

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

**Environmental Assessment for the Royal Gorge
Field Office**

December 2016 Competitive Oil & Gas Lease Sale

PREPARING OFFICE

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BLM



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Royal Gorge Field Office
December 2016 Competitive Oil & Gas Lease Sale**

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

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Chapter 1. Introduction

1.1. Identifying Information

BACKGROUND:

It is the policy of Bureau of Land Management (BLM) as derived from various laws, including the Mineral Leasing Act of 1920 (MLA) and the Federal Land Policy and Management Act of 1976 (FLPMA), to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs.

BLM's Colorado State Office conducts quarterly competitive lease sales to sell available oil and gas lease parcels. A Notice of Competitive Lease Sale, which lists lease parcels to be offered at the auction, is published by the Colorado State Office. Lease stipulations applicable to each parcel are specified in the Sale Notice. The decision as to which public lands and minerals are open for leasing and what leasing stipulations may be necessary, based on information available at the time, is made during the land use planning process. Constraints on leasing and any future development of split estate parcels are determined by BLM in consultation with the appropriate surface management agency or the private surface owner.

In the process of preparing a lease sale, the Colorado State Office sends a draft parcel list to each field office where the parcels are located. Field Office staff then review the legal descriptions of the parcels to determine if they are in areas open to leasing and that appropriate stipulations have been included; verify whether any new information has become available that might change any analysis conducted during the planning process; confirm that appropriate consultations have been conducted; and identify any special resource conditions of which potential bidders should be made aware. The nominated parcels are posted online for a thirty day public scoping period. This posting also includes the appropriate stipulations as identified in the relevant RMP. BLM prepares an analysis consistent with the National Environmental Policy Act (NEPA), usually in the form of an Environmental Assessment (EA). Comments received from the public are reviewed and incorporated into the NEPA document, as applicable.

After the Field Office completes the draft parcel review and NEPA analysis and returns them to the State Office, a list of available lease parcels and associated stipulations is made available to the public through a Notice of Competitive Lease Sale (NCLS). Lease sale notices are posted on the Colorado BLM website at:

http://www.blm.gov/co/st/en/BLM_Programs/oilandgas/oil_and_gas_lease.html

On rare occasions, BLM may defer or withhold additional parcels prior to the day of the lease sale. In such cases, BLM prepares an addendum to the sale notice.

If the parcels are not leased at the December, 2016 lease sale, then they will remain available to be leased for a period of up to two years to any qualified lessee at the minimum bid cost. Parcels obtained in this way may be re-parceled by combining or deleting other previously offered lands.

Mineral estate that is not leased within a two-year period after an initial offering will no longer be available, and must go through a competitive lease sale process again prior to being leased.

The act of leasing does not authorize any development or use of the surface of leased lands, without further application by the operator and approval by BLM.

In the future, BLM may receive Applications for Permit to Drill (APDs) for those parcels that are leased. If APDs are received, BLM conducts additional site-specific NEPA analysis before deciding whether to approve the APD, and what conditions of approval (COA) should apply.

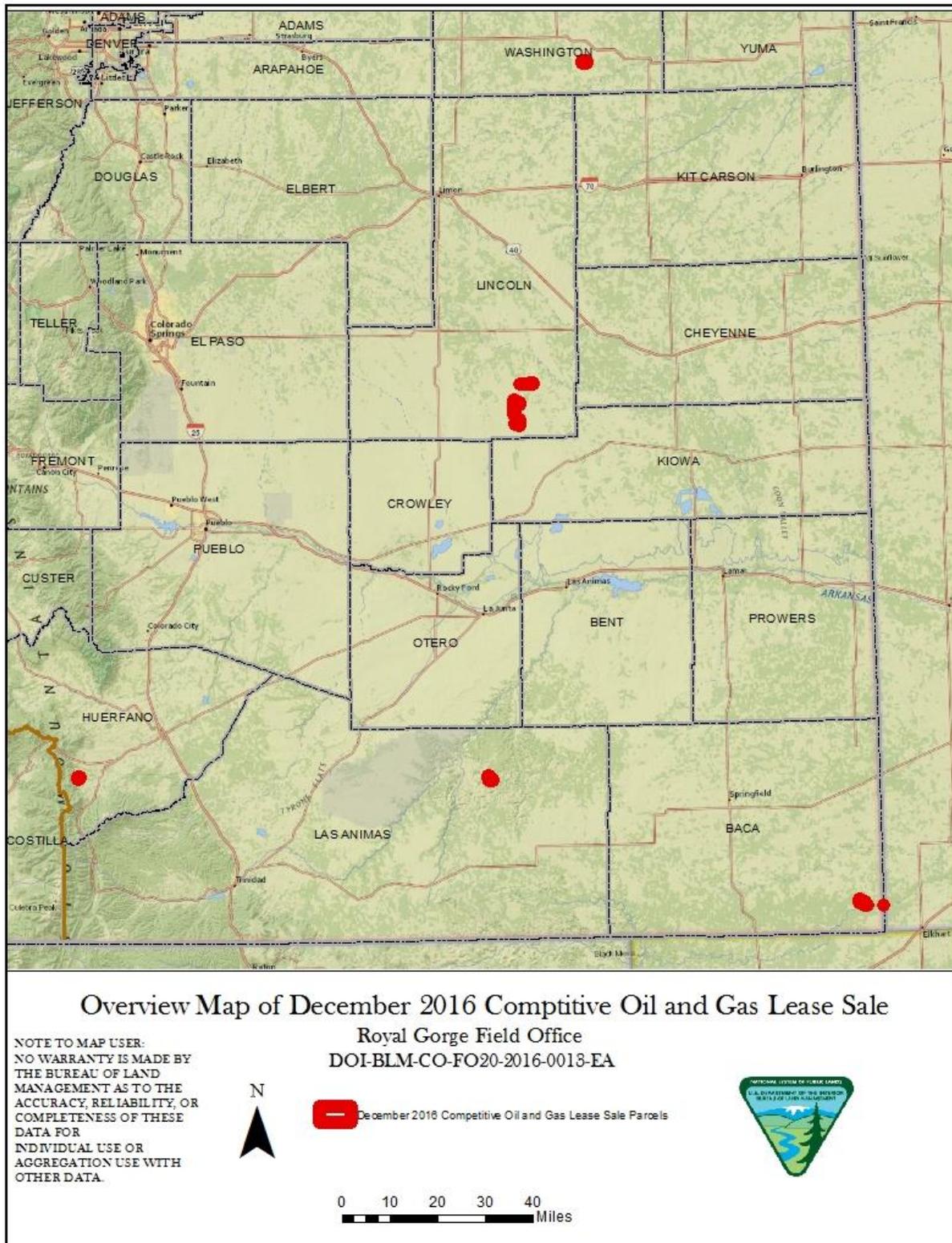
Eight parcels comprising 2037.620 acres within the Royal Gorge Field Office (RGFO) were nominated for the December 2016 Competitive Oil and Gas Lease Sale. This figure is comprised of 2037.620 acres of split-estate land. The parcels nominated are in the following counties; two in Baca County, one in Huerfano, one in Las Animas, three in Lincoln County, and one in Washington County. The legal descriptions of the nominated parcels are in Attachment A.

This EA documents the review of the nominated parcels under the administration of the Royal Gorge Field Office. It serves to verify conformance with the approved land use plan, and provides the rationale for the field office's recommendation to offer or to defer particular parcels from a lease sale.

In accordance with Colorado BLM Instruction Memorandum No. CO-2012-027 and BLM

IM-2010-117, this EA has been released for 30 days of public comment. Any comments received within the 30-day time-frame will be considered and incorporated into the EA as appropriate.

1.2. Project Location and Legal Description



LEGAL DESCRIPTION:

Please see Attachments A, B, and C and E (Parcel Maps)

1.3. Purpose and Need for Action

The purpose of the Proposed Action is to consider opportunities for private individuals or companies to explore and develop oil and gas resources on specific public lands through a competitive leasing process.

The need for the action is to respond to the nomination or expression of interest for leasing, consistent with BLM's responsibility under the Mineral Leasing Act (MLA), as amended, to promote the development of oil and gas on the public domain. Parcels may be nominated by the public, BLM or other agencies. The MLA establishes that deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA under the rules and regulations prescribed by the Secretary of the Interior, where consistent with FLPMA and other applicable laws, regulations, and policies.

1.3.1. Decision to be Made

BLM will decide whether to lease the nominated parcels and, if so, under what terms and conditions.

1.4. Public Participation

1.4.1. Scoping, Public Involvement and Issues

The principal goal of scoping is to identify issues, concerns, and potential impacts that require detailed analysis. BLM uses both internal and external scoping to identify potentially affected resources and associated issues.

Internal scoping was conducted through meetings of an interdisciplinary (ID) team of resource specialists and discussion of the nominated parcels. The following issues were identified:

The lesser prairie chicken habitat and proximity to active leks has been identified on two of the parcels in the proposed lease sale. This species was listed as a Federally Threatened species by the United States Fish and Wildlife Service (USFWS) however; a court ruling removed the listing status. The USFWS is investigating other options for protection of the species.

BLM's 100k quad map and NPS geospatial information indicate the Santa Fe Trail either crosses or passes very close by Parcels 7605 and 7606. Field and archival research on the historic trail as it relates to the parcels has not yet been completed.

External scoping was conducted by posting the nominated lease parcels, stipulations from the RMP, for thirty days from February 8, 2016 to March 10, 2016. Stipulation summaries, GIS shapefiles, and maps were posted on the BLM Colorado State

Office website:

http://www.blm.gov/co/st/en/BLM_Programs/oilandgas/oil_and_gas_lease.html the external scoping process gave the public an opportunity to provide comments, which the BLM considered and incorporated into the EA as appropriate. The BLM sent letters to land surface owners whose land overlies federal minerals proposed for leasing.

Issues Identified:

During the public scoping period RGFO received comments from Colorado Parks and Wildlife (CPW) and the Center for Biological Diversity.

The letter received on March 8, 2016 from Colorado Parks and Wildlife (CPW), stated concerns over aquatic habitat recovery, conservation waters, lesser prairie chicken, Gunnison prairie dog range, elk production areas, and pronghorn winter concentration areas.

The comments on March 10, 2016 from The Center for Biological Diversity expressed the following concerns: climate change, water resources, riparian and wetlands, air quality, sensitive wildlife species, human and safety risks, and land use impacts.

These issues were considered in the development of the EA.

1.4.2. Public Comment Period

The preliminary EA and the unsigned Finding of No Significant Impact (FONSI) were available for a 30-day public review and comment period beginning May 12, 2016 and ending June 13, 2016. The revised document is available online at

http://www.blm.gov/co/st/en/BLM_Programs/oilandgas/oil_and_gas_lease.html

Chapter 2. Alternatives

2.1. Introduction

This chapter describes the alternatives analyzed in detail. Alternatives considered but not analyzed in detail are also discussed.

2.2. Alternatives Analyzed in Detail

2.2.1. No Action Alternative

In an EA, the No Action Alternative typically means that the Proposed Action would not take place. See BLM NEPA Handbook (H-1790-1).

Under the No Action Alternative, BLM would defer all nominated lease parcels from the December 2016 lease sale. The parcels could be considered for inclusion in future lease sales. Surface management would remain the same and ongoing oil and gas development would continue on surrounding private, state, and federal leases.

2.2.2. Lease All Nominated Parcels in Conformance with the RMP

Under this alternative, BLM would lease Federal mineral estate in all nominated parcels available for leasing in the resource area in accordance with the Northeast (November 1991, as amended) and RGFO (May, 1996) RMPs. The current lease sale includes a total of 8 nominated parcels. There are two in Baca County, one in Huerfano, one in Las Animas, three in Lincoln county, and one in Washington County totaling 2,037.62 acres of federal mineral estate that is on private surface (see Attachment A). The lands have been grouped into appropriate lease parcels for competitive sale as oil and gas leases in accordance with the 43 CFR § 3100 regulations. The leases would include the standard lease terms and conditions for development of the surface of oil and gas leases provided in 43CFR 3100. Stipulations to protect other surface and subsurface resources would apply, as prescribed by the RMP. These stipulations are described in Attachment D.

2.2.3. Preferred Alternative

Under the preferred alternative, BLM would offer 1,801.63 acres for lease and defer two parcels totaling 235.99 acres in Baca County. Attachment B lists all parcels that would be deferred from the lease sale under the preferred alternative. Attachment C lists all parcels that would be available for lease under the preferred alternative with applied stipulations. Attachment D contains descriptions of the applicable stipulations, and Attachment E contains maps of the parcels.

Deferral of nominated parcels allows BLM to address situations in which legitimate questions or controversy has arisen over the leasability of a parcel. The process does not necessarily withdraw a parcel from the leasing arena, but merely indicates that further analysis is needed before possibly being reintroduced in a future lease sale. Deferral does not necessarily withdraw a parcel from potential future leasing, but indicates that further analysis is needed before possible

inclusion in a future lease sale.

The two parcels in Baca County that would be deferred under the preferred alternative contain lesser prairie chicken habitat and proximity to leks and the possible presence of a National Historic Trail. Deferral of the parcels would allow for time to receive guidance from the USFWS on the protection of the species and the completion of field and archival research on the historic trail as it relates to the parcels.

2.3. Alternatives Considered but not Analyzed in Detail

There were no alternatives considered but eliminated from detailed analysis.

2.4. Plan Conformance Review

The proposed action was reviewed for conformance (43 CFR 1610.5) with the following plan:

Name of Plan: Northeast Record of Decision and Resource Management Plan (RMP)

Date Approved: September 1986 as amended November 1991

Decision Language: 672,000 acres of BLM administered mineral estate within the Northeast Planning Area are open to oil and gas leasing and development, subject to the lease terms and (as applicable) lease stipulations.

Name of Plan: Royal Gorge Record of Decision and Resource Management Plan (RMP)

Date Approved: May 1996

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.

Chapter 3. Affected Environment and Effect

3.1. Introduction

The CEQ Regulations state that NEPA documents “must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail” (40 CFR 1500.1(b)). While many issues may arise during scoping, not all of the issues raised warrant analysis in an EA. Issues will be analyzed if: 1) an analysis of the issue is necessary to make a reasoned choice between alternatives, or 2) if the issue is associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of the impacts.

The following resources and management issues were determined to not be present or not expected to be impacted by the proposed action and alternatives:

Forestry, Special Status Plants, Access and Transportation, Fire Management, Range Management, Prime and Unique Farmlands, Realty Authorizations and Land Tenure, Recreation, Special Designations, Areas of Critical Environmental Concern, Wild and Scenic Rivers, Lands with Wilderness Characteristics and Wilderness Study Areas.

3.2. Environmental Consequences of the No Action Alternative

The No Action Alternative is used as the baseline for comparison of the alternatives. Under the No Action Alternative, the 8 parcels totaling 2037.62 acres would not be leased. There would be no subsequent impacts from oil and/or gas construction, drilling, and production activities. The No Action Alternative would result in the continuation of the current land and resource uses in the proposed lease areas.

BLM assumes that the No Action Alternative (no lease option) may result in a slight reduction in domestic production of oil and gas. This reduction would diminish federal and state royalty income, and increase the potential for federal lands to be drained by wells on adjacent private or state lands. The public’s demand for oil and gas is not expected to change; oil and gas consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demographics, and weather or climate. If the parcels are not leased, energy demand would continue to be met by other sources such as imported fuel, alternative energy sources (e.g., wind, solar), and other domestic fuel production. This displacement of supply could offset any reductions in emissions and disturbance achieved by not leasing the subject tracts in the short term.

3.3. Past, Present and Reasonably Foreseeable Actions

NEPA requires federal agencies to consider the cumulative effects of proposals under their review. Cumulative effects are defined in the Council on Environmental Quality (CEQ) regulations 40 CFR §1508.7 as “the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.” In its guidance, the CEQ has stated that the “cumulative effects analyses should be conducted on the scale of human communities, landscapes, watersheds, or airsheds” using the concept of “project impact zone” (i.e., the area that might be influenced by the proposed action).

Offering and issuing leases for the subject parcels, in itself, would not result in cumulative impacts to any resource. Nevertheless, future development of the leases could be an indirect effect of leasing. The RMP/EIS, provides BLM's analysis of cumulative effects of oil and gas development based on the reasonable, foreseeable oil and gas development scenario. This analysis is hereby incorporated by reference and is available at: http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp.html. The cumulative impacts analysis in the EIS accounted for the potential impacts of development of lease parcels in the planning area as well as past, present and reasonably foreseeable actions known at that time. This analysis expands upon the EIS analysis by incorporating new information.

The area of influence includes a parcel in the foothills with gambel oak and pinyon juniper vegetation types west of La Veta in Huerfano County, pinon juniper lands in Las Animas County in southeastern Colorado, sage brush lands in Baca county and a patchwork of dry land farming and uncultivated short grass prairie used for cattle grazing in Lincoln and Washington counties on the eastern plains of Colorado. The following activities will be considered in the cumulative impacts analysis of each alternative.

Past Actions:

The nominated acreage is split estate, where the surface is not managed by BLM. BLM does not maintain information about non-mineral activity on split estate parcels on private land but evidence indicates that livestock grazing has been the predominant use. No evidence suggests any past actions by BLM have affected these parcels.

Present Actions:

The nominated acreage is split estate, where the surface is not managed by BLM. There is minimal BLM managed surface near the proposed parcels so not much is known about current uses. Currently there is no fluid minerals development taking place on any of these parcels, as they are unleased at this time. Evidence from aerial photos suggests that private livestock grazing is currently the predominant use. Most parcels are located in areas that have had minimal oil and gas development.

Reasonably Foreseeable Future Actions:

The RGFO completed a Reasonable Development (RFD) Scenario, which is an estimate of fluid mineral exploration, development, and production for the Royal Gorge Field Office for 20 years (2011-2030) based on information available at the time it was created. According to the RFD, the parcels in Washington county are in areas of low potential (1-5 wells per township), Lincoln County very low (< 1 well per township), Baca county is moderate (5 to < 10 wells per township) to low (1-5 wells per township), Las Animas very low (< 1 well per township), and Huerfano county parcels range from low potential (1-5 wells per township) to very low potential (less than 1 well per township). Current uses include agricultural practices such as grazing and farming and these activities are expected to continue.

3.4. Environmental Consequences of Leasing and Potential Development

3.4.1. Physical Resources:

3.4.1.1. Air Quality and Climate:

Affected Environment:

The RGFO encompasses a large geographical area with an appreciable amount of daily meteorological and climatic variance. Characteristic features include low relative humidity, abundant sunshine, infrequent rains and snow, moderate to high wind movement, and a large daily and seasonal range in temperatures. In general, the mean temperatures in the northern portion of the field office range from 15.6 degrees F in January to 88.7 degrees F in July. Temperatures in the southern portion of the field office range from 17.4 to 94.3 degrees F in January and July respectively. Northern RGFO areas receive average annual precipitation of approximately 14.22 inches, while southern RGFO areas receive average annual precipitation of approximately 11.34 inches. A large proportion of the area precipitation (70 to 80 percent of the annual total) falls during the growing season from April through September. Winter precipitation is light and infrequent and usually brings dry air and strong winds that contribute to the aridity of the area. Summer precipitation over the plains comes largely from thunderstorm activity and is sometimes extremely heavy, which can contribute to localized flooding. It is more common, however, to be too dry. The region frequently suffers from drought and multi-year drought is more common than not. At the western edge of the plains and near the foothills of the mountains, there are a number of significant changes in climate. Average wind movement is less, but areas very near the mountains are subject to periodic, severe turbulent winds as high westerly winds move over the Front Range peaks. Temperature changes from day to day are not quite as great. Precipitation gradually decreases from the eastern border to a minimum near the mountains, but rapidly increases with the increasing elevation of the foothills and proximity to higher ranges. This milder corridor close to the mountains is where the majority of Colorado's population resides. Frequent winds and limited topographical influences in the majority of the RGFO provide excellent dispersion characteristics for distributing anthropogenic emissions.

Analysis indicators related to air quality can be described in terms of pollutant classes, standards, and concentrations. The overall health of any region's air quality is determined by monitoring for certain pollutants and determining if the measured concentrations are below an applicable standard's limit. Areas where air quality concentrations are below the applicable standard are said to be in attainment with the National Ambient Air Quality Standards (NAAQS), whereas areas that currently violate a standard or have violated one in the past are designated as non-attainment or maintenance areas.

The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards for criteria pollutants, including carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂), and lead (Pb). Exposure to air pollutant concentrations greater than the NAAQS has been shown to have a detrimental impact on human health and the environment, and thus ambient air quality standards must not be exceeded in areas where the general public has access. All of the criteria pollutants are directly emitted from a

variety of source types, with the one exception being ground level ozone. 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). The EPA has delegated regulation of air quality under the Federal Clean Air Act to the State of Colorado. The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) administers Colorado’s air quality control programs and is responsible for issuing permits for subject emissions sources. The State has established the Colorado Ambient Air Quality Standards (CAAQS), which can be more, but not less stringent than the NAAQS. In addition to the criteria pollutants, regulations also exist to control the release of toxic pollutants, otherwise known as hazardous air pollutants (HAPs). EPA currently lists 188 identified compounds as hazardous air pollutants, some of which can be emitted from oil and gas development operations, such as benzene, toluene, and formaldehyde. Ambient air quality standards for HAPs do not exist; rather these emissions are regulated by the source type, or specific industrial sector responsible for the emissions.

Table 3.1. NAAQS (EPA 2016)

Pollutant [final rule cite]		Primary / Secondary	Averaging Time	Level	Standard 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 80 FR 65292 Oct 26, 2015		primary and secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution [Dec 14, 2012]	PM2.5	primary and secondary	Annual	12 µg/m ³	Annual mean, averaged over 3 years
			24-hour	35 µg/m ³	98th percentile, averaged over 3 years
	PM10	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

Air quality for any region is influenced by the amount of pollutants that are released within the vicinity and up wind of that area, and can be highly dependent upon the contaminants chemical and physical properties. Additionally, an area’s topography or terrain (such as mountains and valleys) and weather (such as wind direction and speed, temperature, air turbulence, air pressure, rainfall, and cloud cover) directly influence the way pollutants accumulate or disperse. Very few “online” (currently operating) air quality monitors exist in areas immediate to the nominated lease parcels. The following table provides air quality monitored values for APCD air monitors located in or near to the counties containing the nominated parcels.

Ambient Air Quality Monitoring Data (See Standard Levels & Units in Table above)

County	Pollutant	Averaging Period	Monitored Values		
			2012	2013	2014
Adams	CO	1-hour	2.2	2.4	2.4
Adams	CO	8-hour	1.3	1.5	1.7
Adams	NO ₂	1-hour	64	58	66
Adams	O ₃	8-hour	0.072	0.077	0.067
Adams	PM ₁₀	24-hour	86	93	97
Adams	PM _{2.5}	24-hour	28.7	23	28
Adams	PM _{2.5}	Annual	8.6	8.5	9.4
Arapahoe	O ₃	8-hour	0.076	0.079	0.067
Arapahoe	PM _{2.5}	24-hour	28.1	19.7	17
Arapahoe	PM _{2.5}	Annual	6.8	6.6	6
Douglas	PM _{2.5}	24-hour	20	17	13
Douglas	PM _{2.5}	Annual	6.1	5.6	5.6
El Paso	O ₃	8-hour	0.075	0.072	0.062
El Paso	PM _{2.5}	24-hour	17	18	13
El Paso	PM _{2.5}	Annual	6.9	6	5.8
Pueblo	PM _{2.5}	24-hour	17	17	12
Pueblo	PM _{2.5}	Annual	6.6	6.5	5.7
Prowers	PM ₁₀	24-hour	163	406	350
Sherman (KS)	PM ₁₀	24-hour	106	136	53

The following National Emissions Inventory (NEI) data shows the emissions loading for the Lease Parcel counties. The data provides a baseline correlation of regional emissions impacts when placed into the context of the measured concentrations shown above.

Table 3.2. 2011 National Emissions Inventory Data for Lease Parcel Counties (tons per year)

County	PM ₁₀	PM _{2.5}	VOC	NO _x	CO	SO ₂	CO ₂	CH ₄	N ₂ O	HAPs
Huerfano	1,382	360	16,210	1,236	7,094	19	165,371	79	4	2,124
Las Animas	9,079	4,527	56,279	7,762	57,028	353	666,804	2,082	5	8,523
Lincoln	8,013	1,543	12,468	2,445	6,547	17	158,673	29	4	3,226
Baca	7,905	1,635	15,792	3,058	7,778	35	97,150	30	2	4,364
Washington	12,463	2,570	13,253	2,746	7,255	34	137,352	11	3	2,976

Air quality in the majority of the RGFO meets the standards, however in certain areas of the RGFO; measurements of pollutants either exceeded or violated an air quality standard.

