed with ponderosa pine are junipers, pinyon pine, aspen, white fir, and Douglas-fir. Birds typical of these habitat types include Merriam's turkey, Williamson's sapsucker, pygmy nuthatch, western bluebird, band-tailed pigeon, Grace's warbler, flammulated owl, red-breasted nuthatch, violet-green swallow, western tanager, and chipping sparrow. These sites also include small areas of aspen habitat and mountain grassland habitat.

Species that could occur within the project area that are listed on the Birds of Conservation Concern list for the Southern Rockies/Colorado Plateau region include: pinyon jay, ferruginous hawk, Lewis's woodpecker, gray vireo, juniper titmouse, Grace's warbler, golden eagle, and Cassin's finch.

Environmental Effects

Proposed Action (Direct and Indirect Impacts)

The Proposed Action would authorize the creation of a pad and drilling of one well on BLM managed surface while also authorizing pad expansion and the drilling of one additional well on

private surface. The immediate impact is the removal of vegetation caused by the creation and expansion of well pads and the act of drilling two new wells. The long term impacts of the additional wells will be negligible because the existing setting for migratory birds will not be altered. Impacts to wildlife would derive from the increase in human activity during the drilling phase, causing an increase in stress to wildlife and disturbing movement patterns throughout the impact area.

Surface disturbing activities associated with implementation of the Proposed Action could impact nesting species if conducted during the nesting season. Noise generated during construction, drilling, and production phases will likely result in a larger impact footprint (i.e. avoidance of human activity) then 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. 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)

Under the No Action alternative, no ground disturbing activities would occur resulting in no impact to migratory birds.

Protective/Mitigation Measures

N/A.

3.3.5 FORESTRY

Affected Environment: The well pad on BLM lands to be cleared consists of moderately dense pinyon pine and juniper woodlands.

Environmental Effects

Proposed Action
Direct and Indirect Impacts: The proposed action shall result in the loss of approximately 4 acres of woodlands on the southwest side of Little Sheep Mountain.

Protective/Mitigation Measures: The trees to be cleared shall be purchased at the appraised rate prior to cutting. The contractor shall purchase the appropriate permit from the RGFO forester 1 week prior to cutting any tree. All slash should be chipped and scattered on site.

No Action Alternative
Direct and Indirect Impacts: None
Protective/Mitigation Measures: None

3.4 HERITAGE RESOURCES AND HUMAN ENVIRONMENT

3.4.1 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 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 Huerfano County, Colorado. Huerfano County's economy is based primarily on ranching. Due to this, much of the natural landscape of Huerfano County has been somewhat modified. Huerfano County has approximately 46 active oil or gas wells. Most of these wells are located on privately owned surface and produce entirely privately owned minerals. Because of the comparatively small number of federally owned mineral parcels in this area, the cumulative impact of the drilling and operation of these two CO2 wells would add incrementally to the cumulative impacts of oil and gas development in Huerfano County. Cumulative impacts are expected to be minor since this action falls within the footprint of the current operation.

Air: The area currently has some degree of alteration in the form of agricultural fields and roads. The addition of the infrastructure needed to construct and drill the additional well and deepen the existing well would have a minimal cumulative impact to the area's air quality given the location of the proposed action and the total cumulative emissions level for the area.

Geologic and Mineral Resources: Cumulative impacts on geology and minerals resources would primarily occur as a result of development, which would irreversibly deplete recoverable carbon dioxide from the producing formations.

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-F02-2014-044 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 has received two Applications for Permits to Drill (APDs) two new CO2 wells. This proposed project would require the expansion of an existing wellpad containing 4 producing CO2 wells and a compressor station, and constructing a new well pad. The proposed projects will occur in the existing Sheep Mountain Unit (SMU), which was established in the early 1980's. Extensive production and maintenance infrastructure was installed at that time. There are several other active CO2 wells in the unit. The surface at the 7-15-I drillsite is privately owned, but the surface at the 8-15-D is federally managed. The target minerals are federally managed. The federal minerals are leased and subject to development. The CO2 that is produced in the SMU is piped to the Permian Basin, where it is used for enhanced recovery of oil in currently producing oil fields.