Historically, these problem areas have centered around the larger front range metropolitan areas that tend to have large amounts of pollutant emitting sources and activities. The RGFO currently has five areas that have a designation other than attainment / unclassifiable; the Denver Metro Area / Northern Front Range 8-hour O³ Non-Attainment Area (NAA), the Colorado Springs CO Maintenance Area, and the Denver, Canon City and Larimer Co. PM₁₀ Maintenance Areas. In these areas the state applies more stringent air pollution control requirements. As shown in the following figure, none of the Lease Parcels are located in any of these designated areas.

The following figure shows pertinent air quality parameters relative to the proposed action Lease Parcels, which includes designated air quality regions, and nearby Class I and sensitive Class II areas.

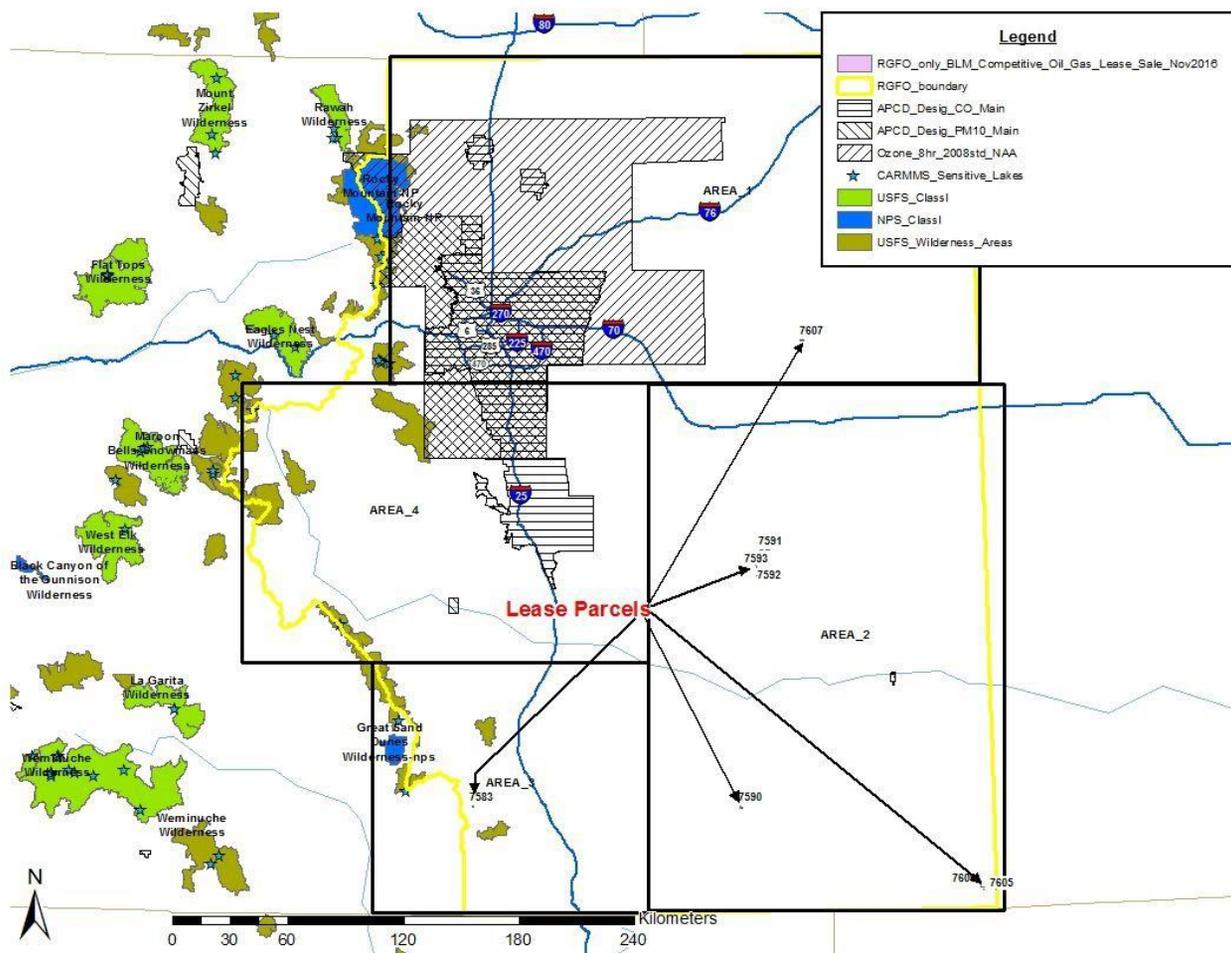


Figure 3.1.

Another relative indicator of air quality is the prevention of significant deterioration (PSD) increments. 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). increments, or the amount of air pollution an area is allowed to increase beyond the relative baseline level that was set for the area when the first PSD permit application was approved, prevents the air quality in clean (i.e. attainment) areas from deteriorating to the level

set by the NAAQS. Although the PSD rule is only applicable to major stationary sources of air pollution, an “increment analysis” can provide a useful measure to evaluate whether expected new sources of pollution (major or minor) could have a significant impact on regional air quality. Note, PSD increment analyses are the sole responsibility of the APCD, and thus within this leasing analysis increment data is presented for informational purposes only.

Table 3.3. PSD Increments ($\mu\text{g}/\text{m}^3$) (APCD 2012)

Pollutant	Period	Class I	Class II	Class III
Nitrogen Dioxide (NO ₂)	Annual	2.5	25	50
Sulfur Dioxide (SO ₂)	3–hr	25	512	700
	24–hr	5	91	182
	Annual	2	20	40
Particulate Matter < 10 μ (PM ₁₀)	24–hr	8	30	60
	Annual	4	17	34
Particulate Matter < 2.5 μ (PM _{2.5})	24–hr	2	9	18
	Annual	1	4	8

Air quality related values (AQRVs) provide another measure of air quality with respect to atmospheric phenomena such as visibility impairment and pollutant deposition. Measuring AQRVs is particularly important in federally mandated Class I lands, which include areas such as national parks and wilderness areas. Class I areas are granted special air quality protections under Section 162(a) of the federal Clean Air Act.

Visibility impairment or haze is caused when sunlight encounters tiny pollution particles in the atmosphere, and is either absorbed or scattered which reduces the clarity and color of what can be seen. Visibility can be expressed in terms of deciviews (dv) or standard visual range (SVR). A change of one dv is approximately a 10% change in the light extinction coefficient (i.e. light that is scattered or absorbed and does not reach the observer), which is a small, but usually perceptible scenic change. Class I areas have statutory mandates to provide for natural visibility conditions such that visitors can experience a pristine environment free observable pollution effects. The ability of a pollutant to cause various degrees of visibility impacts is primarily a function of its physical size, and chemical composition and properties. Various visibility impacting pollutant species have been monitored via the Interagency Monitoring of Protected Visual Environments (IMPROVE) network in many of the sensitive Class I areas around the country since the 1980s. The federal land managers use a data analysis threshold (DAT) of 0.5 dv for projects that contribute to a visibility problem and a value of 1.0 dv for projects that cause visibility issues, FLAG 2010.

Deposition is the process by which pollutants are removed from the atmosphere via mechanical and chemical processes. When air pollutants such as sulfur and nitrogen are deposited into ecosystems, they may cause acidification, or enrichment of soils and surface waters. Atmospheric nitrogen and sulfur deposition may affect water chemistry, resulting in impacts to aquatic vegetation, invertebrate communities, amphibians, and fish. Deposition can also cause chemical changes in soils that alter soil microorganisms, plants, and trees. Although nitrogen is an essential plant nutrient, excess nitrogen from atmospheric deposition can stress ecosystems by favoring some plant species and inhibiting the growth of others. These processes are measured via two distinct methodologies, i.e. wet and dry deposition monitors. The National Atmospheric Deposition Program (NADP) is a conglomerate of various wet chemistry monitoring networks designed to measure wet atmospheric deposition and study its effects on the environment. The

network currently operates approximately 250 sites, many since the early 1980's. The Clean Air Status and Trends Network (CASTNET) is a national air quality monitoring network designed to provide data to assess trends in air quality, dry atmospheric deposition, and ecological effects due to changes in air pollutant emissions. CASTNET began collecting data in 1991 with the incorporation of 50 sites from the National Dry Deposition Network. CASTNET provides long-term monitoring of air quality in rural areas to determine trends in regional atmospheric nitrogen, sulfur, and ozone concentrations and deposition fluxes of sulfur and nitrogen pollutants. The federal land managers use a data analysis threshold (DAT) of 0.005 kg/hr-yr for nitrogen and sulfur deposition for determining the significance of any given project, FLAG 2010.

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and several industrial gases in the Earth's atmosphere. Scientists have concluded that an increase in GHG emissions results in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, which is collectively referred to as climate change. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the average global temperature rise between 1990 and 2100 could be as great as 5.8°C (10.4°F), which could have massive deleterious impacts on the natural and human environments. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and the burning of fossil carbon fuel sources have caused GHG concentrations to increase measurably, from approximately 280 ppm in 1750 to 400 ppm in 2014 (as of April). The rate of change has also been increasing as more industrialization and population growth is occurring around the globe. This fact is demonstrated by data from the Mauna Loa CO₂ monitor in Hawaii that documents atmospheric concentrations of CO₂ going back to 1960, at which point the average annual CO₂ concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO₂ concentration since pre-industrial times occurred within the last 54 years.

Environmental Consequences of Leasing and Potential Development (Direct and Indirect Impacts):

The decision to offer the identified parcels for lease would not result in any direct emissions of air pollutants. However, any future development of these leases will result in emissions of criteria, VOC, HAP and GHG pollutants. Subsequent development would result in both short and longer term emissions of pollutants, including GHGs. Developmental air impacts will be examined in a subsequent analysis when lessees file an Application for Permit to Drill (APD). The analysis will evaluate if any contemporaneous incremental increases from project emissions would be expected to cause significant impacts at the local and regional scales. All proposed activities including, but not limited to, exploratory drilling activities would be subject to applicable local, State, and Federal air quality laws and regulations.

Subsequent activity authorized after APD approval could include soil disturbances resulting from the construction of well pads, access roads, pipelines, power lines, and drilling. Any disturbance is expected to cause increases in fugitive dust and potentially inhalable particulate matter (specifically PM₁₀ and PM_{2.5}) in the project area and immediate vicinity. Particulate

matter, mainly dust, may become airborne when drill rigs and other vehicles travel on dirt roads to drilling locations. Air quality may also be affected by exhaust emissions from engines used for drilling, transportation, gas processing, compression for transport in pipelines, and other uses.

These sources will contribute to potential short and longer term increases in the following criteria pollutants: carbon monoxide, ozone (a secondary pollutant, formed via photochemical reactions between VOC and NO_x emissions), nitrogen dioxide, and sulfur dioxide. Non-criteria pollutants (for which no national standards have been set) such as carbon dioxide, methane and nitrous oxide (GHGs), air toxics (e.g., benzene), and total suspended particulates (TSP), as well as impacts to visibility and atmospheric deposition may also increase as a result of exploration and development.

During exploration and development, ‘natural gas’ may at times be flared and/or vented from conventional, coal bed methane, and shale wells (depending on the resources present on the lease). The gas is likely to contain volatile organic compounds that could also be emitted from reserve pits, produced water disposal facilities, and/or tanks located at the site. The development stage may include the installation of pipelines for transportation of raw product. New centralized collection, distribution and/or gas processing facilities may also be necessary.

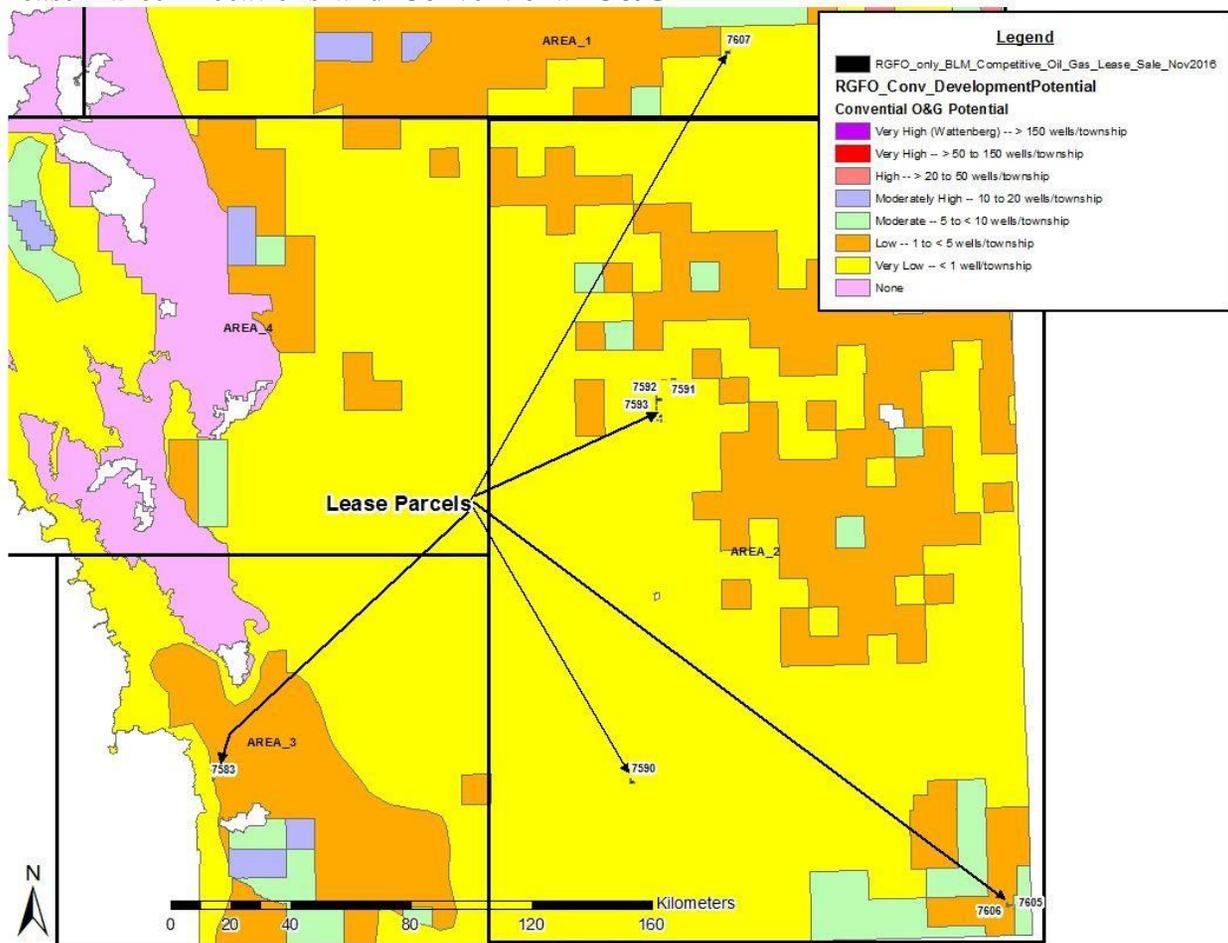
Research has identified the general potential impacts of anthropogenic GHG emissions and their effects on global climatic conditions. Anthropogenic GHGs differentially absorb and emit thermal radiation in the atmosphere and therefore may contribute incrementally to climate change. Changes in global temperatures and climate vary significantly with time, and are subject to a wide range of driving factors and complex interrelationships. Research on climate change impacts is an emerging and rapidly evolving area of science, but given the lack of adequate analysis methods it is not possible to identify specific local, regional, or global climate change impacts based on potential GHG emissions from any specific project’s incremental contributions to the global GHG burden. In the coming decades climate change may lead to changes in the Mountain West and Great Plains, such as increased drought and wildland fire potential. The BLM will continue to evaluate the impacts of oil and gas exploration and development on the global climate as the science and analytical tools evolve, and will apply appropriate adaptive management techniques and BMPs to address changing conditions.

At a minimum, operators must construct at least one well capable of producing economic quantities (unless the parcel is included in a unit at some point in the future) in order to continue to hold the lease beyond the 10 year primary lease term. With that in mind, the BLM has developed an estimated average per well emissions inventory based on current resource recovery methods (i.e. conventional oil and gas) and our knowledge of development for areas similar to those parcels that have been nominated for lease. The emissions inventory is only useful for estimating the minimum indirect impacts of leasing the nominated parcels. Since it is unknown if the parcels would be explored and/or developed, or the extent of any subsequent exploration and development on either a temporal or spatial scale, it is not possible to reasonably assess air quality impacts through dispersion modeling or another acceptable method at this time. However, the BLM will request or develop an exploration / development emissions inventory with project-specific information at the time that BLM receives a development proposal and performs a site-specific NEPA analysis. The following per-well emissions rates were developed using typical data / information for oil and gas development in southeastern Colorado.

Typical Per-Well Emissions (tons)

Resource/Phase	PM ₁₀ t/yr	PM _{2.5} t/yr	NO _x t/yr	SO ₂ t/yr	CO t/yr	VOC t/yr	HAPs t/yr	CO ₂ t/yr	CH ₄ t/yr	N ₂ O t/yr
Oil										
Construction	28.51	3.61	11.16	0.03	2.63	0.75	0.08	1,518.74	0.03	0.01
Operation	15.62	1.64	10.58	0.01	6.26	20.96	2.01	1,149.23	20.86	0.02
Maintenance	0.08	0.01	0	0	0	0	0	0.62	0	0
Reclamation	0.06	0.01	0.02	0	0.01	0	0	1.73	0	0
Total	44.27	5.27	21.75	0.03	8.9	21.72	2.09	2,670.32	20.89	0.03
Natural Gas										
Construction	28.62	3.63	11.18	0.03	2.77	0.76	0.08	1,563.51	0.03	0.01
Operation	14.68	1.65	4.53	0.01	8.06	33.3	3.65	1,211.83	31.69	0.01
Maintenance	0.08	0.01	0	0	0	0	0	0.62	0	0
Reclamation	0.06	0.01	0.02	0	0.01	0	0	1.73	0	0
Total	43.45	5.3	15.73	0.03	10.84	34.06	3.73	2,777.69	31.72	0.03

Lease Parcel Locations and Conventional O&G RFD



As shown in the figure above, most (5 of 8) of the Lease Parcels are located in “very low” potential O&G development areas with one or less foreseeable oil and gas well development; two parcels are located in “low” potential O&G development areas and one parcel is located in a “moderate” potential oil and gas development area.

Potential Conventional O&G Well Development for the Lease Parcels

Parcel ID #	Development Category	Minimum Wells per Township that Intersects Parcel	Maximum Wells per Township that Intersects Parcel
7583	Low	1	5
7590	Very Low	0	1
7591	Very Low	0	1
7592	Very Low	0	1
7593	Very Low	0	1
7605	Moderate	5	10
7606	Low	1	5
7607	Very Low	0	1

The RFD describes both federal and non-federal estimated development projections on a township wide basis (approx. 23,040 acres). It is impractical to scale or translate potential federal development from the township level down to the individual parcels, which is why the BLM provides for a single typical well emissions inventory (above) to describe the minimum emissions that could be expected if the parcels are eventually held by production. Based on knowledge of actual development in other parts of the field office, we also make no claim that the upper bounds of the RFD estimates are reasonable at either the township or parcel scales. However, the CARMMS analysis (outlined below) does provide a reasonable upper bound for emissions and impacts at the landscape scales analyzed. Further, the extent of current and foreseeable development (based on existing trends) is within the range (i.e. budget) analyzed by CARMMS such that offering the parcels for lease does not represent an unreasonable or unforeseeable likelihood for significant impacts to occur on air quality.

The BLM will assess project-specific impacts on air resources during the parcel development plan analysis or permitting stage. There will be much more detailed information at that stage to allow the BLM to more accurately estimate emissions and determine potential impacts to air quality. Substantial emission-generating activities cannot occur without further BLM analysis and approval of proposals for exploration and development operations. BLM Instructional Memorandum CO-2015-009 provides detailed direction and methods for FO staff to follow during future project level analysis. Based on the outcome of our future analysis, BLM will make its approval of these activities subject to conditions of approval that will address air pollutant impacts and climate change pollutants as appropriate.

Detailed project-specific emissions estimates and air quality impacts analyses will be conducted when actual projects are proposed to the BLM. Previously completed near-field air quality impacts analyses for oil and gas development in eastern Colorado show that for just a few wells located at least 500 meters of any sensitive receptor (residence, etc.), near-field air quality impacts are usually not of a concern, especially regarding a proposed action’s contribution to the overall cumulative near-field air quality. GIS and aerial images were evaluated for the Lease Parcels and the following table presents the distance to nearest sensitive receptor for each Lease Parcel.

Distance to Nearest Sensitive Near-Field Receptor for the Lease Parcels

Parcel ID #	Distance to Nearest Sensitive Receptor (meters)
7583	2,000
7590	> 5,000
7591	3,300
7592	2,500
7593	1,000
7605	1,500
7606	2,500
7607	500

As shown in the table above, no sensitive receptor (i.e. residence) is located closer than 500 meters of any of the Lease Parcels, and most are located over 1,000 meters from any residence. Given the parcel area’s low estimated RFD projections, the per-well emissions rates, and previously completed eastern Colorado near-field impacts assessments, BLM has concluded that future oil and gas development that could occur on the Lease Parcels would not significantly contribute to near-field air quality impacts. As described above, the BLM will take a closer look at existing air quality / emissions sources, project-level emissions and the air quality impact potential at an actual project-level stage to ensure new oil and gas development on the Lease Parcels will not significantly impact air quality.

Environmental Consequences of Leasing and Potential Development (Cumulative Impacts):

This lease sale, when combined with the past, present, and reasonably foreseeable future actions may, (through future development), contribute incrementally to the deterioration of air quality in the region. At present, any future potential cumulative impact is speculative, given that the pace, place, and specific equipment configurations of such development are unknown. Development of fluid minerals on these leases would result in additional surface disturbance and emissions during drilling, completion, and production activities. The severity of these incremental impacts could be elevated based on the amount of contemporaneous development (either Federal or private) in surrounding areas. Notwithstanding the uncertainties described above, BLM has used mapping and a modeling study to estimate the potential cumulative impacts to air quality from leasing and development of the parcels under consideration in light of ongoing oil and gas exploration and development in the area.

To examine potential cumulative air quality impacts from activities that it authorizes, BLM has initiated the Colorado Air Resources Management Modeling Study (CARMMS). The study includes assessment of statewide impacts of projected oil and gas development (both federal and fee (i.e. private)) out to year 2021 for three development scenarios (low, medium, and high). Projections for development are based on either the most recent FO Reasonably Foreseeable Development (RFD) document (high scenario), or by projecting the current 5–year average development paces forward to 2021 (low scenario). The medium scenario includes the same well count projections as the high scenario, but assumes restricted emissions, whereas the high and low assumes current development practices and existing emissions controls and regulations (2012). Each FO was modeled with the source apportionment (SA) option, meaning that incremental impacts to regional ozone and AQRVs from development within each field office are essentially tracked to better understand the significance of development in each area on impacted resources and populations. Additionally the RGFO was split into five SA areas, since the FO is so large. 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). The complete report and associated data is available on our website at: http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality.html.

The BLM continually tracks authorized oil and gas activity to determine which CARMMS scenario would be most appropriate to estimate air resource impacts correlations based on the source apportionment area’s cumulative federal development and total production. Although the predicted impacts will be based on future modeling results (2021), the differences in the impacts between the scenarios provide insight into understanding how mass emissions impact the atmosphere on a relative basis, and are thus useful for making qualitative correlations for the tracked emissions levels.

Table 3.4. Current Tracking Data (2014 COGCC & AFMSS Data)

Lease Parcel County / SA Area	Oil Production (bbl)	Gas Production (Mcf)	Water Production (bbl)	Maximum No. of Active Wells	RGFO New Federal Wells Completed Since 2011
Huerfano / Area 3	0	13,717,035	8,905	44	67
Las Animas / Area 2	1,084	87,676,606	55,684,951	3,061	
Lincoln / Area 2	1,453,910	755,615	1,922,498	185	
Baca / Area 2	51,003	683,907	2,742,559	190	
Washington / Area 1	441,269	1,242,589	29,545,088	466	

The majority of the new Federal wells shown above have been spud within RGFO SA Area 1 (i.e. Weld County), and thus SA Area 1 is currently tracking higher than the low CARMMS scenario (9 new federal wells per year), but lower than the high scenario (47 new federal wells per year) on strictly a well count basis. Source apportionment areas two and three are currently tracking lower than the low CARMMS development scenario (9 and 4 new federal wells per year, respectively). Currently no SA area within the RGFO has exceeded the low scenario on a mass emissions basis, but given potential delay between leasing and any actual development, the BLM projects the current development forward and presents the representative CARMMS data to disclose the potential cumulative impacts. For source apportionment area 1 some high development data are shown (non-federal development is trending toward the high CARMMS analysis scenario), and for SA areas 2 and 3, we present the low development scenario results. For all of the SA areas, air

quality related value impacts and the other model values (NAAQS) are shown only for the highest impacted Class I area, monitor, and or unmonitored area value. This is simply because of the sheer volume of data contained in the CARMMS report. Readers interested in viewing all of the available CARMMS data should refer to the link to our website above.

Considering the likelihood that any new oil and gas development would be established on the nominated lease parcels over the next few years and that the conservative CARMMS high scenario is based on aggressive oil and gas development projections that current development levels do not approach, we assume that emissions associated with any potential oil and gas developed through year 2021 on the nominated lease parcels are accounted for in the CARMMS projected year 2021 oil and gas emissions inventories (as modeled, see table below).

Table 3.5. RGFO O&G Emissions (federal tons per year) by SA Area

SA Area	PM10	PM2.5	VOC	CO	NOX	SO2	CO2	CH4	N2O
Area 1 Low	171	22	781	258	249	0.8	27,296	1,166	1
Area 1 High	910	118	2,437	1,092	1,230	4.6	146,617	6,263	2
Area 2 Low	6	2	147	102	104	0.1	3,120	133	0
Area 2 High	57	22	1,154	1,046	1,148	1.2	28,076	1,199	1
Area 3 Low	11	2	33	170	141	0.0	8,398	706	0
Area 3 High	16	3	49	268	224	0.1	12,597	1,059	0

Table 1 provides the estimated downstream emissions by assuming that all production related hydrocarbons are combusted. The production estimates come from the CARMMS analysis (low scenario, as tracking) and are reasonable over the landscape scale, but may not accurately reflect well scale production. The data presented represent cumulative production over a period of years (2015 to 2021) that has been annualized. The estimates were made by deriving emissions factors (tons / btu) from the 2015 EIA Annual Energy Outlook report, which provides sector specific CO2 emissions estimates and the corresponding energy consumption. The BLM used reasonable energy density factors for Colorado produced hydrocarbons to get the total energy from the estimated CARMMS production, and then applied the factors to calculate CO2 emissions. Methane and nitrous oxide emissions were not calculated due to the fact that the combustion apparatus can have significant effects to their formation rates. There is simply too much variation and uncertainty for any given sector that might utilize the resource. Further, their contributions are insignificant compared to the CO2 signal.

Table 3.6. Estimated Downstream (federal and non-federal) Combustion GHG Emissions

CARMMS Area/Scenario	CO2 (MM tons/yr)	CH4	N2O	CO2e
RGFO 1 Low	40.4	ND	ND	ND
RGFO 1 High	93.4	ND	ND	ND
RGFO 2 Low	0.76	ND	ND	ND
RGFO 2 High	0.78	ND	ND	ND
RGFO 3 Low	0.65	ND	ND	ND
RGFO 3 High	1.08	ND	ND	ND

Table 3.7. SA PSD Increment Evaluation (not regulatory, for informational purposes only)

SA Area	Impacted Class I Area	NO ₂ (µg/m ³) Annual	PM ₁₀ (µg/m ³) 24-Hour	PM _{2.5} (µg/m ³) 24-Hour	SO ₂ (µg/m ³) 3-Hour
RGFO Area 1	Rocky Mountain NP	0.000	0.009	0.004	0.000
RGFO Area 2	Pecos Wilderness	0.000	0.000	0.000	0.000
RGFO Area 3	Great Sand Dunes NM	0.002	0.003	0.002	0.000

As shown above the CARMMS high scenario PSD pollutant concentrations at any Class I area due to new Federal oil and gas emissions are less than 2% of any PSD increment and are thus exceedingly low. 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. SA Visibility Impacts

SA Area / Group	Impacted Class I Area	Max Δdv	2021 Worst 20% dv at Class I	2021 Best 20% dv at Class I	2021 Worst % Change Relative to 2008 baseline	2021 Best % Change Relative to 2008 baseline
RGFO Area 1	Rocky Mountain NP	0.02253	11.15	1.87	7.4	2.1
RGFO Area 2	Pecos Wilderness	0.00197	10.82	4.61	4.5	-1.5
RGFO Area 3	Great Sand Dunes NM	0.01214	10.76	3.80	1.3	-6.1
Group R — All New Federal Oil and Gas (Colorado) Low Scenario	Flat Tops Wilderness	1.33	8.0	0.49	7.8	29
Group R — All New Federal Oil and Gas (Colorado) High Scenario	Flat tops Wilderness	1.64	8.07	0.55	7	20.3

Even though an individual SA area is not a project in the strictest sense of the FLAG guidance (i.e. leasing represents a cumulative impact, whereas development is more along the lines of a project related impact), the maximum dv are still below the project based thresholds, which are very low by design. For each field office SA area above, the maximum dv predicted by CARMMS is less than the 2010 FLAG factors described earlier in the document that are said to contribute to a visibility issue (0.5 dv). With respect to the cumulative visibility impacts, CARMMS predicts slight visibility degradation (<10%) at the Great Sand Dunes NM and the Pecos Wilderness on the

20% best visibility days, while forecasting improvements on the worst visibility days.

Table 3.9. SA Deposition Impacts

SA Area / Group	Impacted Class I Area	Maximum Nitrogen Deposition (kg/ha-yr)
RGFO Area 1	Rocky Mountain NP	0.0004
RGFO Area 2	All	0.0000
RGFO Area 3	Great Sand Dunes NM	0.0011
Group R — All New Federal Oil and Gas (Colorado) Low Scenario	Flat Tops Wilderness	0.0434
Group R — All New Federal Oil and Gas (Colorado) High Scenario	Flat Tops Wilderness	0.212

As noted above, an individual SA area is not a project in the strictest sense of the FLAG guidance. However, the maximum predicted nitrogen deposition is still below the project based threshold, which is very low by design. For each field office SA area above, the maximum deposition predicted by CARMMS is less than the data analysis threshold of 0.005 kg/ha-yr. With respect to the cumulative deposition impacts, CARMMS predicts deposition that is not more than 10% of the FLM guidance (nitrogen critical load in Colorado Class I areas) of 2.3 kg/ha-yr. For a Project, the Acid Neutralizing Capacity (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 SA Areas are all predicted to be below the USFS ANC LAC threshold at all sensitive lakes within the CARMMS domain.

Table 3.10. SA Ozone and Particulate Matter Impacts UAA

SA Area / Group	Max O ₃ Contribution (ppb)	Corresponding O ₃ 4th MDA8	% Max Contribution	Max PM _{2.5} Contribution (µg/m ³)	Corresponding PM _{2.5} 8th Daily Average	% Max Contribution
RGFO Area 1	0.0021	76.29	0.00%	0.0253	39.1	0.06%
RGFO Area 2	0.0000	76.90	0.00%	0.0002	39.7	0.00%
RGFO Area 3	0.0002	76.96	0.00%	0.0029	39.9	0.01%
Group R — All New Federal Oil and Gas (Colorado) Low Scenario	0.8622	76.96	1.12%	0.0229	49.9	0.00%
Group R — All New Federal Oil and Gas (Colorado) High Scenario	3.2125	76.47	4.20%	0.1126	49.9	0.23%

The maximum contributions to 4th high daily maximum 8-hour concentrations are expected to be minimal with respect to the current 70 ppb 8-hour ozone standard, and the maximum contributions to any modeled exceedance (above NAAQS) are expected to be much less than 1% of the ozone standard. 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 Low Development Scenario. There are eight monitoring sites in the CARMMS 4 km domain with

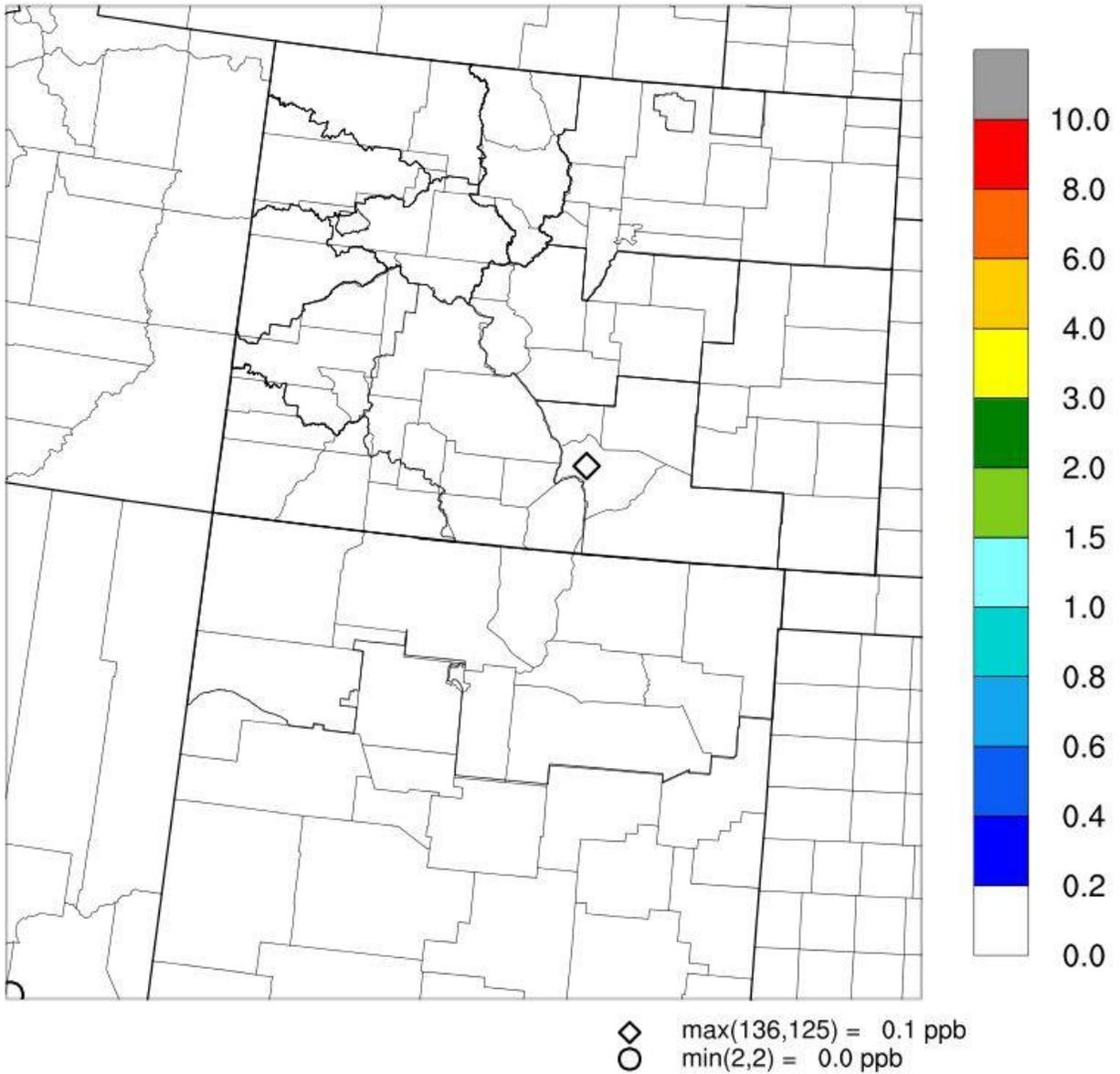
year 2008 DVCs above the former ozone NAAQS (75 ppb) and CARMMS predictions show that there would be 17 monitoring sites with DVF for future year 2021 ozone concentration above the new ozone Standard (70 ppb) for the CARMMS 2021 High and Medium scenarios, and 16 monitoring sites with DVF above new ozone Standard for CARMMS Low scenario (note that there would be ~ 19 monitoring sites with year 2008 DVCs above the new ozone Standard [70 ppb] and CARMMS predicts that there would only be two sites with year 2021 ozone concentration DVFs above the former ozone Standard [75 ppb] for all CARMMS scenarios). Even though there has recently been new ozone Standard established since base year 2008, the cumulative ozone concentrations are predicted to decrease at air quality monitor locations throughout the Region. The CARMMS predicted average reductions in cumulative ozone concentrations (from base year 2008 to future year 2021) for all 37 Regional monitors in the CARMMS ozone analysis are 1.6 ppb, 1.6 ppb and 2.1 ppb for the CARMMS High, Medium and Low Scenarios, respectively. CARMMS predicts slight increases (< 1ppb) at only two Larimer County, Colorado based monitor locations for the CARMMS High and Medium Scenarios (no predicted increases at Regional monitors for the CARMMS Low Scenario). For the ozone design value projection unmonitored area analysis (UAA, analysis for areas with no monitors), the geographical extent (i.e. size) of the overall area of ozone design value exceedances is reduced (from 2008 to 2021) and the CARMMS difference plot below shows the largest ozone reduction in the Denver area while there are slight ozone increases just east of Fort Collins, Colorado.

The maximum contribution to the 8th high maximum 24-hour $PM_{2.5}$ concentration is minimal with respect to the $35 \mu\text{g}/\text{m}^3$ 24-hour standard. The $PM_{2.5}$ CARMMS plots below show changes in 8th highest daily average $PM_{2.5}$ concentrations (2021 High Scenario minus Base Year 2008 concentrations) and emissions source apportioned to the RGFO. As shown in the figures, concentrations are expected to increase in major Colorado Front Range cities and near some surface mining operations in Colorado, but are not expected to be significant from the RGFO oil and gas sources (max = $0.7 \mu\text{g}/\text{m}^3$).

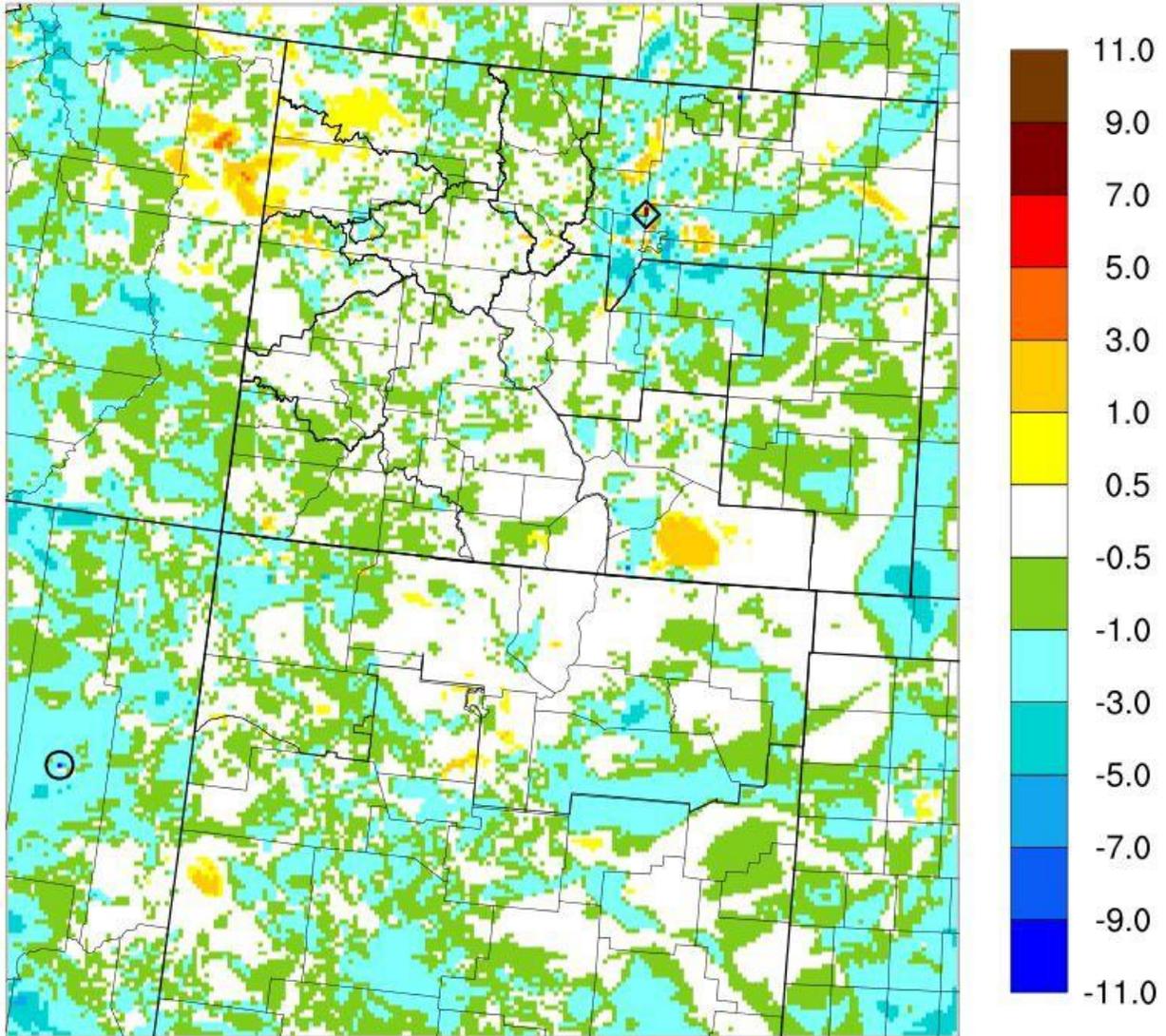
The NO_2 one hour CARMMS plots generally show decreases in future cumulative NO_2 concentrations, and are again not expected to be significant from the RGFO oil and gas sources (max = $14.4 \mu\text{g}/\text{m}^3$).

Figure 3.2. RGFO & Cumulative Change Ozone Plots (CARMMS — Low Scenario)

4th High 8 Hour Avg Daily Max Ozone
2021 Low O&G Scenario
(P) Total Royal Gorge Field Office



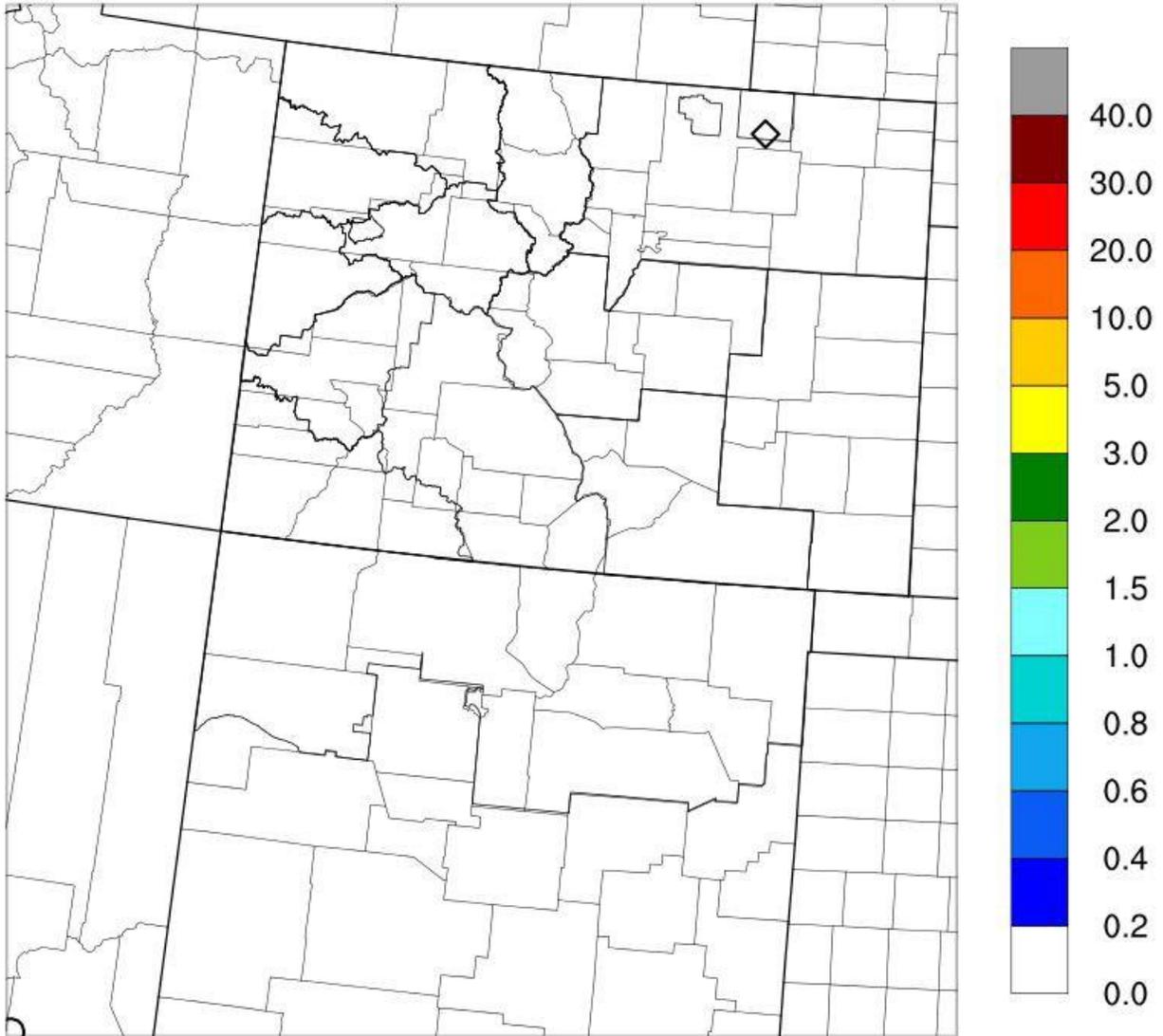
The 4th highest 8 hour average daily max O3
2021 Low Oil and Gas Scenario - 2008
CARMMS CAMx 4km



◇ max(144,185) = 7.8 ppb
○ min(13,62) = -11.3 ppb

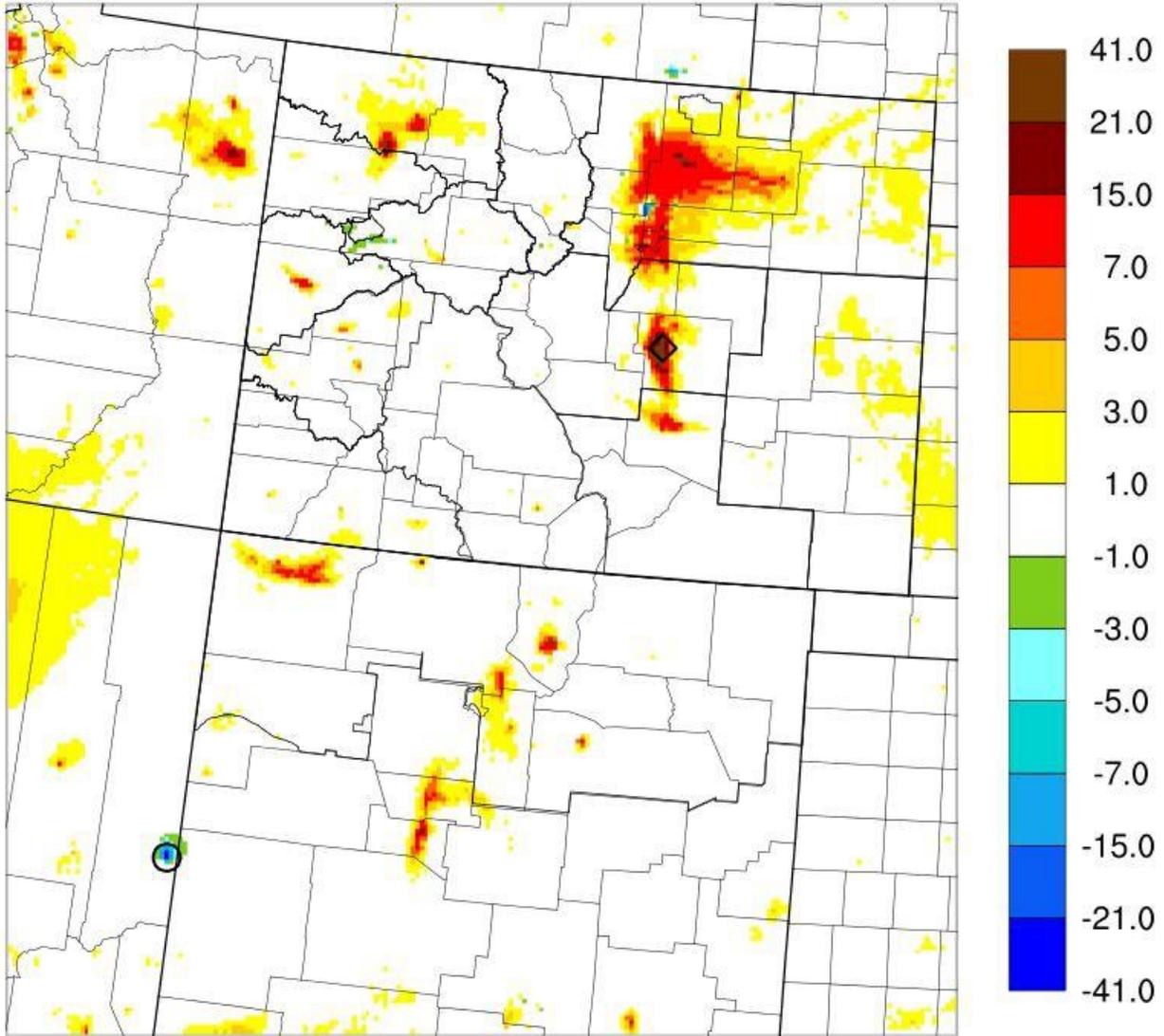
Figure 3.3. RGFO & Cumulative Change PM_{2.5} Plots (CARMMS — Low Scenario)