The project is in Huerfano County, Colorado approximately 6 miles south of the town of Gardner. The federal mineral estate is leased and subject to oil and gas development.

The general area description would be defined as mountainous forest (mixed conifer and pinon/ juniper) and rangeland on the northwest side of Sheep Mountain. The proposed project is located on a ranch used for cattle grazing and CO2 production.

Intensity:
I have considered the potential intensity/severity of the impacts anticipated from the proposed Oxy SMU 7-15-I and 8-15-D APD 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. 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 drilled in the SMU.

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 construction and drilling in the SMU. 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 CO2 development activities that have historically occurred in the area, within a federal unit developed in the early 1980's. Continued CO2 development 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 CO2 products. Although past cattle grazing had contributed to cumulative impacts, there have been no other recent activities besides CO2 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.

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: /s/Jay M. Raiford

NAME OF ENVIRONMENTAL COORDINATOR: /s/ Martin Weimer

DATE: 9/11/14

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

DATE SIGNED: 9/16/14

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

DECISION RECORD

Project Name

DOI-BLM-CO-F02-2014-044-EA

DECISION: It is my decision to authorize the Proposed Action as described in the attached EA. The proposed action is to drill 2 new CO2 wells. This proposed project would take place within a previously developed federal unit and utilize existing production facilities in the Sheep Mountain Unit (SMU), which was established in the early 1980's. Extensive production and maintenance infrastructure was installed at that time. There are several other active CO2 wells in the unit, mostly on private surface, producing federal minerals (split estate). The surface at the proposed 7-15-I project is privately owned, and managed by BLM at the 8-15-D project, and the target minerals are federal (split estate). The federal minerals are leased and subject to development. The CO2 that is produced in the SMU is piped to the Permian Basin, where it is used for CO2 flooding of oil wells.

The project is in Huerfano County, approximately 6 miles south of Gardner. The federal mineral estate is leased and subject to oil and gas development.

The general area description would be defined as mountainous forest (mixed conifer) and rangeland on the northwest side of Sheep Mountain. The proposed project is located on a private ranch used for cattle grazing and CO2 development.

The proposed action was analyzed in the Environmental Assessment (EA) DOI-BLM-CO-F02-2014-044 EA 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 #s 10488 and 10646 consistent with existing Federal lease rights provided for in the Mineral Leasing Act of 1920, as amended.

The project area currently has a high degree of alteration in the form of infrastructure (roads, pads, facilities) currently used for CO2 production. The addition of the infrastructure needed to construct and drill the 2 proposed wells would have mostly temporary and overall minor impacts on resources present in the project area.

MITIGATION MEASURES\MONITORING:

Air Quality: Multiple near-field modeling assessments (including application of BLM COSO near-field impacts screening tool as described earlier) performed by the BLM Colorado for Colorado-based oil and gas air quality assessments indicate that routine water (or product with equivalent dust control) application to unpaved surfaces is necessary during the oil and gas development / construction phase to achieve air quality compliance even though construction phases last just a few weeks. The short-term particulate matter air quality standards do not allow for many exceedances per year and therefore could be exceeded multiple times with only a couple of weeks of construction activities emissions not controlled.

It is anticipated that the operator would apply for either an APCD air permit for the site as a whole, or cover individual equipment under one of Colorado's general permits for oil and gas operations. The state as the regulatory authority for oil and gas actions requires controls of emissions and standards for compliance that the operator will be subject to. It is expected that the operator will comply with the requirements and make every effort to minimize emissions through good engineering and operating practices to the maximum extent practical.

In addition to the existing state and federal requirements, the following BLM requirements will apply:

- Applicant will continuously apply water or dust-suppressant to public unpaved surfaces that access the new well pad / facility likely to be disturbed during construction / well development phase.