**8th High Daily Avg PM_{2.5} Contribution
2021 Low O&G Scenario
(P) Total Royal Gorge Field Office**



◇ max(171,203) = 0.2 ug m⁻³
○ min(2,2) = 0.0 ug m⁻³

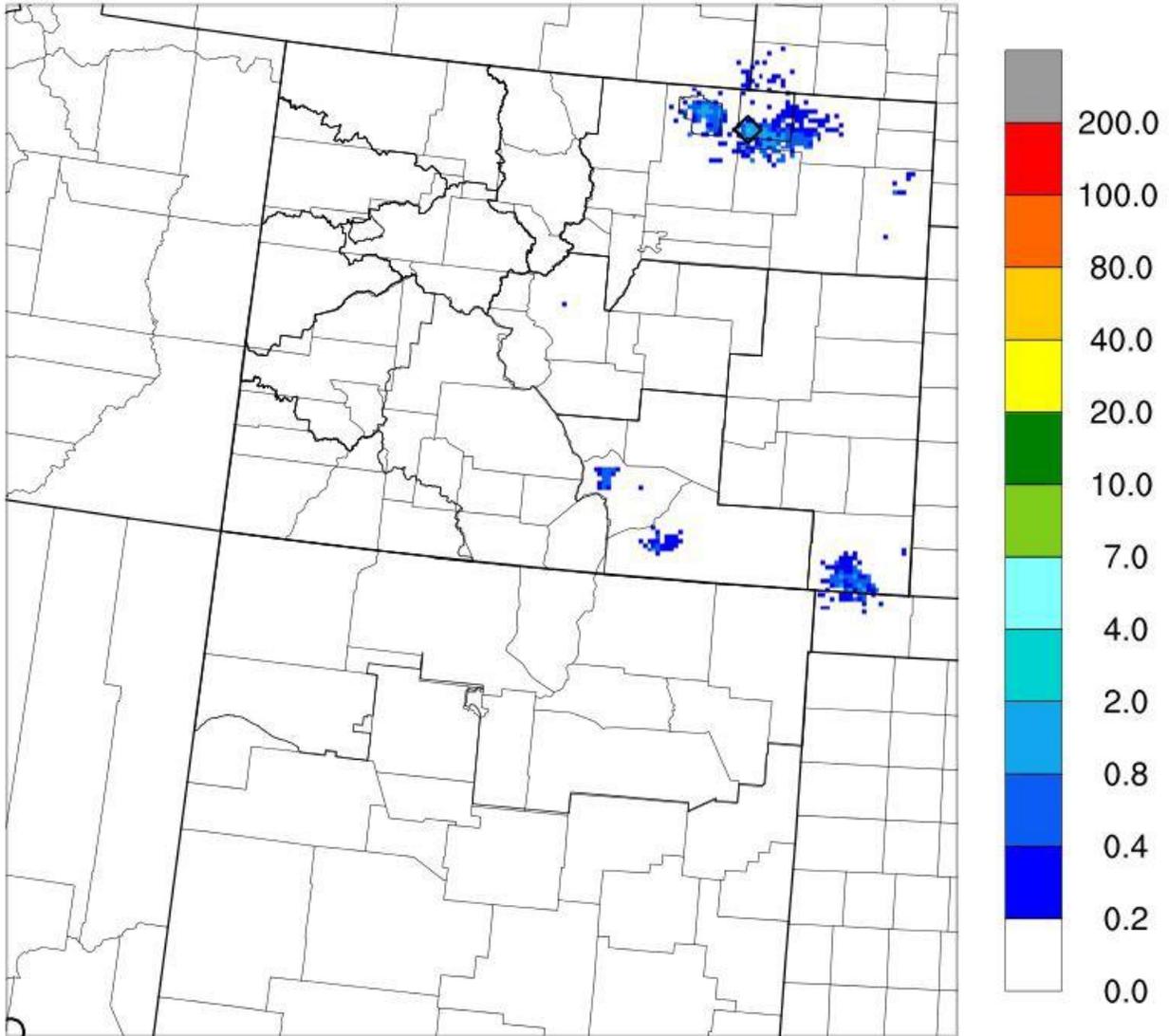
The 8th highest daily average PM_{2.5} Concentration
2021 Low Oil and Gas Scenario - 2008
CARMMS CAMx 4km



◇ max(148,155) = 40.8 ug m⁻³
○ min(37,41) = -31.1 ug m⁻³

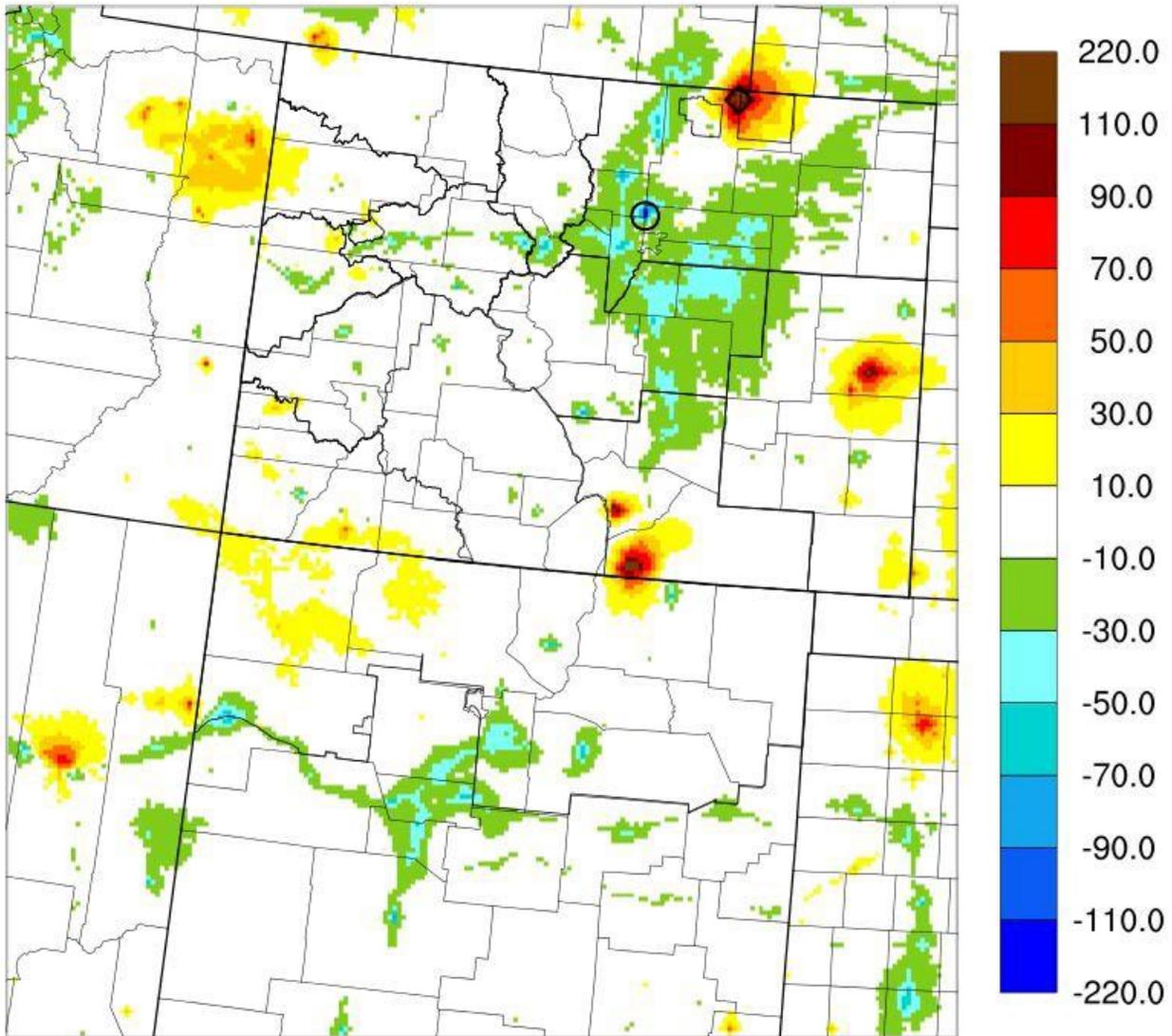
Figure 3.4. RGFO & Cumulative Change NO₂ Plots (CARMMS — Low Scenario)

8th High 1 Hour Daily max NO₂ Contribution
2021 Low O&G Scenario
(P) Total Royal Gorge Field Office



◇ max(167,204) = 2.1 ug m⁻³
○ min(2,2) = 0.0 ug m⁻³

The 8th highest 1 hour daily max NO₂ Concentration
2021 Low Oil and Gas Scenario - 2008
CARMMS CAMx 4km



◇ max(165,211) = 216.6 ug m⁻³
○ min(144,185) = -132.4 ug m⁻³

As future oil and gas development occurs in the RGFO, the BLM Colorado will add project-specific emissions (based on approved APDs) to total regional emissions estimates to compare the RGFO oil and gas and other regional emissions rates modeled in cumulative air quality modeling studies (CARMMS) along with the corresponding modeling results to confirm whether the modeled emissions predicted in the cumulative impacts analysis accurately describe the actual emissions from activities approved by the BLM Colorado, and whether any refinement of the model is needed.

Cumulative GHG Emissions and Climate Change

To estimate the cumulative GHG emissions from the RGFO SA areas (see cumulative CARMMS discussion above), the BLM assumed a well life of 25 years and multiplied the total projected production over this time period by the projected annual production emission rates for the potential future wells. When added to the construction emissions for the total projected development for RGFO SA areas, the estimate for cumulative GHGs is approximately 9,459,794 metric tons of carbon dioxide equivalent (CO₂(e)). 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) and location of end-use consumption cannot be predicted with any reasonable certainty. However, a reasonable down-stream /end-use consumption estimate could be made for the ranges of potential O&G development (RFD) on the Lease Parcels by using per-well annual production values (see production data for each County and RFD ranges for each Lease Parcel in tables above) converted to energy equivalent and ranges of RFD for Lease Parcels with the following CO₂e emissions factors: ~ 52 mmMT CO₂e per QBtu consumption of natural gas and ~ 61 mmMT of CO₂e per QBtu consumption of petroleum; these factors were derived using the Annual Energy Outlook (AEO) 2014 Report. It should be noted that any production value (estimated at this time) could vary significantly over the life of the project, making any prediction of the quantities of GHG emitted highly speculative.

The CDPHE used the EPA's State Inventory Tool to estimate future years GHG emissions inventories for Colorado. In year 2020, it is estimated that Colorado's annual GHG emissions will be approximately 128,060,000 metric tons CO₂(e). The cumulative RFD emissions (federal and non-federal minerals — projected out to 25 years) represent about 7.4% of the state of Colorado's year 2020 annual GHG emissions. Given the relative magnitude of greenhouse gas emissions associated with the development of the SA wells as compared to the state's annual GHG emission levels, the GHG contribution associated with the SA (federal) wells is small. It should be noted that the CDPHE projected year 2020 value is for a single year and GHG emissions estimate for the RGFO SA areas is for 25 years of projected annual O&G production.

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). EPA estimated a hypothetical maximum mean global temperature value increase resulting from such a project. The results ranged from 0.00022 and 0.00035 degrees Celsius occurring approximately 50 years after the facility begins operation. The modeled changes are extremely small, and any downsizing of these results from the global scale would produce greater uncertainty in the predictions. The EPA concluded that even assuming such an increase in temperature could be down-scaled 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 projected cumulative RFD emissions are a fraction of the EPA's modeled source and are shorter in duration, and therefore leasing and development of the proposed parcels is expected to have no measurable impact on the climate.

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

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

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

Increases in winter temperatures in the mountains could have impacts on traditional big game migration patterns. Due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Warmer winters with less snow would impact the Canada lynx by removing a competitive advantage they have over other mountain predators. Earlier snowmelt could also have impacts on cold water fish species that occupy streams throughout the planning area. Climate change could affect seasonal frequency of flooding and alteration of floodplains, which could impact riparian conditions. More frequent and severe droughts would have impacts on many wildlife species throughout the region as well as vegetative composition and availability of livestock forage in some areas. Climate change could increase the growing season within the region, which could result in more forage production provided there is sufficient precipitation. Drier conditions could have severe impacts on forests and woodlands and could leave these areas more susceptible to insect damage and at higher risk of catastrophic wildfires. Increased fire activity and intensity would increase greenhouse gas emissions, providing for a negative feedback loop. In fact most of the predicted changes on a

global scale have some level of a predicted negative feedback loop, exacerbating adverse impacts.

Potential Future Mitigation: Substantial emission-generating activities cannot occur without further BLM analysis and approval of proposals for exploration and development operations. BLM may make its approval of these activities subject to conditions of approval (COA) addressing air pollutant emissions, as appropriate. Prior to approving development activities on a leased parcel, the BLM will conduct a refined project-level impacts analysis that will consider the impacts of the operator's development plans for the lease, to the extent reasonably foreseeable. The BLM's analyses will typically consider the emissions inventory for the proposal, and estimated emissions from other development on and outside the lease and other nearby emissions sources. All operators must comply with applicable local, State and Federal air quality laws and regulations. As described in the lease notice that would be attached to the leases in the proposed action, BLM may require additional analyses (such as air dispersion modeling assessments) or impose specific mitigation measures within its authority as COA, based on the review of site-specific proposals or new information about the impacts of exploration and development activities in the region.

Oil and gas resources may be developed and produced subsequent to the proposed lease sale and may ultimately be utilized by the public as demand dictates. The BLM will evaluate potential impacts of emissions of regulated air pollutants (including GHGs) associated with the development of the oil and gas resources in a subsequent NEPA analysis at the lease development (typically APD) stage. Project specific GHG emissions can generally be quantified and compared to overall sector, regional, or global estimates to provide some estimate of the level and significance of any potential impacts. The BLM will continue to evaluate climatic variability and change in the future, and apply appropriate management techniques and policy to address changing conditions as developments occur.

3.4.1.2. Hydrology/Water Quality:

Affected Environment:

The proposed parcels are located on the eastern slope of Colorado. All of the parcels are located on the eastern plains, except the Huerfano County and Las Animas County parcels, which are in pinyon/juniper foothills and canyons. The entire surface of the lands being proposed for leasing is privately owned; therefore BLM has no site specific information about water quality on the proposed parcels. In general, most of the water quality in these areas is good and there is very little surface water.

Surface Water: The proposed lease parcels located in Huerfano (1), Las Animas (1), and Lincoln (3) counties are in the Upper Arkansas watershed basin, which encompasses approximately 25,000 square miles all within Colorado. The Arkansas River originates in the mountains near Leadville, Colorado, and flows south and east, until it joins the Mississippi River in Arkansas. The proposed parcels in Baca County lie within the Upper Cimarron watershed basin, which encompasses approximately 12,000 square miles in New Mexico, Colorado and Kansas. The Cimarron River originates on Johnson Mesa, near Folsom, New Mexico and flows generally eastward, until it joins the Arkansas River west of Tulsa, Oklahoma. The western portion of the river is frequently dry in some locations. The parcel in Washington County is located within the Republican watershed basin, which encompasses approximately 25,000 square miles in Colorado, Kansas and Nebraska. The Republican River is formed at the confluence of the Arikaree and

North Fork Republican Rivers in southwestern Nebraska. The South Fork Republican River flows into the Republican River approximately 50 miles east of the origin of the Republican. These three tributaries all originate in the high plains of eastern Colorado, and generally flows southeasterly until it joins the Smoky Hill River at Junction City Kansas to form the Kansas River.

Ground Water: The proposed lease parcels within Washington and Baca Counties are located above the Ogallala Formation, which is part of the High Plains aquifer. The High Plains aquifer underlies an area of about 174,000 square miles that extends throughout parts of Colorado, Nebraska, Kansas, New Mexico, Oklahoma, South Dakota Texas and Wyoming. The aquifer is the principal source of water in one of the major agricultural areas of the United States. In eastern Colorado the High Plains aquifer has an average saturated thickness of about 75 feet, and the average transmissivity is about 4,500 square feet/day. The base of the aquifer is underlain by the Pierre shale formation that is generally considered impermeable, except for some sands near the top of the Pierre shale that can contain usable water. Dissolved solids concentration of water in the aquifer in eastern Colorado is generally less than 500 mg/l but exceeds 1,000 mg/l in some areas. Potential well yields of more than 750 gpm may be obtainable in the eastern Colorado portion of the aquifer, but many wells yield far less. (USGS 1995)

The remaining lease parcels, which are in Huerfano, Las Animas and Lincoln Counties are not located above any major aquifers, however there is potential for groundwater in subterranean permeable formations such as alluvial or eolian deposits that may underlie these parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The act of leasing the parcels for oil and gas development would have no direct impact on water resources; however activities at the exploration and development stage could have impacts to water quality and quantity. The magnitude and location of direct and indirect effects cannot be predicted with accuracy until the site-specific APD stage of development. No lease stipulations for the proposed parcels specifically address either surface or groundwater quality. The leasing of these parcels would not affect whether or not these lands meet Public Land Health Standards; but development could negatively affect water quality. With adherence to state and federal regulations, and proper site specific BMP implementation, which would take place at the APD stage if these parcels are developed, any possible development should not result in waters not meeting quality standards. Similar to water quality, water quantity impacts cannot be predicted with accuracy until the site specific APD stage. Many factors, such as well type, depth, the formation being drilled, and the use of recycled water, influence the amount, timing and location of water used in oil and gas development. Water usage is regulated by the State of Colorado's water rights system and operators would need to obtain a legal source of water.

Surface Water: Impacts to surface water resources would be associated with the surface disturbance from the construction of roads, pipelines, well pads, and power lines. 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. Impacts would be greatest shortly after the start of the activity and decrease over time. These impacts can also be mitigated by the implementation BMPs that would design facilities with temporary runoff control measures that would slow down runoff and capture sediment, and require proper revegetation at the interim and final reclamation phases. These BMPs would be applied at the APD stage to address site specific conditions based on submitted Surface Use and Drilling Plans.

Chemicals, or other fluids, accidentally spilled or leaked during the development process could result in the contamination of both ground and surface waters; however the BLM and State of Colorado have regulations that help to minimize the likelihood of contamination of water resulting from spills, and require effective clean-up of spills that may occur. The state also regulates the disposal remediation and recycling of waste generated by oil and gas development to ensure that water resources are not impacted. Authorization of development projects would be further analyzed at the APD stage and permits would require full compliance with BLM directives and state regulations for surface and groundwater protection.

Ground Water: If the proposed parcels are developed, drilling would most likely pass through useable groundwater. 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 and completion 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 result in the loss of drilling fluids, which, in the absence of proper cementing and casing, can be introduced into groundwater. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted; however conditions of approval are added to the APD as necessary to protect these resources.

If the parcels are developed, wells within the parcels may be completed using hydraulic fracturing techniques. Hydraulic fracturing is intended to change the physical properties of producing formations by increasing the flow of water, gas, and/or oil around the well bore, resulting from the introduction of water, proppant (sand) and chemical additives into the producing formations. Types of chemical additives used in completion activities may include acids, hydrocarbons, thickening agents, gelling agents lubricants, and other additives that are operator and location specific. The largest components in hydraulic fracturing fluid are water and sand. The state of Colorado requires operators to publicly disclose all chemicals in hydraulic fracturing fluids used on all wells completed in Colorado using hydraulic fracturing techniques on frac focus, a database available to the public online at <http://fracfocus.org/>.

Some have raised the question as to whether hydraulic fracturing causes earthquakes. According to the Colorado Geological Survey (CGS), there are only two instances in the world where hydraulic fracturing near faults has been interpreted to cause earthquakes - one in Oklahoma and one in Great Britain. Both of these were less than magnitude 3.0, which causes a shaking intensity that most people would not notice. The USGS states, "Fracking causes small earthquakes, but they are almost always too small to be a safety concern." (CGS Background Paper)

If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and residential wells that are sourced from the affected aquifers. BLM Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved in the APD to protect and/or isolate all usable water zones from other geologic formations (including the hydrocarbon producing zones), and any completion fluids introduced in the wellbore. Engineering reviews at the APD stage and inspections at the drilling and completion stages of the project are conducted to ensure compliance with this regulation. The Colorado Oil and Gas Conservation Commission (COGCC) regulates drilling and hydraulic fracturing, and has extensive operational requirements in place to protect ground (and surface) water. Examples include casing and cementing programs, comprehensive spill clean-up

requirements, regulation of waste management, groundwater monitoring and offset well evaluation for horizontal wells that will be hydraulically fractured. This policy requires operators proposing to hydraulically fracture a horizontal well evaluate existing wells that penetrate the target formation, within 1,500' of the wellbore of the proposed well to be fracture treated, ensuring these offset wells have adequate zonal isolation. If offset wells are deemed to have inadequate zonal isolation, the operator must adequately remediate the well with casing and cementing improvements, or properly plug the offset well. This is to prevent fluid from migrating along offset well bores into freshwater zones from zones that are hydraulically fractured. The wellheads of offset wells are also evaluated and upgraded, if necessary, to ensure that any pressure increase in the wellbore due to the fracture treatment will not result in a spill at the surface, protecting surface water.

At the APD stage, geologic and engineering reviews are performed to ensure that mud programs, cementing and casing programs are adequate to protect all downhole resources. BLM Onshore Order #2 requires the protection of usable water zones (TDS < 10,000). This includes proper casing, cementing and plugging (upon abandonment) procedures, making contamination of ground water resources highly unlikely. Surface casing and cement would be extended beyond usable water zones. Production casing will be extended and adequately cemented within the surface casing to protect other mineral formations, in addition to usable water bearing zones. These requirements ensure that drilling fluids, hydraulic fracturing fluids and produced water and hydrocarbons remain within the well bore and do not enter groundwater, or any other formations.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect water quality. These activities may include: oil and gas development, residential and commercial development, grazing, farming, and mining. Potential development of these parcels would incrementally add an additional impact to water resources into the future. Most of this impact would be phased in and lessened as individual wells are completed and older wells are plugged and the locations reclaimed. Overall, it is not expected that the leasing and possible future development of the parcels would cause long term degradation of water quality below state standards.

Water is used to drill and complete oil and gas wells and potential development would result in the use of water. The State of Colorado regulates water use within Colorado, including water used for oil and gas development. It is not known at the lease stage how many (if any) wells will be drilled on a given lease parcel, how many parcels will be developed, and how much water may be used for each potential well. Factors such as the type of well to be drilled (vertical, directional or horizontal), method of well completion (hydraulic fracturing, acidizing ect.) total measured depth of well, and geologic conditions of the formations all determine how much water may be required for each well. This information is not known at the lease stage, and will be analyzed at the APD stage. The act of oil and gas leasing does not directly result in any water use.

Potential impacts to ground water at site specific locations are analyzed through the NEPA review process at the development stage when the APD is submitted. This process includes geologic and engineering reviews to ensure that cementing and casing programs are adequate to protect all downhole resources.

Potential Future Mitigation: The soils mitigation (interim and final reclamation), along with additional construction requirements (onshore order #2, engineering reviews, stormwater management features), at the APD stage is adequate to protect water resources on the parcels

being proposed for leasing. Additional site specific mitigation measures would be analyzed and may be added at the APD stage.

3.4.1.2.1. Minerals/Fluid:

Affected Environment: The eight nominated parcels are located in northeast and southeast Colorado. The development potential according to the most recent reasonable foreseeable development scenario for the field office ranges from moderate (5-10 wells per township) to low (1-5 wells per township) for the parcels in Baca and Huerfano Counties to very low (less than one well per township) for the remaining parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Leasing of the parcels would allow for the development and recovery of oil and natural gas resources and help avoid potential drainage of federal fluid minerals from nearby non-federal wells. If development of the parcels takes place, it would result in the extraction and irreversible depletion of hydrocarbon resources from the targeted zones of the leases.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Should the leases be issued, there would be the potential for development resulting in draining these parcels of fluid minerals, which would add incrementally to the production of overall fluid minerals which may be taking place on non-federal leases, and contribute to the domestic supply of crude oil and natural gas.

Potential Future Mitigation: None.

3.4.1.3. Soils:

Affected Environment:

The proposed lease parcels cover a large variety of soil types and conditions ranging from higher elevation, cooler, steeper soils on the parcel in Huerfano County to lower elevation, flatter, potentially drier and warmer soils on the eastern plains. These soils and associated topography vary in ease of reclamation and suitability for use as roads, fill and related infrastructure during subsequent exploration and production of the lease.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

All of the surface ownership of the lands being proposed for leasing is private; therefore no site specific knowledge of soil resources is available. In general, most of the soils in these areas are in good condition; however some have been used in cultivated agricultural fields at some point. The leasing of these parcels would not have an effect on whether or not these lands meet Public Land Health Standards; but at the development stage there would be instances where soils are affected negatively. With proper Best Management Practice (BMP) implementation, such as stormwater control structures, salvaging and reuse of topsoil and effective reclamation and re-vegetation processes, soil resource impacts would be mitigated and would still meet standards with future development.

The act of leasing the parcels for oil and gas development would have no direct impact on soil resources; however impacts at the exploration and development stage would have impacts on soils. The magnitude and location of direct and indirect effects cannot be predicted with accuracy

until the site-specific APD stage of development.

At the exploration and development stage, soils would be physically disturbed through the removal and compaction of soil and the exposure of subsoils. Direct impacts at this stage would result from the construction of well pads, roads, power lines and other infrastructure removing vegetation, exposing soil, mixing horizons, compaction, loss of productivity, and loss of soil through wind/water erosion. On most of the lease parcels, wind erosion would be expected to be minor; however on some of the parcels in the eastern plains wind erosion could be severe. Decreased soil productivity as a result of these impacts has the potential to hinder revegetation efforts and leave soils further exposed to erosion. Segregation and reapplication of surface soils would result in the mixing of shallow soil horizons, resulting in a blending of soil characteristics and types. This blending would modify physical characteristics of the soils, including structure, texture, and rock content, which could lead to reduced permeability and increased runoff from these areas.

Contamination of surface and subsurface soils can occur from leaks or spills of oil, produced water, and condensate liquids from wellheads, pipelines, produced water tanks and condensate or oil storage tanks. Leaks or spills of drilling and hydraulic fracturing fluids, fuels and lubricants could also result in soil contamination. Such leaks or spills could compromise the productivity of the affected soils. Depending on the size and type of spill, the impact to soils would primarily consist of the loss of soil productivity. If a spill were to occur, contaminated soils would be removed and replaced with clean soils and disposed of in a permitted facility or would be bioremediated in place using techniques such as excavating and mixing with mulch and/or microbes to increase biotic activities that would break down petrochemicals into inert and/or common organic compounds. Spill cleanup and bioremediation processes, and any remaining impacted soils would be required to meet Colorado state standards before spill would be considered remediated. These direct impacts of potential development would be lessened through necessary of Best Management Practices.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

The proposed lease parcels are scattered throughout the eastern Colorado, from the eastern plains to the foothills and canyons in Huerfano and Las Animas counties, and have various current surface uses. The main uses of these parcels are currently either native grassland grazing or some sort of cultivated agriculture. Current oil and gas development practices may allow multiple wells to be drilled from a single pad. Often these pads are shared with wells that are entirely non-federal and the development of the federal leases adds very little to the surface impact. Overall, the leasing of these proposed parcels would add little to the overall soil impacts in the area.

Potential Future Mitigation:

A universal Best Management Practice that is used, as applicable, is the practice of stockpiling the topsoil from the surface of well pads which would be used for surface reclamation of the well pads. If the wells are found to be economic and are produced, the top soil will be used for interim reclamation of the areas of the well pad not in use. If the well is a dry hole, the soil will be used for immediate reclamation. The soil should not be stockpiled for more than one year without reseeded of the topsoil. BLM Onshore Order #1 requires interim reclamation to be initiated within 6 months of completion of final well, and initiation of final reclamation within 6 months of plugging of the final well on the location, weather permitting. BLM regulations require that before operators are released of liability for the location on a federal lease, a BLM inspector must deem the reclamation successful. Site-specific reclamation plans submitted by the operator at the

APD stage are reviewed and approved by BLM. The impact to the soil would be remedied upon reclamation of well pads when the stockpiled soil that was specifically conserved to establish a seed bed is spread over well pads and vegetation re-establishes. The Colorado Oil and Gas Conservation Commission (COGCC) also have soil conservation and reclamation requirements.

3.4.2. Biological Resources

3.4.2.1. Invasive Plants:

Affected Environment: Invasive plants are common in the area due to livestock grazing and other agricultural practices. It is likely that the native plant community has been altered due to the long-term agricultural practices in the area.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: If drilling were to occur on these parcels subsequent activities would create an environment for and provide a mode of transport for invasive species and other noxious weeds to become established. Construction equipment and any other vehicles or equipment brought onto the site can introduce weed species. Wind, water, recreational vehicles, livestock and wildlife would also assist with the distribution of weed seed into the newly disturbed areas. Other species of noxious weeds can be introduced by vehicle traffic, livestock and wildlife and will readily spread into newly disturbed areas. Non-native and invasive weed species that occur on adjacent rangelands would occupy disturbed areas; the bare soils and the lack of competition from a perennial plant community would allow these weed species to grow unchecked and can affect the establishment of seeded plant species. Establishment of perennial grasses and other seeded plants as part of interim reclamation is expected to reduce the presence of invasive annual weeds.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Due to the long-term exposure of the project area to agricultural practices, expected cumulative impacts are thought to be minor.

Potential Future Mitigation: Equipment used to implement the proposed action should be washed prior to entering the project area to remove any plant materials, soil, or grease. The site should be monitored for non-native species prior to soil disturbing activities and for at least two growing seasons after the project area has been rehabilitated. All non-native species identified by monitoring should be treated. Proponent will be responsible for Monitoring and treatment of non-native species. Periodic monitoring would be done by BLM staff. At the APD stage, the operator may be required to control any invasive and/or non-native weeds that become established within the disturbed areas involved with drilling and operating the well and continue weed control actions throughout the life of the project.

3.4.2.2. Migratory Birds:

Affected Environment: BLM Instruction Memorandum No. 2008-050 provides guidance towards meeting the BLM's responsibilities under the Migratory Bird Treaty Act (MBTA) and Executive Order (EO) 13186. The guidance emphasizes management of habitat for species of conservation concern by avoiding or minimizing negative impacts and restoring and enhancing habitat quality.

The dominant habitat in this physiographic area is shortgrass prairie. Shortgrass is dominated by two low-growing warm-season grasses, blue grama and buffalo grass; western wheatgrass is also present, along with taller vegetation including widespread prickly-pear cactus and yucca, and cholla in the south. Sandsage prairie is found where sandy soils occur, and is dominated by sand sagebrush and the grasses sand bluestem and prairie sand-reed. Mixed grass (needle-and-thread, side-oats grama) and tallgrass (big bluestem, little bluestem, switchgrass) communities occur locally.

A second habitat in this physiographic area is lowland riparian. In the shortgrass prairie, lowland riparian habitats occur along the few stream and river courses. Riparian vegetation is dominated by plains cottonwood, willow shrubs, and introduced species such as Russian-olive and Chinese elm. Trees were uncommon features of the shortgrass prairie before European settlement; development of woody vegetation has been facilitated in historical times by alteration of natural river flow regimes, a result of irrigation drawdown and reservoir construction for flood control.

Parcels located in the Southern Rockies physiographic area in Huerfano County contain the following vegetation cover types: Gamble oak and grassland.

The following birds are listed on the US Fish and Wildlife Service Birds of Conservation Concern (BCC) – 2008 List for BCR 16-Southern Rockies/Colorado Plateau and BCR 18-Shortgrass Prairie and may be occur within the proposed lease area: mountain plover, upland sandpiper, Bell's vireo, Sprague's pipit, lark bunting, McCown's longspur, chestnut-collared longspur, grasshopper sparrow, northern harrier, and prairie falcon. These species have been identified as species that may be found in the project area, have declining populations and should be protected from habitat alterations.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: Leasing will have no impact on migratory bird individuals, populations or habitat. If leases are developed, surface disturbing activities, such as road building or pad and pipeline construction will destroy existing habitat. If surface disturbing activities occur during the nesting season, "take" of nests may occur. Noise and human activity generated during construction, drilling, and production phases will likely result in a larger impact footprint than the disturbance footprint alone.

Migratory birds may be burned, entrapped, and/or killed by exhaust vents, heater-treaters, flare stacks, and open pipes, etc., as a result of development related infrastructure. An increase in activity, i.e. road traffic, will likely result in an increase in vehicular collisions with migratory birds. If oil and/or gas are located in economically feasible quantities, it is likely additional development will occur.

Appropriate lease stipulations to protect some migratory birds and their habitats were attached to parcels and described in Attachments A and C. Further, at the field development and APD stage it is standard procedure to include a COA on all APDs that alerts the operator to their responsibility under the Migratory Bird Treaty Act to prevent the "take" of migratory birds. The COA will ensure that operators take measures to prevent destruction of nests and effectively preclude migratory bird access to, or contact with, reserve pit contents that possess toxic properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage, or other harmful features associated with development.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect migratory bird resources. These activities include: oil and gas development, residential development, grazing, agriculture, mining and recreation. In areas where human development had previously modified the natural environment (i.e. agricultural, settlement, past oil and gas development) it is likely that migratory bird species richness and diversity had been compromised. However, new oil and gas development will likely cause an additive negative impact to most species of migratory birds currently present at the site. While the leasing of parcels will not compound these impacts, future oil and gas development may impose deleterious effects. Every parcel is unique and cumulative impacts will need to be addressed in the APD stage.

Potential Future Mitigation: 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. 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, the breeding and brood rearing season for most Colorado migratory birds. The provision will not apply to completion activities in disturbed areas that were initiated prior to May 15 and continue into the 60-day period.

An exception to this timing limitation will be granted if nesting surveys conducted no more than one week prior to vegetation-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.

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 or pipes 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.

Additionally, standard lease terms and conditions, which allow the BLM to move an operation up to 200 meters and delay operations for up to 60 day, may be implemented to protect valuable wildlife resources.

3.4.2.3. Special Status Animals:

Affected Environment: Many BLM sensitive species (lesser prairie chicken, black-tailed prairie dog, swift fox, Townsend’s big eared bat, common kingsnake, milk snake, massasauga, mountain plover, Brewer’s sparrow, ferruginous hawk and golden eagle) could potentially occur on parcels available for leasing.

All proposed lease parcels are subject to lease stipulation Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal species. Protective measures for these species will be applied, if necessary, at the APD stage and might include the need to move development pads, enforce timing limitations, enforce no surface occupancy restrictions, etc. Additional NEPA will be completed as individual APDs are received for all the parcels identified in this document. Site specific field visits will be conducted as deemed necessary for those parcels that contain federally listed and sensitive species habitat.

Lesser prairie chicken: lesser prairie chickens (LEPC) were likely resident in six counties in Colorado prior to European settlement (Giesen 2000). At present, LEPC are known to occupy portions of Baca, Cheyenne, Prowers, and Kiowa counties, but are not known to persist in Bent and Kit Carson counties. Critical habitat has not been designated for the LEPC; however the CPW has designated LEPC production areas in and around known leks. Parcels 7605 and 7606 occur within a LEPC production area.

Black-tailed and Gunnison's prairie dog: The BLM considers the black-tailed and Gunnison's prairie dog a sensitive species.

Black-tailed prairie dogs primarily occur in scattered colonies throughout the eastern plains of Colorado. In the summer of 2001, Colorado started aerial surveys for black-tailed prairie dogs throughout their historic range. Based on known locations of black-tailed prairie dogs, transects were developed for each county to give a 95% confidence interval to the resulting data. Statewide 631,000 acres of black-tail prairie dog colonies were documented. Gunnison's prairie dog occupy high elevation short-grass prairie in Colorado. Parcel 7583 in Huerfano County contains limited habitat for this species.

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

Townsend's big-eared bat: The Townsend's big-eared bat occurs throughout the west and in Colorado. Habitat associations include: coniferous forests, deserts, native prairies, riparian communities, and agricultural areas. Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, with population centers occurring in areas dominated by exposed, cavity forming rock and/or historic mining districts. Townsend's habit of roosting on open surfaces makes it readily detectable, and it is often the species most frequently observed (commonly in low numbers) in caves and abandoned mines throughout its range. It has also been reported to utilize buildings, bridges, rock crevices and hollow trees as roost sites.

Foraging associations include: edge habitats along streams, adjacent to and within a variety of wooded habitats. They often travel large distances while foraging, including movements of over 10 miles during a single evening. Townsend's are a moth specialist with over 90% of its diet composed of lepidopteron.

The primary threat to the species is almost certainly disturbance or destruction of roost sites (e.g., recreational caving, mine reclamation, renewed mining in historic districts). This species is very sensitive to disturbance events and has been documented to abandon roost sites after human visitation. Both roosting and foraging habitat may be impacted by timber harvest practices. Pesticide spraying in forested and agricultural areas may affect the prey base.

Common king snake: Generally associated with lowland river valleys. In Southeastern Colorado it has been found near irrigated fields on the floodplain of the Arkansas River, in rural residential areas in plains grassland, near stream courses, and in other areas dominated by shortgrass prairie. Most activity occurs on the ground or in rodent burrows. Periods of inactivity are spent in burrows and logs, in or under old buildings, in other underground spaces, or beneath various types of cover.

Known from a few locations in southeastern Colorado (north to the vicinity of the Arkansas River) and a few sites in extreme southwestern Colorado (western Montezuma County), at elevations below about 5,200 feet. Generally difficult to find but may be locally fairly common in the very restricted range in Colorado.

Milk snake: Wide variety of habitats in Colorado, including shortgrass prairie, sandhills, shrubby hillsides, canyons and open stands of ponderosa pine with Gambel oak in the foothills, piñon-juniper woodlands, arid river valleys, and abandoned mines; generally stays hidden, except at night; found under discarded railroad ties in sand-hill regions. Hibernation sites include rock crevices that may be shared with other snake species.

The species occurs throughout most of Colorado at elevations primarily below 8,000 feet and is generally scarce or at least hard to find, but locally fairly common.

Massasauga: Habitat in Colorado consists of dry plains grassland and sandhill areas. Massasauga may be attracted to sandy soils supporting abundant rodent populations. The species occurs in the Great Lakes region of southern Ontario and western New York southwest through the Midwest and central and southern Great Plains to southeastern Arizona, northern Mexico, and southern Texas. It occurs in southeastern Colorado at elevations below about 5,500 feet.

Mountain Plover: Mountain Plovers are found throughout the Royal Gorge Field Office (RGFO) in suitable habitats. While the species is relatively rare they can be found generally in open, flat tablelands that display some function of disturbance such as agricultural production, drought, grazing, fire, etc. (Knopf and Miller 1994). Plover habitat associated with this assessment is located in Baca, Las Animas, Lincoln, and Washington counties.

Brewer's Sparrow: The Brewer's sparrow breeds primarily in sage brush shrublands, but will also nest in other shrublands such as mountain mahogany or rabbit brush. While migrating, the species will occupy wooded, brushy and weedy riparian, agricultural, and urban areas. They are locally uncommon to common on the eastern plains and lower foothills.

Burrowing Owl: The burrowing owl is closely associated with active prairie dog colonies throughout its range. Burrowing Owls require a mammal burrow or natural cavity surrounded by sparse vegetation. Burrow availability is often limiting in areas lacking colonial burrowing rodents. Burrowing Owls frequently use burrows of black-tailed prairie dogs. They nest less commonly in the burrows of Douglas' ground squirrels, whitetailed prairie dogs, Gunnison's prairie dogs, yellowbellied marmots, woodchucks, skunks, foxes, coyotes, and nine-banded armadillos.

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

Golden eagle: Colorado populations of golden eagles occupy a variety of habitat in Colorado, ranging from grasslands and shrublands to forest woodlands. Nesting occurs on cliffs or in trees,

but birds range widely over surrounding habitats.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The act of leasing parcels for oil and gas development would have no direct impact on wildlife resources. However, the authorization to lease parcels for oil and gas development will likely result in future development at some locations. The magnitude and location of direct and indirect effects cannot be predicted until the site-specific APD stage of development. At this time, the speculative nature of this process does not provide specifics of development; therefore, specific impacts to terrestrial wildlife from development remain unknown. Potential effects of development for some species are below.

Lesser Prairie Chicken: Pitman et al. (2005) studied LEPC in southwestern Kansas from 1997-2002. They examined nest distances from anthropogenic features (wellheads, buildings, improved roads, unimproved roads, transmission lines, and center pivot irrigation fields) to determine if the features were related to location and success of nests. They found that anthropogenic features (transmission lines, wellheads, buildings, improved roads, center-pivots) were avoided by nesting LEPC when compared to random points within the study area. The study demonstrated the functional loss of habitat beyond the footprint of physical structures by identifying avoidance areas that lost all value as LEPC nesting habitat due to the proximity to these features.

Patten et al. (2005) studied populations of LEPC in New Mexico and Oklahoma from 1999-2003. They radio-tracked 93 females and 188 males in New Mexico and 62 females and 191 males in Oklahoma and found that female mortality was significantly higher in Oklahoma when compared to their study population in New Mexico. They found that the cause for this increase in mortality was related to collisions with fences, power lines, and vehicles, which was three times higher than that in the study birds in New Mexico.

Bidwell et al. (2003) suggests that LEPC avoid high quality habitat within 200 meters of a single oil well or gas pump and they avoid areas within 600 meters of an unimproved road and within 1,000 meters of an elevated power line.

Crawford and Bolen (1976) found that a constructed road through rangeland caused the abandonment of the otherwise traditional lek.

Woodward et al. (2001) performed geographic information system (GIS) analysis on landscapes and landscape change through time. They then compared this to the trend in LEPC populations. They found that LEPC populations with a declining population trend were related to landscapes with higher rates of landscape change and greater loss of shrub land cover types.

Recent research indicates that development of anthropogenic infrastructure is causing a deleterious effect on reproductive success and chicken populations. Related to mineral leasing and development, existing lesser prairie chicken habitat should be protected from development as the presence of buildings, improved roads, transmission lines, center-pivot files, and wellheads reduce potential nesting habitat for a radius of up to 1 km. Lease stipulations RG-03 (TL) and CO-02 (NSO) have been attached to parcels 7605 and 7606.

The preferred alternative describes the deferral of lease parcels 7605 and 7606. If the preferred alternative is selected as described, the lease sale and subsequent development of lease parcels will have no impact on LEPC.

Black-tailed and Gunnison's Prairie Dog: Within the range of black-tailed and Gunnison's prairie dogs, areas have been classified as valuable for oil and gas development. Possible direct negative impacts associated with oil and gas development include clearing and crushing of vegetation, reduction in available habitat due to pad construction, road development and well operation, displacement and killing of animals, alteration of surface water drainage, and increased compaction of soils. Indirect effects include increased access into remote areas by shooters and OHV users. Gordon et al. (2003) found that shooting pressure was greatest at colonies with easy road access as compared to more remote colonies. Conversely, oil and gas development may create areas with reduced shrub cover, providing additional habitat for prairie dogs to colonize.

Swift Fox: Oil and natural gas exploration fragment existing grasslands and increase road traffic and access by humans. Impacts of this type of disturbance on Swift Foxes are unknown, but both positive and negative effects may be expected. On the positive side, prey abundance for Swift Foxes may increase in the vicinity of roads. However, loss of local habitat, increased mortality due to road kills, trapping and accidental shooting may also result (Carbyn et al. 1994).

Townsend's big eared bat: It is unlikely that the proposed lease parcels offer habitat suitable for hibernation or rearing of young Townsend's big eared bat. Perhaps widely distributed singly or in small groups during the summer months, roosting bats may be subject to localized disturbance from development activity and relatively minor but long term impacts from reductions in the real extent of mature woodland stands as sources of roost substrate.

Reptile species: Direct effects to the BLM sensitive reptile species could include injury or mortality as a result of construction, production, and maintenance activities. These effects would be most likely during the active season for these species, which is generally April to October. Indirect effects could include a greater susceptibility to predation if roads or pads are used to aid in temperature regulation. Overall, however, there is a low likelihood that these species would be substantially affected.

Mountain Plover: Mountain plovers nest on nearly level ground (often near roads), adults and chicks often feed on or near roads, and roads may be used as travel corridors by mountain plovers. These factors make plovers susceptible to being killed by vehicles. Therefore, as oil and gas infrastructure is developed and used, the probability of plover mortality or nest destruction will likely increase. While known nesting locations are currently unknown, mitigation (plover nesting survey, timing limitations, etc.) to prevent take will be implemented at the APD stage.

Brewer's Sparrow: Leasing will have no impact on migratory bird individuals, populations or habitat. If leases are developed, surface disturbing activities, such as road building or pad and pipeline construction will destroy existing habitat. If surface disturbing activities occur during the nesting season, "take" of nests may occur. Noise and human activity generated during construction, drilling, and production phases will likely result in a larger impact footprint than the disturbance footprint alone.

Migratory birds, including Brewer's sparrow, may be burned or killed by exhaust vents, heater-treaters, flare stacks, etc., if perched at the opening while in operation. An increase in activity, i.e. road traffic, will likely result in an increase in vehicular collisions with migratory birds

Mitigation proposed in the migratory bird section will be adequate to protect Brewer's sparrow.

Burrowing Owl: Primary impact to the burrowing owl is the potential loss of habitat or the disruption of a nest site if development were to occur within an active prairie dog colony. However, standard lease stipulations would allow the BLM the flexibility to move development up to 200-meters to mitigate direct impacts to BLM sensitive species.

Ferruginous Hawk: Ferruginous hawks will construct nests upon oil and gas related structures. However, these nests are less successful than nests built upon natural structures due to repeated human visitation. While the footprint of individual oil and gas wells is minimal relative to other energy developments, the total habitat lost to the network of wells and connecting roads can be considerable in areas undergoing full-field development. The potential for oil and gas related disturbance of nesting, foraging or roosting raptors arises not only from new well installation activities, including road and pad construction, drilling and equipment installation over the course of several weeks to months, but also from continual servicing and maintenance of wells over their production lifetime. Raptors are protected by a suite of stipulations (CO-03, CO-18, and CO-19) that require no surface occupancy within one-eighth of a mile of nests and a timing limitation to protect raptor nesting and fledgling habitat.

Golden Eagle: Golden eagles are a wide ranging species that is dispersed across the entire RGFO area. Surface disturbing activities that have potential to disrupt golden eagle nesting activity are subject to NSO and TL provisions (CO-03, CO-18) established in the applicable Resource Management Plans. These stipulations have been successful in protecting ongoing nest efforts and maintaining the long term utility nest sites in the resource area.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect wildlife resources. These activities include: oil and gas development, residential development, grazing, agriculture, mining and recreation. While the leasing of parcels will not compound these impacts, future oil and gas development may impose deleterious effects. Every parcel is unique and cumulative impacts will need to be thoroughly addressed in the development stage.

Potential Future Mitigation: A potential condition of approval that could be applied at the development phase would require operators to conduct a survey for federally listed and BLM sensitive species where potential habitat exists. If these species or key habitat features are located, BLM may implement timing limitations and/or spatial buffers to mitigate conflicts to the extent the RGFO Resource Management Plan, Northeast Resource Management Plan, and the Code of Federal Regulations (43 C.F.R. § 3101.1-2) allow.

If development is to occur April 10 through July 10 a survey for nesting mountain plover will be required where habitat exists. A no surface occupancy buffer of 300-feet will be placed around located nests.

Migratory birds and raptors, including golden eagles, ferruginous hawks, and burrowing owls, are protected by federal law. Therefore, it will be required that a raptor nest survey be conducted within a 0.5-mile radius (Colorado Parks and Wildlife recommended golden eagle buffer) of future project sites. Raptor nests located will be protected by species appropriate no surface occupancy buffers and timing limitations approved by existing resource management plans.

As a potential condition of approval, if a ferruginous hawk constructs a nest upon any oil and gas related platforms (e.g. tanks), the BLM will be notified, an alternative nesting structure will be constructed, and the nest moved to the structure at the expense of the lessee.

Additionally, BLM may require an operator move an operation and delay activities to protect

valuable wildlife resources, if supported by the site-specific NEPA analysis for the development activity.

3.4.2.4. Upland Vegetation:

Affected Environment: Most of the plains area supports short prairie grasses. Needleandthread, prairie junegrass, blue grama, galleta, cholla, threeawn, ring muhly, and alkali sacaton are the major species. It is likely that the native plant community has been altered due to the long-term grazing practices, crop agriculture or both.

Environmental Consequences of Leasing and Development - 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; this impact is primarily associated with parcels in short-grass prairie and not cultivated agriculture. The type of ground activity associated with oil and gas development does result in increased susceptibility to adverse impacts such as soil compaction, weed infestations and erosion (See Soils and Invasive Plants sections). Due to these adverse impacts, establishment of native vegetation similar to adjacent undisturbed vegetation in rangelands can take up to 30 years. Projects in cropland areas would likely continue in that vein once sites are rehabilitated.

Environmental Consequences of Leasing and Development - Cumulative Impacts: The proposed lease parcels are scattered in areas where the main uses are either native grassland grazing or cultivated agriculture. Leasing within cultivated agriculture would have little, if any, cumulative impact to upland vegetation. Leasing and any future development within native grassland areas, even if they are currently grazed, could increase the amount of area without native vegetation. Also see the soils section.