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: Recommendations developed as a result of the elk research project remain valid and will provide the necessary protections to terrestrial species.

- Development of drill sites, roads and other facilities necessary to support the operation should be completed in the shortest possible time, and during periods of the year elk are absent.
- A timing limitation prohibiting development activity (pad/road construction, hauling of cut/fill material, well drilling, etc.) will be enforced from May 1 through July 1 to protect calving elk.
- On all service roads through the calving area, travel is to be restricted during the hours of 4 am – 8 am and 4 pm – 8 pm during the calving period.
- Speed limits of 25 mph will be enforced and no stopping or standing is allowed while traveling through elk use areas.
- Firearms and pets are to be prohibited in the project area.
- A timing limitation restricting development activity will be in place from January 1 to March 1 to reduce impact to wintering big game animals (mule deer and elk). An exception may be granted if climatic conditions warrant.

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.

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 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: 9/16/14

ATTACHMENTS: Public comment response

APPENDIX A PUBLIC COMMENT RESPONSE

During the 2 week public comment period for the draft EA, the RGFO received a comments from Green Rockies Emerging Ecology Network. The comment regarding the production of CO2 and its resulting "Social Cost of Carbon" and RGFO's response are considered below.

Comment:

(We) observe in this Environmental Assessment an inadequate factoring of the greenhouse gas impacts of the petroleum produced using Sheep Mountain CO2 for Enhanced Oil Recovery. On June 27, 2014, Denver Federal District Judge R. Brooke Jackson pointed out the failure of Federal regulators to consider the social costs of atmospheric carbon in their environmental review of the West Elk coal project. Judge Jackson ruled that despite the claim by Federal regulators that, "Predicting the degree of impact of a single emitter of (greenhouse gases) may have on global climate change, or on changes to biotic and abiotic systems that accompany climate change, is not possible at this time. (and) As such... the accompanying changes to natural systems cannot be quantified or predicted at this time."
"But such a tool is available," Judge Jackson countered. It is "the social cost of carbon protocol... expressly designed to assist agencies in cost benefit analysis..." Judge Jackson's ruling is 36 pages, and in our view, any Environmental Assessment henceforth including this one should use the social cost of carbon protocol to adequately address pressing environmental problems.

RGFO's Response:

The BLM appreciates the comment suggesting the use of the social cost of carbon (SCC) in NEPA analyses for its proposed land and resource management actions. SCC estimates the monetary cost incurred by the emission of one additional metric ton of carbon dioxide (CO_2). Estimating SCC is challenging because it is intended to model effects on the welfare of future generations at a global scale caused by additional carbon emissions occurring in the present. A federal Interagency Working Group on the Social Cost of Carbon (IWG), convened by the Office of Management and Budget, developed an SCC protocol for use in the context of federal agency rulemaking.

The BLM has considered and presented a *qualitative* discussion of the environmental effects of climate change and their socioeconomic consequences in the SMU 7-15-I and 8-15-D APD EA. The BLM believes that using SCC in its NEPA analysis for this proposed action, which is not a rulemaking, would not be useful.

For instance, some of the specific challenges involved in attempting to apply SCC to the analysis of this proposed action include the following:

- Given the global nature of climate change, estimating SCC of an individual project requires assessing the impact of the project on the global market for the commodity in question.
- NEPA does not require monetization of economic benefits and costs, and CEQ NEPA regulations state that "the weighing of the merits and drawbacks of the various

alternatives need not be displayed in a monetary cost-benefit analysis and should not when there are important qualitative considerations" (40 CFR § 1502.23). Monetizing only certain effects can lead to an unbalanced assessment. A regional economic impact analysis is often used to estimate impacts on economic activity, expressed as projected changes in employment, personal income, or economic output. Such estimates are not benefits or costs, and are not part of a benefit cost analysis.