Potential Future Mitigation: Will be addressed at the APD stage.

3.4.2.5. Wetlands and Riparian Zones:

Affected Environment: The Proposed Action and the Preferred Alternative are the same except that the Preferred Alternative withdraws parcels in Baca County. With Either action, all parcels are in eastern Colorado except for one parcel west of La Veta CO. Almost all parcels are bisected by unnamed drainages of some size. All parcels are split estate and not BLM managed surface lands. As such, RGFO has limited on site knowledge or specific details about riparian, wetland or aquatic habitats, however remote sensing layers are used to determine land use patterns and potential for resource presence. Generally, the parcels are upland with either agriculture on the parcel or nearby, or are grazed rangelands. Livestock trailing patterns, plowing patterns are evident from remote sensing. Drainage ways are visible and they too are often modified with ponds, ditching, channelizing, and other modifications through agricultural areas. No parcel has a major stream or river. Nearby livestock watering facilities such as windmills, stock ponds are visible near to several parcels indicating that the stream courses going through the lease parcels are very likely ephemeral.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: In all cases, any parcel with a drainage suspected of carrying water with some regular frequency is treated as a stream with riparian and aquatic habitat present. Due to this, stipulations to guide safe placement of drilling areas are applied because seeps, springs, and small perennial habitats may be present even within otherwise ephemeral drainages. Should development occur, typical field development to wetlands generally relates to overland flow acceleration impacts. These cannot

be addressed at the leasing stage but are typical potential impacts that would be addressed at the site specific APD stage.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Regional variation in land use modification occurs in the counties where leasing is proposed. On certain parcels post lease development would be intrusive where development would be noticeable altering disturbance regimes in proximity to riparian areas and wetlands. In other locations, development would be masked by extensive agriculture or other surface uses within modified drainage-ways and possibly in proximity to other oil and gas development. Most of the specific parcels under this lease sale however are not in close proximity to other substantial oil and gas activity so new activity would be additive and cumulative to other area wide ranching, agriculture, and other land uses that are present.

Potential Future Mitigation: At the APD stage, RGFO will need to evaluate if location stipulations alone are sufficient to protect wetland resources or if other protective measures are necessary. RGFO will incorporate appropriate oil and gas development BMPs to limit and buffer overland runoff from being accelerated into drainages

3.4.2.6. Aquatic Wildlife:

Affected Environment: The Proposed Action and the Preferred Alternative are the same except that the Preferred Alternative withdraws parcels in Baca County. All parcels are in eastern Colorado except for one parcel west of La Veta CO. All parcels are split estate and not BLM managed surface lands. As such, RGFO has limited on site knowledge or specific details about riparian, wetland or aquatic habitats, however remote sensing layers are used to determine land use patterns and potential for resource presence. Generally the parcels are upland with either agriculture on the parcel or nearby, or are grazed rangelands. Livestock trailing patterns and plowing patterns are evident from remote sensing. Drainage ways are visible and they too are often modified with ponds, ditching, channelizing, and other modifications through agricultural areas. No parcel has a major stream or river and no fisheries are suspected to be present on any parcel. Nearby livestock watering facilities such as windmills and stock ponds are visible near to several parcels indicating that the stream courses going through the lease parcels are very likely ephemeral.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: In all cases, any parcel with a drainage suspected of carrying water with some regular frequency is treated as a stream with riparian and aquatic habitat present. Due to this, stipulations to guide safe placement of drilling areas are put in place because seeps, springs, and small perennial habitats may be present even within otherwise ephemeral drainages. The action of Leasing does not include how future development of fluid mineral resources would be extracted so this analysis doesn't evaluate the potential necessary infrastructure.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Historic aquatic habitat modifying land uses vary from minimal to extensive resulting from grazing, agricultural modification, irrigation, reservoirs, and other modifications. Post-lease development in certain parcels would be intrusive where development would be noticeable altering disturbance regimes along riparian areas. In other locations, development would be masked by extensive agriculture, within modified drainage-ways or in proximity to other oil and gas development. Most of the specific parcels under this lease sale however are not in close proximity to other substantial oil and gas activity so new activity would be additive and cumulative to other area

wide ranching, agriculture, and other land uses that are present.

Potential Future Mitigation: At the APD stage RGFO will need to evaluate if development location stipulations are sufficient to protect wetland resource or if small aquatic habitats possibly not located by remote sensing exist. Environmental analysis then will also show whether, in addition to location modification (CO-28), additional protective measures may be necessary. Additional protective BMP's would be incorporated to development designs.

3.4.2.7. Terrestrial Wildlife:

Affected Environment: See the migratory bird section for a general habitat description of proposed lease parcels. The area encompassing the proposed lease parcels is vast, stretching the entirety of the high plains in Colorado. The area encompasses the full complement of deer and pronghorn seasonal ranges. Winter range is that part of the overall range of a species where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each data analysis unit. All or portions of the following parcels contain big game winter habitat (mule deer severe winter range, elk severe winter range, and/or pronghorn winter concentration area): 7583, 7591, 7592, 7593, 7605, and 7606.

Portions of parcel 7583 are located within elk calving habitat. Calving habitat is generally described as the range female elk occupy from May 15 to June 15 for calving. Elk require a combination of open meadows for foraging and woodlands for hiding cover, calving and thermal regulation. Aspen, regenerating conifer stands and shrublands provide foraging and cover opportunities required during elk calving periods.

Turkeys concentrate activities during the winter months; therefore, actions that occur on winter grounds impact a larger percentage of the population. Turkey winter range is described as that part of the overall range where 90% of the individuals are located from November 1 to April 1 during the average five winters out of ten. All or portions of the following parcels fall within turkey winter range: 7583, 7605, and 7606.

Few raptor nest locations are known within the proposed lease parcels for two primary reasons, lack of information and the fact that many parcels are located on private surface. Lease stipulations attached to each parcel would require raptor nest surveys that maintain site characteristics of existing nests. Additionally, timing limitations will reduce disruption of adult attendance at each known occupied nest location.

Several parcels are located in Colorado Natural Heritage Program (CNHP) Potential Conservation Areas (PCAs). A PCA may include a single occurrence of a rare element or a suite of rare elements or significant features. The goal is to identify a land area that can provide the habitat and ecological processes upon which a particular element or suite of elements depends for their continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, as well as current and potential land uses. The proposed boundary does not automatically exclude all activity. Specific activities or land use changes proposed within or adjacent to the preliminary conservation planning boundary should be carefully considered and evaluated for their consequences to the element on which the conservation unit is based. Affected PCAs include Central Shortgrass, Central Arkansas Playas, Comanche Grassland, Cimarron River at High Plains, and Purgatoire Canyon.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: The act of leasing the parcels for oil and gas development would have no direct impact on wildlife resources; however, impacts at the exploration and development stage could have impacts on wildlife. The magnitude and location of direct and indirect effects cannot be predicted until the site-specific APD stage of development.

At this time, specifics of potential future development are unknown; therefore, specific impacts to terrestrial wildlife caused by potential future development cannot be analyzed with accuracy at this stage. If a parcel is leased and development occurs, impacts likely to occur will be habitat loss and fragmentation (well pad construction, road construction, etc.). Wildlife could avoid preferred habitat because of human presence, noise from drilling and production facilities, increased road density and traffic.

Sawyer et al. (2006) demonstrated an avoidance response by mule deer of well pads and roads in the development of a natural gas field in western Wyoming and Northrup et al. (2015) have conducted research indicating similar results in mule deer avoidance in the Piceance Basin of Colorado. The response was immediate (i.e., year 1 of development) and no evidence of acclimation occurred during the course of the 3 year study. However, the indirect habitat loss caused by an avoidance response of mule deer could be reduced by 38-63% with the use of advanced technologies and proper planning that minimize the number of well pads and amount of human activity associated with them (Sawyer et al. 2006). Northrup et al. (2015) also suggested that measures aimed at mitigation impacts from drilling, such as seasonal drilling restrictions, sound and light barriers, and reductions in vehicle traffic, are likely to have greatest benefit to deer.

Elk have displayed similar avoidance characteristics as mule deer to oil and gas development. Radio collared elk in the Jack Marrow Hills, Wyoming displayed an avoidance buffer of 1000-m in winter and 2000-m in summer of roads and active well sites (Powell 2003). While habitat between the well sites in the studies listed above and the parcels in the RGFO lease sale may not be equal, a general assumption can be made that oil and gas development activities could alter habitat use of these terrestrial animals.

Therefore, to protect terrestrial species during critical times of the year, parcels that contain big game winter habitat will have either stipulation CO-09 (TL) or RG-08 (TL) attached, and parcels within turkey winter range will have stipulation RG-09 (TL) attached to protect the resource. Parcels that are within elk calving habitat will have stipulation RG-14 (TL) attached.

Raptors are protected by a combination of “no surface occupancy” and “timing limitation” stipulations that are attached to leases to reduce adverse effects of potential oil and gas development. This control method allows the protection of known active nest sites during the APD phase. While the footprint of individual wells is minimal, the functional habitat lost to the network of wells and connecting roads can be considerable. The potential for oil and gas related disturbances of nesting, foraging and roosting raptors arises not only from new well installation activities, including road and pad construction, drilling, and equipment installation over the course of several weeks to months, but also from continual servicing and maintenance of wells over their productive lifetime.

Several lease parcels are located within PCAs; however, the RGFO RMP and the Northeast RMP contain a suite of stipulations that will protect the elements outlined in each PCA in the event

that leased parcels are eventually developed.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect wildlife resources. These activities include: oil and gas development, residential development, grazing, agriculture, mining and recreation. While the leasing of parcels will not compound these impacts, future oil and gas development may impose deleterious effects. Every parcel is unique and cumulative impacts will need to be thoroughly addressed in the APD stage.

Potential Future Mitigation: Because of the lack of raptor nesting information and the lease stipulations attached to each parcel a standard COA would require a raptor nest survey where habitat existed. If a nest were found, the stipulations would require the lessee to maintain the integrity of site characteristics for existing nests. Additionally, timing limitations will reduce disruption of adult attendance at each known occupied nest location.

Additionally, BLM may require an operator move an operation and delay activities to protect valuable wildlife resources, if supported by the site-specific NEPA analysis for the development activity.

3.4.3. Heritage Resources and Human Environment:

3.4.3.1. Cultural Resources:

Affected Environment: Paleoindian sites are relatively scarce in the eastern half of Colorado, although a relatively large number are located in Weld County, where much oil and gas exploration continues to take place. During the years 10,000-5500 BC, Paleoindian populations appear to have subsisted on large game (based on associated lithic tools), and probably supplemented their diets with a variety of small game and vegetal materials. Paleoindian materials from the Clovis period (9500-8950 BC) have been reported for southeastern Colorado, and although not extensive, Folsom and Plano artifacts seem to suggest an increase in population through time. It appears that Paleoindian populations were living in relatively small groups, and seem to have been mostly nomadic.

Many more cultural materials dating to the Archaic period (5500 BC-AD 500) have been found. The general size reduction of lithic tools, coupled with the presence of groundstone and vegetal evidence, suggests that a gradual shift in subsistence from large game to smaller game and possible horticulture was taking place. As early as 7800 BP, Archaic populations were living in pithouses, and, later, in structures with stone foundations. Based on these and other data, it appears that Archaic groups were sedentary to some extent.

Evidence of the Formative and Late Prehistoric/Protohistoric periods (AD 500-1600) occupations is spotty in the mountain region. While some scholars interpret data from these periods as representing a clearly defined "mountain formative culture", the majority still believe that the mountains were inhabited seasonally by Plains-oriented groups. However, there is little to indicate substantial Formative or Late Prehistoric/Protohistoric settlement in the mountains, most likely due to a nomadic lifestyle.

The appearance of pottery and stemmed, corner-notched projectile points in the archaeological record suggest a change in culture in the Colorado Plains around AD 100. The Late Prehistoric

(AD 100-1725) was a time when aboriginal populations in eastern Colorado seemed to have adopted a more sedentary lifestyle than in previous times. The construction of complex structural sites, the adoption of pottery and the increased dependence on horticulture (in the southeastern Plains) are all suggestive of less mobility.

Sites dating to the protohistoric period (beginning with the Diversification Period, AD 1450-1725) are difficult to identify. In southeastern Colorado, sites of that time period are dated based on the presence of “Apachean” traits, like pottery, rock art, and stone circles. In northeastern Colorado, the Dismal River Aspect (AD 1525-1725) is distinguished by shallow pithouses, bell-shaped roasting pits, and by Dismal River Gray Ware ceramics.

The Protohistoric was a time of increasing population movement, and was further complicated by the arrival of the Spanish, and, later, the Euro-Americans. Starting in 1725, and continuing until they were entirely eliminated by the 1870s, Native American groups identified as the Plains, Jicarilla, and Kiowa Apaches; the Utes; the Arapaho; the Comanches; the Cheyennes; and occasionally the Crow, Shoshoni, and the Blackfeet, were known to occupy the Plains region.

Europeans first explored southeastern Colorado in 1540. By 1822, Spanish dominance of the area ended. The Santa Fe Trail was established that year, bringing American populations into the region. Commercial ranching commenced in the 1860s, and the Homestead Act of 1862 increased the population further. By 1870, all Native American groups had been subdued, following several decades of violence. Buffalo hunting, popular among Euro-Americans in the early 1800s, finally decimated any remaining animals by 1880. After 1900, sugar beet production and dryland farming and ranching were the dominant industries in the area. The Great Depression of 1929 and the Dust Bowl of the 1930s combined to cause severe problems for agriculturalists. By 1941, programs created by the Roosevelt administration and the industrial needs resulting from the U. S. entry into World War II had greatly improved the economy. Agriculture continues to predominate as the largest revenue-producing industry in eastern Colorado.

BLM conducted a literature review of records in the BLM-RGFO field office and database, and reviewed relevant information in the Compass database maintained by the Colorado Office of Archaeology and Historic Preservation. The records indicate that no inventories for cultural resources have been completed on any portions of the proposed lease parcels.

No sites or isolated finds have been recorded on or adjacent to proposed lease parcels, but both BLM’s 100k quad map and NPS geospatial information indicate the Santa Fe Trail either crosses or passes very close by Parcels 7605 and 7606. Deferral of these parcels under the preferred alternative would allow for field and archival research on the historic trail as it relates to the parcels, if the parcels are deferred, the proposed lease sale will have no effect on the National Historic Trail corridor.

Environmental Consequences of Leasing and Development – Direct and Indirect Impacts: Because the leasing of parcels does not involve ground disturbance, it will have no effect on historic properties. Future lease development that might affect historic properties will be subject to the standard National NHPA Lease Stipulation. This lease stipulation requires additional cultural resources work pursuant to Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108, including identification, effects assessment, consultation, and if necessary, resolution of adverse effects.

In an informational letter dated March 10, 2016, BLM notified the Colorado State Historic Preservation Officer (“SHPO”) of these determinations (see CR-RG-16-100L).

Environmental Consequences of Leasing and Development – Cumulative Impacts: None known at present. However, any future development of parcels that are purchased as a result of the lease sale will be subject to additional cultural resources work pursuant to Section 106 of the

National Historic Preservation Act, 54 U.S.C. § 306108, including identification, effects assessment, consultation, and if necessary, resolution of adverse effects. At that time, any adverse effect on historic properties will be identified and mitigated, if necessary.

Potential Future Mitigation: None anticipated.

3.4.3.2. Native American Religious Concerns:

Affected Environment: The mountains and plains in Colorado were inhabited by numerous tribes throughout history. Because of their nomadic culture, Plains populations used items that were easily transported and light, and therefore generally left little material evidence of habitation or traditional cultural properties. Although sacred locales are present on the lands within the RGFO jurisdiction, no known sites are present on any of the parcels included in the lease sale.

A consultation with potentially interested Native American tribes has been completed [CR-RG-16-099 NA], and no concerns were identified. The BLM contacted the following tribes: Apache Tribe of Oklahoma, Cheyenne and Arapaho Tribes of Oklahoma, Cheyenne River Sioux Tribe, Comanche Tribe of Oklahoma, Crow Creek Sioux, Eastern Shoshone, Jicarilla Apache Nation, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, the Ute Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe, Southern Ute Tribe, Standing Rock Lakota Tribe, and the Ute Mountain Ute Tribe.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts: No concerns identified.

Environmental Consequences of Leasing and Development - Cumulative Impacts: None anticipated.

Potential Future Mitigation: None anticipated.

3.4.3.3. Paleontological Resources:

Affected Environment:

Occurrences of paleontological resources are closely tied to the geologic units that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Using the Potential Fossil Yield Classification (PFYC) system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossil and their sensitivity to adverse impacts, with a higher class number indicating higher potential (WO IM2008-009).

Many of the proposed lease sale parcels contain geologic formations that are classified as PFYC 3 to PFYC 5 formations that have an unknown or moderate to likely potential of containing significant paleontological resources that could potentially be impacted by activities associated with oil and gas leasing. The formations affected, their known fossil types, and their PFYC values

are as follows (Tweto 1979, BLM Colorado State Office PFYC chart):

Formation	Fossil Types	PFYC
Eolian Deposits	Bison and various	3
Quaternary gravels	Bison, horse, prairie, dog, gopher, large camel	3
Tertiary Ogallala	Various significant mammals including horses	5
Cretaceous Pierre Shale	Marine reptiles, fish, birds, pterosaurs, dinosaurs, invertebrates including ammonites, bivalves, and gastropods	3
Cretaceous Burro Canyon Sandstone, Dakota Sandstone, Purgatoire	Various invertebrate, vertebrate, and plant fossils, including conifer cones	3
Cretaceous Greenhorn Limestone, Graneros, Carlile	Various invertebrates, including forams and ammonites	3
Jurassic Morrison, Ralston Creek, Entrada	Various and many dinosaurs, fish, amphibians, mammals, and a diverse fauna of fresh-water molluscs	5

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

Locations for proposed oil or gas well pads, pipelines, and associated infrastructure on these parcels will be subject to further analysis for the protection of paleontological resources during APD/development stage NEPA review.

Areas that contain geologic formations that are PFYC 3, 4, and 5, for which new surface disturbance is proposed on or adjacent to bedrock (native sedimentary stone) including disturbance that may penetrate protective soil cover and disturb bedrock, may be subject to an inventory that shall be performed by a BLM permitted paleontologist and approved by the appropriate RGFO specialist. Surface disturbing activities in many areas including PFYC 4 and 5 may also require monitoring by a permitted paleontologist.

Direct impacts to or destruction of fossils would occur from unmitigated activities conducted on formations with high potential for important scientific fossil resources. Indirect impacts would involve damage or loss of fossil resources due to the unauthorized collection of scientifically important fossils by workers or the public due to increased access to fossil localities on or near the lease parcels. Adverse impacts to important fossil resources would be long-term and significant since fossils removed or destroyed would be lost to science. Adverse significant impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the leasing action would have the beneficial impact in that ground disturbance activities might result in the discovery of important fossil resources. The following lands are likely to contain significant paleontological resources and are subject to Exhibit CO-29 to alert lessees of (PFYC 4 and 5) paleontological area inventory requirement to protect paleontological values: 7590, 7605, and 7606.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Cumulative impacts to paleontological resources could result from surface disturbing activities associated with potential development, when added to past, present, and reasonably foreseeable future actions, but would not be expected to contribute to cumulative impacts to paleontological resources in the lease area if protective mitigation measures are followed.

Potential Future Mitigation:

Mitigations will be developed during the NEPA review of individual ground disturbing activities. Typically, such mitigations include provisions for the monitoring of ground disturbance by a

BLM permitted paleontologist, a requirement for the operator to inform all persons associated with the project of relevant Federal laws protecting fossil resources, and requirements regarding the disclosure to the RGFO of inadvertent fossil discoveries during construction or operation.

3.4.3.4. Social and Economic Conditions:

Affected Environment: The proposed parcels for the December 2016 lease sale are located within Baca, Huerfano, Las Animas, Lincoln, and Washington Counties, in eastern Colorado. Accordingly, the socioeconomic study area includes the five Counties and the State of Colorado as the effects of the economic activity generated by the lease sale may impact the socioeconomic and fiscal conditions and within the counties and State. Specifically, the State of Colorado receives 49% of the total revenue associated with federal mineral leases, and this revenue is shared with the counties via various State budgeting processes.

Average annual production of oil from 2000 to 2015 was negligible or decreased in all counties except for Lincoln County. Average annual production of gas decreased in all counties except for Lincoln County. The average annual fluid minerals production for each county is listed in Table 1. Average Annual Production and Production Trend by County 2000-2015. The production values are averaged over the past sixteen full years from 2000 through 2015 (COGCC, 2016).

Huerfano, Las Animas, and Weld County have experienced varying level of effort in fluid mineral development. Las Animas has 1,314 producing gas wells and 3 producing oil wells, Weld County has approximately 22,000 producing oil and gas wells, and Huerfano County has 28 producing gas wells and no producing oil wells (DOI, 2015a). Additionally, production of oil and gas from 2010 to present has declined in Huerfano and Las Animas counties, while it has increased in Weld County. The average annual fluid minerals production for each county is listed in Table 1. The production values are averaged over the past five full years from 2010 through 2014 (COGCC, 2015).

Table 1. Average Annual Production and Production Trend by County 2000-2015

	Oil Production (barrels)	Oil Trend 2000 to 2015	Gas Production (MCF)	Gas Trend 2000 to 2015
Baca	75,188	Downward	1,851,077	Downward
Huerfano	18	Negligible	20,312,132	Downward
Las Animas	253	Negligible	91,957,043	Downward
Lincoln	356,567	Upward	196,163	Upward
Washington	617,024	Downward	1,520,385	Downward

Leasing mineral rights for the development of Federal minerals generates public revenue through the bonus bids paid at lease auctions and annual rents collected on leased parcels not held by production. Nominated parcels approved for leasing are offered by the BLM at a minimum rate of \$2.00 per acre at the lease sale. These sales are competitive and parcels with high potential for oil and gas production often command bonus bids in excess of the minimum bid. In addition to bonus bids, lessees are required to pay rent annually until production begins on the leased parcel, or until the lease expires. These rent payments are equal to \$1.50 an acre for the first five years and \$2.00 an acre for the second five years of the lease.

The State of Colorado receives 49% of the total revenue associated with federal mineral leases.

Federal mineral lease revenue for the State of Colorado is divided as such: 48.3 percent of all state mineral lease rent and royalty receipts are sent to the State Education Fund (to fund K-12 education), up to \$65 million in FY 2009 – FY 2011, and growing at four percent per year thereafter (Colorado Senate Bill 08-218). Any amounts greater than the upper limit flow to the Higher Education Capital Fund. Ten percent of all state mineral lease rent and royalty receipts are sent to the Colorado Water Conservation Board, up to \$13 million in FY 2009, and growing at four percent per year thereafter. Any amounts greater than the upper limit flow to the Higher Education Capital Fund. 1.7 percent of all state mineral lease rent and royalty receipts are distributed directly to local school districts originating the revenue or providing residence to energy employees and their children. Forty percent of all state mineral lease rent and royalty receipts are sent to the Colorado Department of Local Affairs, which then distributes half of the total amount received to a grant program, designed to provide assistance with offsetting community impacts due to mining, and the remaining half directly to the counties and municipalities originating the Federal mineral lease revenue or providing residence to energy employees.

Bonus payments are allocated separately from rents and royalties, in the following manner: 50 percent of all state mineral lease bonus payments are allocated to two separate higher education trust funds: the “Revenues Fund” and the “Maintenance and Reserve Fund”. The Revenues Fund receives the first \$50 million of bonus payments to pay debt service on outstanding higher education certificates of participation. The Maintenance and Reserve Fund receives 50 percent of any bonus payment allocations greater than \$50 million. These funds are designated for controlled maintenance on higher education facilities and other purposes. The remaining 50 percent of state mineral lease bonus payments are allocated to the Local Government Permanent Fund, which is designed to accumulate excess funds in trust for distribution in years during which Federal mineral lease revenues decline by ten percent or more from the preceding year.

During the lease period annual lease rents continue until one or more wells are drilled that result in production and associated royalties. The Federal oil and gas royalties on production from public domain minerals equal 12.5 percent of the value of production (43 CFR 3103.3.1).

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The direct effect of the proposed action would be the payments received, if any, from the leasing all or a subset of the 2037.62 acres of federal mineral estate. Indirect effects that might result, should exploration and development of the leases occur, could include increased employment opportunities related to the oil and gas and service support industry in the region as well as the economic benefits to federal, state, and county governments related to lease payments, royalty payments, severance taxes, and property taxes. Other effects could include the potential for an increase in transportation, roads, and noise disturbance associated with development. These effects would apply to all public land users in the project areas.

Due to energy market volatility and the dynamics of the oil and gas industry it is not feasible to predict the exact effects of this action, as there are no guarantees that the leases will receive bids, and that any leased parcels will be explored or that exploration will result in discovery of viable fluid mineral production. A rudimentary estimate for the amount to be raised in the lease sale from bonus bids and lease payments can be estimated using the past year average from lease sales within the Field Office multiplied by both the percent of parcels sold and the total acreage for the December 2016 lease sale. However, the volatility in the oil and gas sector and the limited sales activity of peer parcels within Baca, Huerfano, Las Animas, Lincoln, and Washington Counties results in poor quality to non-existent data to estimate the amount to be raised in the lease sale

from bonus bids and lease payments.

As previously noted BLM cannot predict whether any of the leases sold will be developed. However, any Application for Permit to Drill received will require future site-specific NEPA analysis, in which further socioeconomic effects would be examined including any negative socioeconomic effects resulting from disturbance and drilling on leased parcels. It is unknown when, where, how, or if future surface disturbing activities associated with oil and gas exploration and development such as well sites, roads, facilities, and associated infrastructure would be proposed. It is also not known how many wells, if any, would be drilled and/or completed, the types of technologies and equipment would be used and the types of infrastructure needed for production of oil and gas. Thus, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Any possible future development of fluid mineral resources resulting from this lease sale would be in addition to the current level of development.

Potential Future Mitigation: None

3.4.3.5. Environmental Justice:

Affected Environment and Direct and Indirect Impacts of Leasing and Development:

Executive Order 12898 requires Federal agencies to assess projects to ensure there is no disproportionately high or adverse environmental, health, or safety impacts on minority and low income populations. A review of US Census data indicates that there are minority populations in Huerfano and Las Animas Counties within the study area that meet the criteria for environmental justice consideration. These populations are not expected to be adversely impacted by the lease sale and any impacts from possible future development would be examined in site-specific analysis.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Any possible future development of fluid mineral resources resulting from this lease sale would be in addition to the current level of development, as examined in the affected environment.

Potential Future Mitigation: None

3.4.3.6. Visual Resources:

Visual Resource Management (VRM) classes along with the corresponding VRM Objectives for BLM managed surface were established in the Royal Gorge Field Office in 1996 with the approval of the Royal Gorge (RMP). Visual Resource Management objectives corresponding to the various management classes provide standards for analyzing and evaluating proposed projects. Projects are evaluated using the Contract Rating System to determine if it meets VRM objectives established by the RMP. VRM objectives are not established for split estate lands.

Affected Environment:

A visual resource inventory was conducted by the BLM in 2013. This inventory considers distance zones from major travel corridors, scenic quality and viewer sensitivity. This inventory covered the project area and found that parcels 7590, 7591, 7592, 7593, 7605, 7606 and 7607 had

low visual resource values. The landscape is fairly uniform and already has several modifications to the landscape such as pre-existing oil and gas development, residential development, and agricultural modifications. There are also very few major travel corridors. Where the parcels differ is in viewer sensitivity. The 2013 inventory indicates that people are sensitive to changes within and near the Comanche grasslands. Parcel 7590 is six miles from the Grasslands while parcels 7605 and 7606 are located approximately 12-15 miles away. Parcels 7605 and 7606 are in the vicinity of the historic Santa Fe Trail contributing to a higher sensitivity to change. While several modifications have already occurred within this landscape there is a sentiment that oil and gas development is cumulatively changing the overall character and the scenic values. Parcel 7583 located in Huerfano County near La Veta had high visual resource values due to its proximity to the Highway of Legends scenic byway where scenic quality is high as well as view sensitivity.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

For the areas proposed for leasing that already have high levels of human modification the proposed action would introduce visual contrasts but at limited levels given the context of the project area, the level of existing development, and the use of best management practices (BMPs) if the lease were to go into production. If leases were developed structures associated with this activity could be introduced on the landscape such as roads, pads, buildings, and pump infrastructure potentially creating contrasts in form, texture, color, and line at varying levels. These effects would need to be evaluated later at the APD stage. For parcel 7590, located 6 miles from the Comanche Grasslands impacts would be similar however; cumulative impacts to visual resources are anticipated. These are analyzed below.

In Huerfano County, parcel number 7583 is 4.5 miles from the community of La Veta and the Highway of Legends Scenic Byway. The lease proposal itself would not affect the visual resource but if proposed for development, the visual resource would need to be evaluated for its effect on the casual observer travelling the scenic byway. Direct impacts from oil and gas development on this lease are likely to be minimal due to the distances from the byway and other existing development in the area such as agricultural modifications and residential development. However, the inventory suggests that people in the area are sensitive to changes associated with oil and gas development.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Any subsequent development associated with the lease would add additional contrasts to the environment. In areas with lower sensitivity this impact is anticipated to be minimal and people are more accepting to change for this type of development. In areas where viewers are more sensitive to change such as near the Comanche Grasslands and scenic byways the changes associated with oil and gas development would be seen as an incremental impact to visual resources and the overall character of the area. This project would add to this overall cumulative impact to visual resources in these areas.

Potential Future Mitigation:

The BMPs could include painting equipment a proper color that blends with the environment and locating facilities so they are off of ridges, are screened from nearby residences, and are not “skylined”. In split estate areas where there is less development these contrasts would most likely be more readily noticeable due to the lack of other structures or human modifications in the area.

BMPs would also be applied to reduce these impacts.

3.4.3.7. 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 substances have been previously used, stored, or disposed of at the project site).

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The act of leasing the parcels for oil and gas development will not involve the use and management of petroleum products or hazardous substances. However, these activities will take place at the exploration and development stage. The magnitude and location of potential direct and indirect effects cannot be understood or analyzed until the site-specific APD stage of development.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

This action may lead to future operations that would use some type of chemical or petroleum product. However, if mitigation measures are implemented for this action, then future impacts would be limited.

Potential Future Mitigation:

The following mitigations are applied as COAs and 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 hazardous wastes (non-E&P) 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 will apply to pit construction and removal.

3.4.4. Resource Uses:

3.4.4.1. Scenic Byways:

Affected Environment: parcel 7583 is approximately 4.5 miles from the community of LaVeta and the Highway of Legends Scenic Byway. The 2013 Visual Resource Inventory Conducted by the BLM identified this area as having high visual resource values associated with the scenic quality, proximity to major travel corridors, and higher level of sensitivity to change.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The proposed action of a lease sale does not affect the view shed from the Byway but if development is proposed, visual resource impacts would need to be evaluated at that time (see the Visual Resource section, 3.4.3.6). The 2013 inventory suggests that people are sensitive to change associated with oil and gas development in this area.

Environmental Consequences of Leasing and Development - Cumulative Impacts: Development associated with the lease sale could have cumulative impacts to visual resources along the byway. See the Visual Resource section, 3.3.3.6.

Potential Future Mitigation: Apply best management practices to reduce impacts to visual resources associated with the scenic byway

Chapter 4. Coordination and Consultation

PERSONS/AGENCIES CONSULTED

BLM consulted with the following in the preparation of this EA:

CPW, surface owners of split estate nominated lease parcels, Apache Tribe of Oklahoma, Cheyenne and Arapaho Tribes of Oklahoma, Cheyenne River Sioux Tribe, Comanche Nation of Oklahoma, Crow Creek Sioux, Eastern Shoshone, Jicarilla Apache Nation, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, the Ute Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe, Southern Ute Tribe, Standing Rock Lakota Tribe, and the Ute Mountain Ute Tribe.

LIST OF PREPARERS AND PARTICIPANTS

INTERDISCIPLINARY REVIEW

Name	Title	Resource
Sharon A. Sales	Natural Resource Specialist	Project Lead, Fluid Minerals
Chad Meister/ Forrest Cook	Air Quality Scientist	Air Quality / Climate
Melissa Smeins	Geologist	Solid Minerals, Paleontology, Hazardous and Solid Wastes
Aaron Richter	Natural Resource Specialist	Fluid Minerals, Water Quality, Soils

John Lamman	Range Specialist	Invasive Plants, Rangeland Mgt., Prime and Unique Farmlands, Upland Vegetation
Matt Rustand	Wildlife Biologist	Special Status Plants and Animals, Wildlife Terrestrial, Migratory Birds
Dave Gilbert	Fisheries Biologist	Wildlife Aquatic, Wetlands and Riparian
Aaron Richter	Natural Resource Specialist	Forestry
Monica Weimer	Archaeologist	Cultural Resources, Native American Religious Concerns
Martin Hensley	Economist	Socioeconomics, Environmental Justice
Kalem Lenard	Recreation Planner	Visuals, Lands with Wilderness Characteristics, Special Designations, Recreation, Access and Transportation
Aaron Richter	Natural Resource Specialist	Realty Authorizations
Aaron Richter	Natural Resource Specialist	Cadastral Survey

Attachments:

Attachment A – All Nominated Parcels/Proposed Action with Stipulations for Lease

Attachment B – Recommended Parcel Deferrals

Attachment C – Preferred Alternative Parcels with Stipulations for Lease

Attachment D – Stipulation Exhibits

Attachment E – Maps

Attachment F— Comment Summaries and Responses

Chapter 5. References

United States Geological Survey (USGS) 1995. Ground Water Atlas of the United States Segment 2

Colorado Oil and Gas Conservation Commission. 2015. COGIS - Production Data Inquiry <http://cogcc.state.co.us/cogis/>

Colorado General Assembly July 2008. Colorado Senate Bill 08-218

“Earthquakes Triggered by Humans in Colorado-a background paper by the Colorado Geological Survey” CGS

<http://coloradogeologicalsurvey.org/wp-content/uploads/2013/08/Earthquakes-Triggered.pdf>

Appendix A

Parcels Proposed for Lease

The Colorado State Office is reviewing a competitive offering of 8 parcels containing 2037.620 acres of Federal lands in the Royal Gorge Field office for oil and gas leasing. This notice provides:

THE FOLLOWING ACQUIRED LANDS ARE SUBJECT TO FILINGS IN THE MANNER SPECIFIED IN THE APPLICABLE PORTIONS OF THE REGULATIONS IN 43 CFR, SUBPART 3120.

PARCEL ID: 7607

T.0040S., R.0510W., 6TH PM

Section 32: N2;

U.S. Interest 50.00%

Washington County

Colorado 320.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; COF: RGFO

THE FOLLOWING PUBLIC DOMAIN LANDS ARE SUBJECT TO FILINGS IN THE MANNER SPECIFIED IN THE APPLICABLE PORTIONS OF THE REGULATIONS IN 43 CFR, SUBPART 3120

PARCEL ID: 7605

T.0340S., R.0410W., 6TH PM

Section 15: Lot 15,17;

Section 18: Lot 4;

Baca County

Colorado 6.210 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation

The following lands are subject to Exhibit CO-29 to alert lessee of Class I and II paleontological area inventory requirement:

T.0340S., R.0410W., 6TH PM

Section 15: Lot 15,17;

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

All lands are subject to Exhibit RG-03 to protect lesser prairie chicken habitat:

The following lands are subject to Exhibit RG-07 to protect wild turkey critical winter habitat:

T.0340S., R.0410W., 6TH PM

Section 18: Lot 4;

All lands are subject to Exhibit RG-08 to protect deer winter ranges

BLM;PVT/BLM; COF: RGFO

PARCEL ID: 7606

T.0340S., R.0420W., 6TH PM

Section 11: W2SE;

Section 13: Lot 5,19,24;

Section 13: NENW;

Section 14: Lot 1;

Section 14: NENE;

Baca County

Colorado 229.780 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation

All lands are subject to Exhibit CO-29 to alert lessee of Class I and II paleontological area inventory requirement

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened,

endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

All lands are subject to Exhibit RG-03 to protect lesser prairie chicken habitat:

The following lands are subject to Exhibit RG-07 to protect wild turkey critical winter habitat:

T.0340S., R.0420W., 6TH PM

Section 13: Lot 19,24;

The following lands are subject to Exhibit RG-08 to protect deer winter ranges:

T.0340S., R.0420W., 6TH PM

Section 11: W2SE;

Section 13: Lots 5,19,24;

PVT/BLM; COF: RGFO

PARCEL ID: 7591

T.0160S., R.0530W., 6TH PM

Section 4: Lot 1-4;

Section 6: Lot 1-4;

Lincoln County

Colorado 161.630 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-09 to protect big game winter habitat

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

BLM; COF: RGFO

PARCEL ID: 7592

T.0160S., R.0540W., 6TH PM

Section 25: S2;

Section 26: E2E2;

Section 35: E2NE,NESE;

Lincoln County
Colorado 600.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests
All Lands are subject to Exhibit CO-09 to protect big game winter habitat
All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat
All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat
All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation
All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

BLM; COF: RGFO

PARCEL ID: 7593

T.0170S., R.0540W., 6TH PM
Section 2: SENE,E2SE;
Section 13: N2NE,SWSW,SESE;
Section 24: NENE;

Lincoln County
Colorado 320.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests
All Lands are subject to Exhibit CO-09 to protect big game winter habitat
All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat
All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat
All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation
All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

BLM; COF: RGFO

PARCEL ID: 7590

T.0290S., R.0550W., 6TH PM
Section 25: W2NW,SW,SWSE;

Las Animas County
Colorado 280.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests
All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat
All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat
All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation
All Lands are subject to Exhibit CO-29 to alert lessee of Class I and II paleontological area inventory requirement
All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; COF: RGFO

PARCEL ID: 7583

T.0290S., R.0690W., 6TH PM
Section 27: NENW, W2NW;

Huerfano County
Colorado 120.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests
All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat
All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat
All lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

All lands are subject to Exhibit RG-07 to protect wild turkey critical winter habitat

All lands are subject to Exhibit RG-08 to protect deer winter ranges
The following lands are subject to Exhibit RG-14 to protect elk calving habitat:

T.0290S., R.0690W., 6TH PM
Section 27: NWNW;

PVT/BLM; COF: RGFO

Appendix B

Recommended Deferrals

THE FOLLOWING PUBLIC DOMAIN LANDS ARE SUBJECT TO FILINGS IN THE MANNER SPECIFIED IN THE APPLICABLE PORTIONS OF THE REGULATIONS IN 43 CFR, SUBPART 3120.

PARCEL ID: 7605

Deferred Portion: Entire Parcel

T.0340S., R.0410W., 6TH PM

Section 15: Lot 15,17;

Section 18: Lot 4;

Baca County

Colorado 6.210 Acres

BLM;PVT/BLM; COF: RGFO

PARCEL ID: 7606

Deferred Portion: Entire Parcel

T.0340S., R.0420W., 6TH PM

Section 11: W2SE;

Section 13: Lot 5,19,24;

Section 13: NENW;

Section 14: Lot 1;

Section 14: NENE;

Baca County

Colorado 229.780 Acres

BLM;PVT/BLM; COF: RGFO

Appendix C

Parcels Available for Lease with Applied Stipulations

THE FOLLOWING ACQUIRED LANDS ARE SUBJECT TO FILINGS IN THE MANNER SPECIFIED IN THE APPLICABLE PORTIONS OF THE REGULATIONS IN 43 CFR, SUBPART 3120

PARCEL ID: 7607

T.0040S., R.0510W., 6TH PM

Section 32: N2;

U.S. Interest 50.00%

Washington County

Colorado 320.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; COF: RGFO

THE FOLLOWING PUBLIC DOMAIN LANDS ARE SUBJECT TO FILINGS IN THE MANNER SPECIFIED IN THE APPLICABLE PORTIONS OF THE REGULATIONS IN 43 CFR, SUBPART 3120

PARCEL ID: 7591

T.0160S., R.0530W., 6TH PM

Section 4: Lot 1-4;

Section 6: Lot 1-4;

Lincoln County

Colorado 161.630 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-09 to protect big game winter habitat

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat
All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

BLM; COF: RGFO

PARCEL ID: 7592

T.0160S., R.0540W., 6TH PM

Section 25: S2;

Section 26: E2E2;

Section 35: E2NE,NESE;

Lincoln County

Colorado 600.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-09 to protect big game winter habitat

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

BLM; COF: RGFO

PARCEL ID: 7593

T.0170S., R.0540W., 6TH PM

Section 2: SENE,E2SE;

Section 13: N2NE,SWSW,SESE;

Section 24: NENE;

Lincoln County

Colorado 320.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests

All Lands are subject to Exhibit CO-09 to protect big game winter habitat

All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation
All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

BLM; COF: RGFO

PARCEL ID: 7590

T.0290S., R.0550W., 6TH PM

Section 25: W2NW,SW,SWSE;

Las Animas County

Colorado 280.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests
All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat
All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat
All Lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation
All Lands are subject to Exhibit CO-29 to alert lessee of Class I and II paleontological area inventory requirement
All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; COF: RGFO

PARCEL ID: 7583

T.0290S., R.0690W., 6TH PM

Section 27: NENW,W2NW;

Huerfano County

Colorado 120.000 Acres

All Lands are subject to Exhibit CO-03 to protect raptor nests
All Lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat
All Lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat
All lands are subject to Exhibit CO-28 to protect riparian/wetland vegetation

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

All lands are subject to Exhibit RG-07 to protect wild turkey critical winter habitat

All lands are subject to Exhibit RG-08 to protect deer winter ranges

The following lands are subject to Exhibit RG-14 to protect elk calving habitat:

T.0290S., R.0690W., 6TH PM

Section 27: NWNW;

PVT/BLM; COF: RGFO

Appendix D

Stipulation Exhibits

EXHIBIT CO-03

Lease Number:

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal description or other description):

For the purpose of:

To protect raptor nests within a one-eighth mile radius from the site.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

An exception may be granted depending on current usage, or on the geographical relationship to topographic barriers and vegetation screening.

EXHIBIT CO-09

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

December 1 through April 30

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect big game (mule deer, elk, pronghorn antelope, and bighorn sheep) winter range, including crucial winter habitat and other definable winter range as mapped by the Colorado Division of Wildlife. This may apply to sundry notice that require an environmental analysis.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

An exception may be granted under mild winter conditions for the last 60 days of the closure.

EXHIBIT CO-18

Lease Number:

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

February 1 through August 15

For the purpose of (reasons):

To protect raptor (this includes golden eagles, all accipiters, falcons [except the kestrels], all butteos, and owls) nesting and fledgling habitat during usage for one-quarter mile around the nest site.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

Exceptions may be granted during years when the nest site is unoccupied, when occupancy ends by or after May 15, or once the young have fledged and dispersed from the nest.

EXHIBIT CO-19

Lease Number:

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

February 1 through August 15

For the purpose of (reasons):

To protect ferruginous hawk nesting and fledgling habitat during usage for a one-quarter mile buffer around the nest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

Exceptions may be granted during years when a nest site is unoccupied, when occupancy ends by or after May 15, or once the young have fledged and dispersed from the nest.

EXHIBIT CO-28

Lease Number:

CONTROLLED SURFACE USE STIPULATION

Surface occupancy or use is subject to the following special operating constraints.

On the lands described below:

For the purpose of:

To protect perennial water impoundments and streams, and/or riparian/wetland vegetation by moving oil and gas exploration and development beyond the riparian vegetation zone.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

Exceptions may be granted only if an on-site impact analysis shows no degradation of the resource values.

EXHIBIT CO-29

Lease Number: <LEASE_NUMBER>

LEASE NOTICE

The lessee is hereby notified that prior to any surface disturbing activities, an inventory of paleontological resources (fossils) may be required. Mitigation may be required such as monitoring in any area of PFYC 4 or 5 and also upon the discovery of any vertebrate fossil or other scientifically important paleontological resource. Mitigation of scientifically important paleontological resources may include avoidance, monitoring, collection, excavation, or sampling. Mitigation of discovered scientifically important paleontological resources may require the relocation of the surface disturbance activity over 200 meters. Inventory and any subsequent mitigation shall be conducted by a BLM permitted paleontologist.

On the lands described below:

<LEGAL_DESCRIPTIONS>

EXHIBIT CO-34

Lease Number:

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 *et seq.*, including completion of any required procedure for conference or consultation.

EXHIBIT CO-39

Lease Number:

CONTROLLED SURFACE USE STIPULATION

This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O.13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT CO-56

Lease Number:

LEASE NOTICE

Due to potential air quality concerns, supplementary air quality analysis may be required for any proposed development of this lease. This may include preparing a comprehensive emissions inventory, performing air quality modeling, and initiating interagency consultation with affected land managers and air quality regulators to determine potential mitigation options for any predicted significant impacts from the proposed development. Potential mitigation may include limiting the time, place, and pace of any proposed development, as well as providing for the best air quality control technology and/or management practices necessary to achieve area-wide air resource protection objectives. Mitigation measures would be analyzed through the appropriate level of NEPA analysis to determine effectiveness, and will be required or implemented as a permit condition of approval (COA). At a minimum, all projects and permitted uses implemented under this lease will comply with all applicable National Ambient Air Quality Standards and ensure Air Quality Related Values are protected in nearby Class I or Sensitive Class II areas that are afforded additional air quality protection under the Clean Air Act (CAA).

On the lands described below:

EXHIBIT RG-03

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

March 1 through July 31

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect lesser prairie chicken habitat.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT RG-07

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

Winter Range: December 1 – April 1

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect wild turkey during the critical winter periods.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT RG-08

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

December 1 through March 31

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect deer and elk winter ranges.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT RG-14

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

May 1 through June 30

On the lands described below:

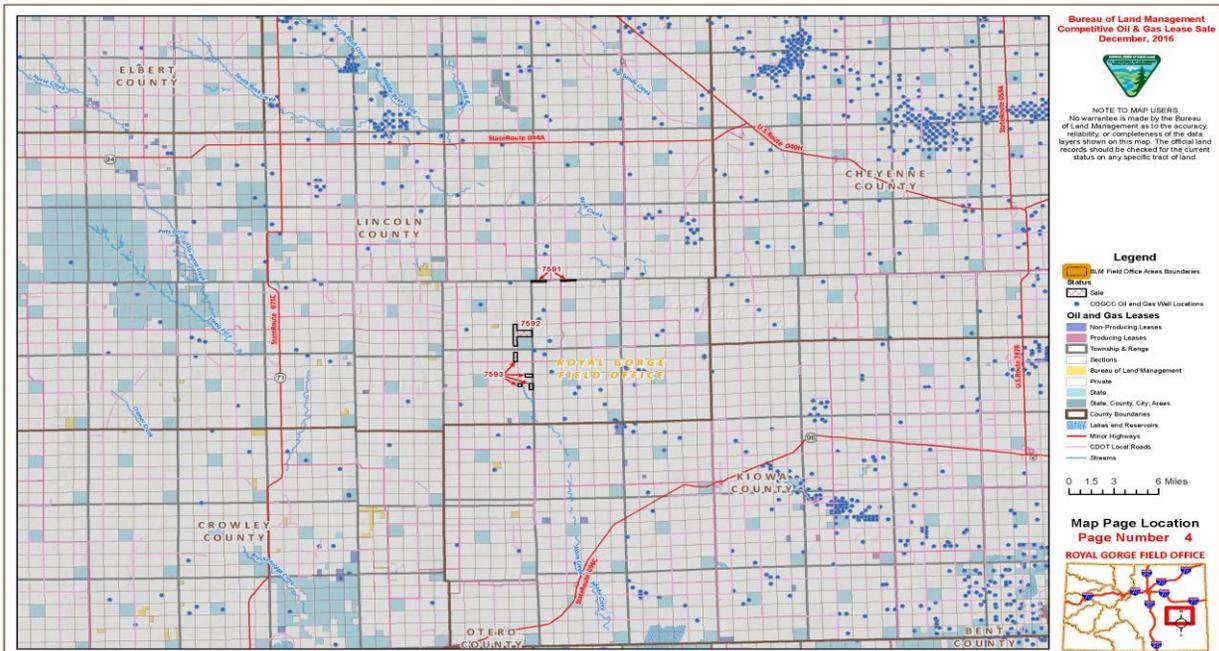
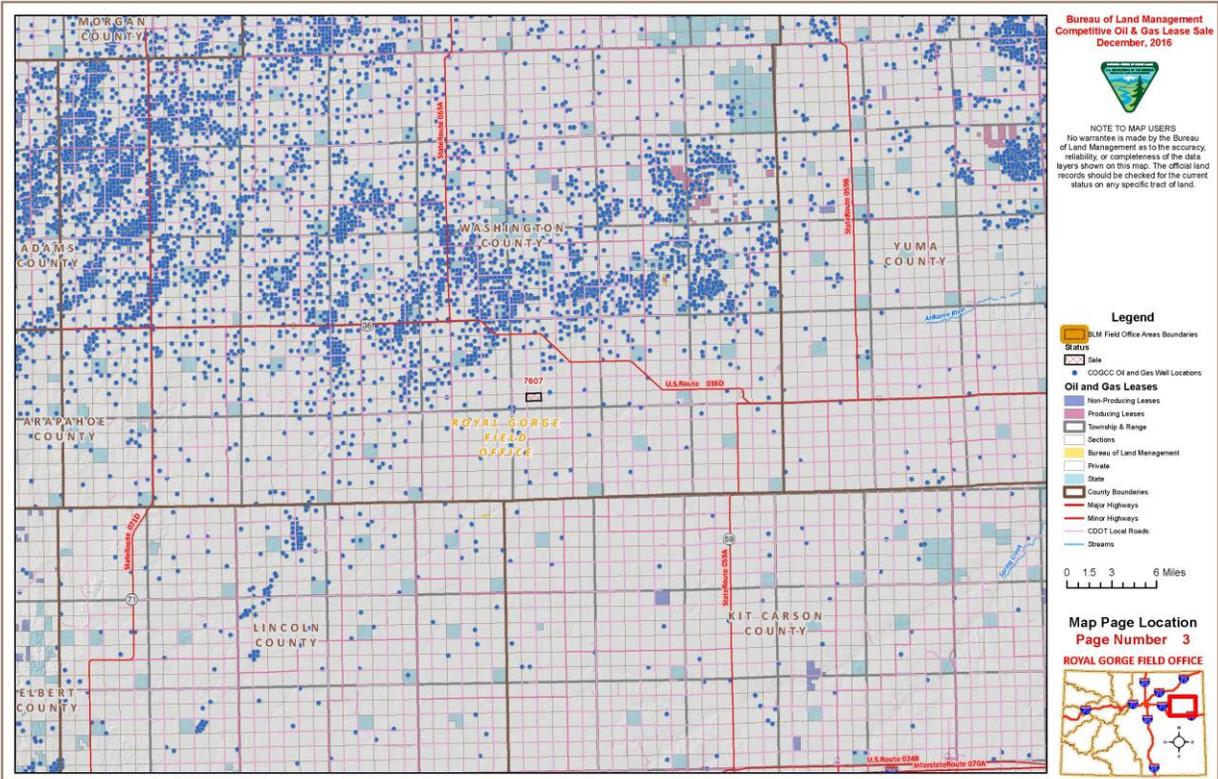
<LEGAL_DESCRIPTIONS>

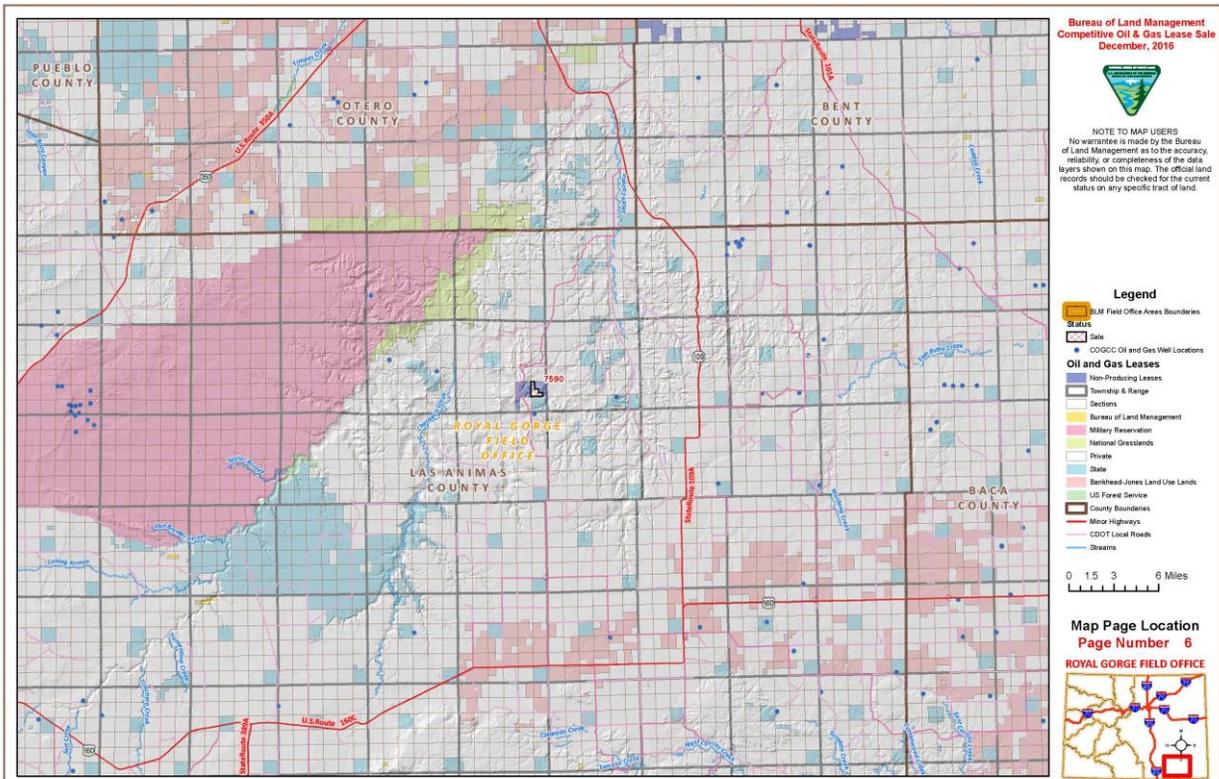
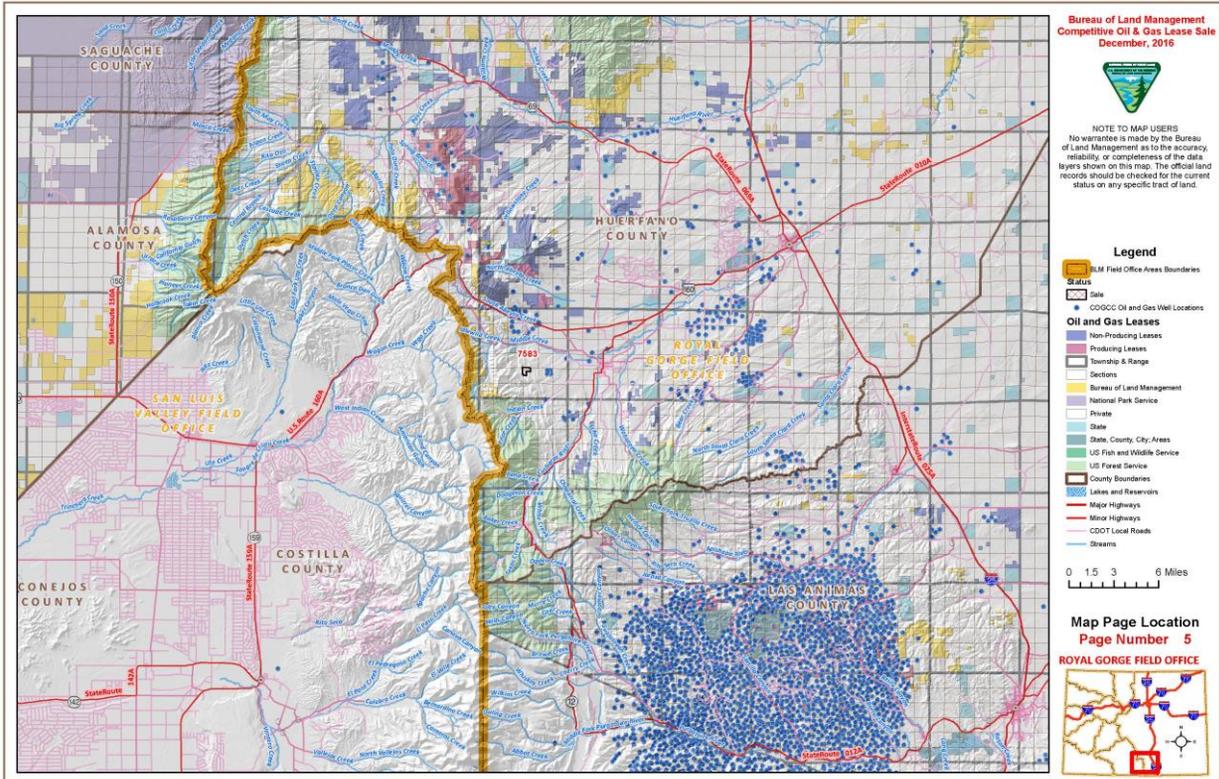
For the purpose of (reasons):

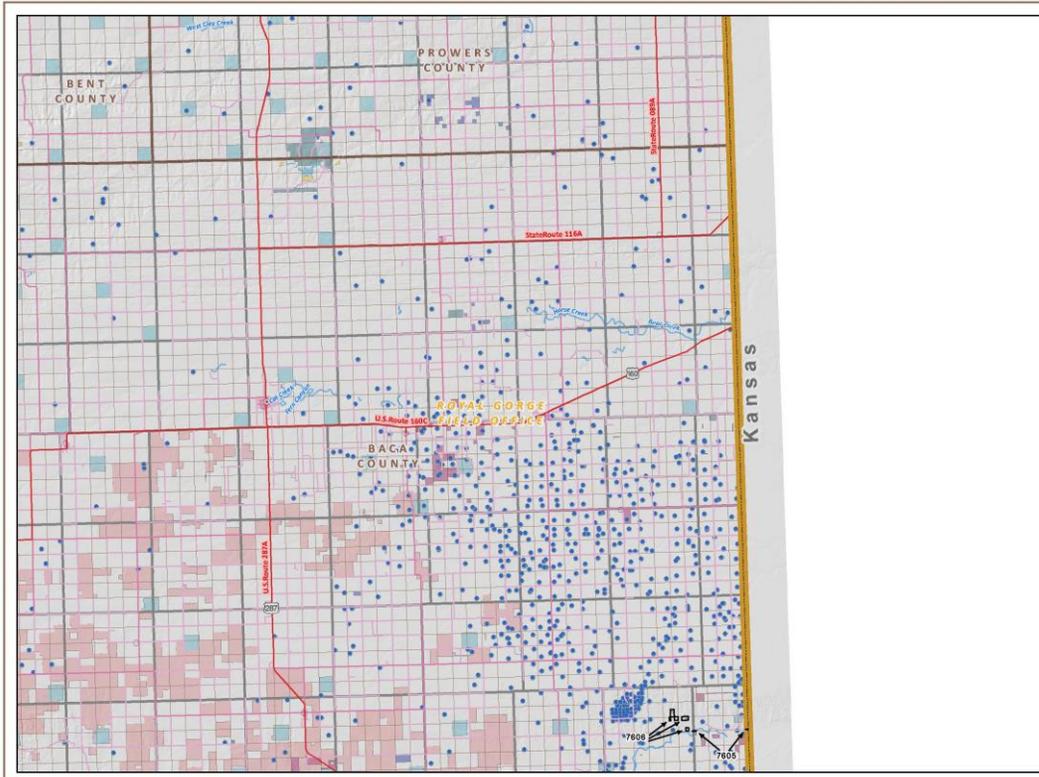
To protect elk calving habitat.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Appendix E







**Bureau of Land Management
Competitive Oil & Gas Lease Sale
December, 2016**



NOTE TO MAP USERS
No warranty 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 should be checked for the current status on any specific tract of land.

Legend

- BLM Field Office Areas Boundaries
- Status**
 - Federal
 - COGCC Oil and Gas Well Locations
- Oil and Gas Leases**
 - Non-Producing Leases
 - Producing Leases
 - Township & Range
 - Sections
 - Bureau of Land Management
 - Private
 - State
 - State, County, City Areas
 - Benthed Jones Land Use Lands
 - County Boundaries
 - Lakes and Reservoirs
 - Minor Highways
 - CDOT Local Roads
 - Streams



**Map Page Location
Page Number 7**



Appendix F

December 2016 Oil & Gas Lease EA Summary of Substantial Public Comment Topics

Topics raised by public comments are summarized and addressed below or in each of the relevant resource sections of the EA; if warranted, considered in modifying the proposed action or preferred alternative. BLM received comments from Wild Earth Guardians (WEG), Center for Biological Diversity (CBD), and Western Energy Alliance. There was one similar comment letter submitted by 3,773 commenters regarding the social cost of carbon. The comments were in regards to wildlife, air quality, and social cost of carbon, seismology, archeology and NEPA. Copies of public comments received are available for viewing at the Royal Gorge Field Office.

COMMENTS TOPIC SUMMARY	BLM RESPONSE
Wildlife	
#1 Western Energy Alliance commented regarding concerns over lesser prairie chicken, and felt our stipulations were adequate to address the protection of the species.	The U.S Fish and Wild Life Service’s (USFWS) decision to list the lesser prairie chicken (LPC) was vacated in September 2015 by the U.S. District Court for the Western District of Texas. In May 2016, the USFWS dropped its appeal of the District Court ruling. Therefore, the LPC is not a federally listed species. However, the reversal of the listing decision was based on a conservation effort directed at recovery of the species. The Range-wide Conservation Agreement (RCA) developed by the Western Association of Fish and Wildlife Agencies (WAFWA) created numerous conservation measures and a mechanism to establish a conservation fund to offset impact to LPC. The stipulations available for the RGFO to protect LPC under its current RMP are not adequate to protect and recover LPC as outlined by the RCA. Therefore, RGFO has decided to defer these parcels until stipulations can be modified and/or added to sufficiently protect and recover the species.
#2 Center for Biological (CBD) states the EA fails to adequately describe and address impact to Ferruginous Hawks and other raptors and big game.	The EA discusses impacts due to direct and indirect habitat loss to raptors and big game. Appropriate stipulations to protect these species have been attached to parcels in the event that the resources may be present. However, as stated in the EA, this analysis addresses the leasing of federal minerals; impacts due to specific development operations will be addressed during review of site-specific APD. Further, BLM may require additional conditions of approval for protection of resources, if its analysis of a proposed development projects supports such measures.
#3 CBD states the concerns over mule deer and big game habitat loss	The EA discusses impacts due to direct and indirect habitat loss. The parcels the commenter is referencing in the cited maps have the big game winter habitat stipulations attached. However, as stated in the EA, this analysis addresses the leasing of federal minerals; impacts due to specific development

was not adequately addressed.	operations will be addressed during review of APD. Further, BLM may require additional conditions of approval for protection of resources, if its analysis of a proposed development projects supports such measures.
Air Quality	
#4 The EA fails to quantify the specific emissions that could potentially result from the RGFO lease sale and include an analysis of climate change and project effects on climate change using the best available science. (WEG & CBD)	<p>As disclosed in the EA (pg. 18), the lease sale itself would not produce any direct air pollution emissions. The EA further discloses that future development is unforeseeable in terms of the rate of development, contemporaneous timing, and the exact methods and equipment configurations that could be employed for extraction and field processing (pg. 25). In general, only 50% of BLM Colorado leases are held by production (45% in terms of actual acres), and the number of leased acres has been in decline since 2008. It is unforeseeable whether such low potential parcels as those considered in the EA would ever be developed or contains economically recoverable quantities of hydrocarbon resources. Therefore, estimating total emissions from each parcel would require BLM to speculate on the myriad possible exploration and development scenarios for each parcel. Such speculation would result in information that is too uncertain to be useful for the decision-maker. However, the EA discloses typical emissions (including GHGs) from a single well (construction and production emissions), which provides the minimum potential emissions for any sale parcel (assuming development occurs). The EA also explains that for such emissions (pg. 25) there is little likelihood of near-field impacts given the distances to nearby sensitive receptors. In addition, the EA contains a cumulative estimated emissions (including GHGs) inventory for all projected federal development from the low and high CARMMS scenarios in the RGFO (pg. 27), which is expected to include any development on the parcels under consideration. This data identifies the upper bounds for cumulative federal development that can be expected in the RGFO for the next several years, and places it in the context of all expected federal and non-federal development in the same area over the same period. The EA therefore describes the range of potential GHG and other emissions that could result from any future development activities on the sale parcels, as well as potential cumulative emissions for the RGFO. All of the federal development in the vicinity of the parcels under consideration is currently tracking along the low scenario projections. However, the rate of development could change by the time actual emissions-generating activities are proposed; any future parcel development would be analyzed in the context of conditions at the time, including the existing and projected rate of development in the area.</p> <p>The EA has been updated to include downstream, or product end-use emissions for federal and non-federal production as derived from the CARMMS analysis emissions calculations (see EA, pg. 22-33). The BLM CO can provide this data because we have the CARMMS analysis, which is specific to Colorado. This data (for all of Colorado) is also available to view on our website at http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality/carmms.html.</p> <p>The downstream estimates conservatively assume that 100% of the estimated federal and non-federal production is combusted. However, actual production</p>

	<p>levels can vary considerably from well to well, even at proximate locations within the same hydrocarbon bearing formations. Over the broader landscape analyzed by the CARMMS study, single well variability has less effect on emissions modeling results than differences among groups of wells (such as at well pads).</p> <p>Regardless, the EA disclosed the predicted climate change impacts for the region (see EA pgs. 36-37) that are expected to occur regardless of future development on the lease sale parcels, in the RGFO, or in the CARMMS analysis area. The potential for climate change impacts that are disclosed are based on the entire world’s worth of GHG emissions projected well into the future. BLM’s methodology of quantifying the estimated GHG emissions from a proposed action, placing them in a regional or global context, and providing qualitative analysis of climate change impacts is consistent with the approach that has been approved by the Interior Board of Land Appeals in <i>Powder River Basin Resource Council</i>, 180 IBLA 119, 134-35 (2010), and <i>Bristlecone Alliance</i>, 179 IBLA 51, 57 (2010), and the U.S. Court of Appeals for the D.C. Circuit in <i>WildEarth Guardians v. Jewell</i>, 738 F.3d 298, 309-310 (D.C. Cir. 2013). There is no other available scientific method to describe impacts that could result from any future emissions attributable to this lease sale alone.</p> <p>The question whether BLM should prepare a programmatic analysis of GHG emissions and climate change impacts from federal fluid mineral leasing and development is outside the scope of the December 2016 leasing decision.</p>
<p>Social Cost of Carbon</p>	
<p>#5 The December 2016 lease sale EA fails to perform any social cost of carbon analysis. (WEG, CBD and common comment letter)</p>	<p>The BLM finds that including monetary estimates of the Social Cost of Carbon (SCC) in its NEPA analysis for this proposed action would be of limited use in analyzing and selecting between alternatives. A federal Interagency Working Group on the Social Cost of Carbon (IWG), convened by the Office of Management and Budget, developed estimates of the SCC, which reflect the monetary cost incurred by the emission of one additional metric ton of carbon dioxide. The SCC is used to estimate the monetized damages associated with an incremental increase in carbon emissions in a given year.</p> <p>The NEPA analysis for this proposed action does not include monetary estimates of any benefits or costs. Unlike rulemaking, project-level NEPA analysis does not require a cost-benefit analysis, although CEQ NEPA regulations allow agencies to use it in NEPA analyses in certain circumstances (40 CFR § 1502.23). The CEQ regulation states (in part), “...for the purposes of complying with the Act, the weighing of the merits and drawbacks of various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations.” Unlike a full cost-benefit analysis, the quantitative economic analysis presented in this NEPA document is primarily a regional economic impact analysis, which is used to estimate impacts on economic activity, with a focus on potential fiscal</p>

	<p>impacts for this NEPA analysis. In regional economic impact analyses, changes in economic activity are not considered benefits or costs (Watson, Wilson, Thilmany, and Winter 2007 ¹). As contemplated in the CEQ regulations, the analysis recognizes that there are environmental impacts associated with the development and use of fossil fuels. The analysis also identifies impacts of oil and gas development to the local economy and tax base. The analysis appropriately weighs the merits and the drawbacks of the proposed action and alternatives, without reduction to an imprecise monetary or quantitative cost-benefit analysis. Without any other monetized benefits or costs reported, monetized estimates of the SCC would be presented in isolation, without any context for evaluating their significance. This limits their usefulness to the decision maker.</p>
Seismicity	
<p>#6 The EA failed to address the possibility of increased seismicity due to wastewater injection and hydraulic fracturing operations. (WEG, CBD)</p>	<p>At the leasing stage it is not known which (if any) of the parcels will be developed, and if so, how much water will be produced, and what the disposal method for the produced water will be (see comment response #10 in this appendix). Moreover, a fluid mineral lease is not required to locate a class II injection well on BLM land. Hydraulic fracturing and seismicity are discussed in section 3.4.1.2 of the EA. If, in the future, an injection well were proposed for BLM surface or for other situations in which BLM exercises approval authority, BLM would perform site-specific analysis of the proposal prior to making its decision.</p> <p>The Colorado Oil and Gas Conservation Commission (COGCC) regulates class II injection wells, a common disposal method for wastewater produced during oil and gas development. Applications for class II injection wells undergo extensive, site specific analysis by COGCC engineers, and permits are subject to specific limits. Testing, monitoring and inspections are performed on injection wells to identify any potential problems or seismic activity. If problems develop, COGCC may modify permits to prevent or mitigate ongoing impacts. ²</p>
Archeology	
<p>#7 Western Energy Alliance had concerns that there were stipulations in place to protect the historic trail possibly near the parcels in Baca County.</p>	<p>Under the preferred alternative the parcels with possible historic trails would be deferred from the lease sale to allow for further analysis that cannot be completed before the December 2016 lease sale.</p>

NEPA	
#8 WEG stated BLM has not undertaken implementation of Landscape scale policy with respect to GHG emissions and climate change.	BLM considered GHG emissions and climate change impact, which occur at a global scale, in its analysis of the alternatives. The analysis reflects the currently available analytical tools and information. If additional information and analytical methods become available, BLM will use them in the updated analysis that would be performed for specific development proposals.
#9 CBD commented that the RGFO RMP is outdated.	The BLM Land Use Planning Handbook (H-1601-1, page 47) specifies that “existing land use plan decisions remain in effect during an amendment or revision until the amendment or revision is completed and approved”. When new information or circumstances exist BLM analyzes the associated impacts in the Lease EA (see, e.g. sections on Air Quality and Climate and Hydrology and Water Quality).
#10 CBD commented that site-specific analysis is required and feasible, but lacking	<p>To provide a more site-specific and detailed analysis of the impacts from lease development activities would require the BLM to speculate on the density of drilling locations, the number, characteristics, and specifications of related production equipment, and the rate at which the lease would be developed. The BLM cannot speculate in this manner; to do so would likely either underestimate impacts or over-estimate impacts. BLM's NEPA Handbook H-1790-1 at page 59 states: ". . . you are not required to speculate about future actions."</p> <p>Often, where the context and intensity of the environmental impacts such as those described by the commenters remain unidentifiable until exploration activities are proposed, the Application for Permit to Drill (APD) may be the first useful point at which a site-specific environmental appraisal can be undertaken. (<i>Park County Resource Council, Inc. v. U.S. Department of Agriculture</i> (10th Cir. 1987)). However, when site-specific impacts are reasonably foreseeable at the leasing stage, NEPA requires the analysis and disclosure of such reasonably foreseeable site specific impacts (<i>N.M. ex rel. Richardson v. BLM</i>, 565 F.3d. 683, 719-19 (10th Cir. 2009)). Although certain site-specific impacts remain unforeseeable at this time, the analysis in this EA provides additional disclosure and analysis of the anticipated environmental impacts associated with a decision to offer and possibly issue leases for these parcels.</p> <p>At the lease sale stage, BLM does not yet know the specific location and operating procedures, such as the use of hydraulic fracturing, including hydraulic fracturing chemicals, for any oil and gas operations that might be proposed in an APD on a leased parcel. In light of the uncertainties that exist at this time, conducting the detailed analysis and addressing the issues raised in</p>

	<p>this comment on the potential impacts of hydraulic fracturing would require a great deal of speculation and, as a result, offer little useful information useful for the decision maker.</p> <p>If oil and gas operations are proposed for any of the subject lease parcels, the BLM will complete a site-specific NEPA analysis of the proposal(s) utilizing the best available and most current data. That NEPA analysis may include an estimate of proposed completion activities (such as hydraulic fracturing) and would address project-specific health and safety and environmental impacts. This site-specific NEPA analysis would guide the BLM’s decision whether to approve the proposed oil and gas operations, and if so, under what permit conditions.</p>
<p>#11 RMP-EISs do not otherwise fully disclose foreseeable environmental effects of new oil and gas development, including hydraulic fracturing or “fracking” BLM must prepare an EIS, or at minimum, address these effects in an EA (CBD)</p>	<p>The EA, in section 3.4, addresses the environmental consequences of leasing and potential development, including hydraulic fracturing, to the greatest extent practical at the lease stage. The potential impacts, as well as protections required by BLM and COGCC, related to hydraulic fracturing, are discussed in section 3.4.1.2 of the EA.</p>

References:

- (1) Determining Economic Contributions and Impacts: What is the difference and why do we care? 2007.
<http://www.ntc.blm.gov/krc/uploads/74/Watson,%20et%20al%20Impacts%20vs%20Contribution%2037-2-6.pdf>
- (2) “COGCC Underground Injection Control and Seismicity in Colorado” COGCC January 19, 2011
<http://cogcc.state.co.us/documents/library/Technical/Induced%20Seismicity/Underground%20Injection%20Control%20and%20Seismicity.pdf>