United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Miles City Field Office
111 Garryowen Road
Miles City, Montana 59301-7000
www.blm.gov/mt

In Reply Refer To:

July 24, 2013

Dear Reader:

The Bureau of Land Management (BLM) Miles City Field Office prepared an environmental assessment (EA) to analyze the potential effects from offering 2 nominated lease parcels for competitive oil and gas leasing in a sale tentatively scheduled to occur on October 22, 2013. The EA was available for a 30-day public comment period.

Based on our analysis and review of comments received, the EA has been updated (refer to Chapter 5 of the EA for a summary of public comments). A competitive oil and gas lease sale is tentatively scheduled to be held on October 22, 2013. It will be my recommendation to offer the 2 lease parcels in whole, 160.00 surveyed federal mineral acres, along with stipulations identified in the BLM preferred alternative in the updated EA, see Appendix A

We anticipate preparing and finalizing our Decision Record after the October oil and gas lease sale, but prior to lease issuance. Upon finalization, the Decision Record and accompanying finding of no significant impact (FONSI) will be posted on the website listed below.

Please refer to the Montana/Dakotas BLM website at http://blm.gov/h2kd. Current and updated information about our EAs, Lease Sale Notices, and corresponding information pertaining to this sale can be found at the link referenced above. Once there, locate the October 22, 2013 lease sale to review the MCFO EA and the parcel list with recommended stipulations.

If you have any questions or would like more information about lease sale notices or the issuance of the EA, Decision Record and FONSI, please contact me at 406-233-2837.

Sincerely,

Todd D. Yeager
Field Manager

United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-MT-C020-2013-126-EA
July 24, 2013

Project Title: Oil and Gas Lease Parcel, October 22, 2013 Sale

Location: Miles City Field Office (see Appendix A for list of lease parcels by number
and legal description and Maps 1-3)

BLM

Miles City Oil and Gas Lease Sale EA
DOI-BLM-MT-C020-2013-126-EA

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1.0 PURPOSE AND NEED

1.1 Introduction

It is the policy of the Bureau of Land Management (BLM) to make mineral resources available for use and to encourage development of mineral resources to meet national, regional, and local needs. This policy is based on various laws, including the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 Sec. 5102(a)(b)(1)(A) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing. The Montana State Office conducts mineral estate lease auctions for lands managed by the federal government, whether the surface is managed by the Department of the Interior (BLM or Bureau of Reclamation), United States Forest Service, or other departments and agencies. In some cases the BLM holds subsurface mineral rights on split estate lands where the surface estate is owned by another party, other than the federal government. Federal mineral leases can be sold on such lands as well. The Montana State Office has historically conducted five lease sales per year.

Members of the public file Expressions of Interest (EOI) to nominate parcels for leasing by the BLM. From these EOIs, the Montana State Office provides draft parcel lists to the appropriate field offices for review. BLM field offices then review legal descriptions of nominated parcels to determine: if they are in areas open to leasing; if new information has come to light which might change previous analyses conducted during the land use planning process; if there are special resource conditions of which potential bidders should be made aware; and which stipulations should be identified and included as part of a lease. Ultimately, all of the lands in proposed lease sales are nominated by private individuals, companies, or the BLM, and therefore represent areas of high interest.

This environmental assessment (EA) has been prepared to disclose and analyze the potential environmental consequences from leasing all 2 nominated lease parcels encompassing a total of 160.00 surveyed federal mineral acres located in the Miles City Field Office (MCFO), to be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on October 22, 2013.

The analysis area includes the 2 nominated parcels in Richland and Fallon counties (Map 1).

1.2 Purpose and Need for the Proposed Action

The purpose of offering parcels for competitive oil and gas leasing is to provide opportunities for private individuals or companies to explore for and develop federal oil and gas resources after receipt of necessary approvals and to sell the oil and gas in public markets.

This action is needed to help meet the energy needs of the people of the United States. By conducting lease sales, the BLM provides for the potential increase of energy reserves for the U.S., a steady source of income, and at the same time meets the requirement identified in the

Energy Policy Act, Sec. 362(2), Federal Oil and Gas Leasing Reform Act of 1987, and the Mineral Leasing Act of 1920, Sec. 17.

The decision to be made is whether to sell oil and gas leases on the lease parcels identified, and, if so, identify stipulations that would be included with specific lease parcels at the time of lease sale.

1.3 Conformance with Land Use Plan(s)

This EA is tiered to the information and analysis and conforms to the decisions contained in the Big Dry Resource Management Plan (RMP/EIS) of April 1996 and the Powder River RMP/EIS of March 1985, as amended (1994 Oil and Gas RMP/EIS Amendment, 2003 Final Statewide Oil and Gas Environmental Impact Statement and proposed Amendment of the Powder River and Billings RMPs, and the 2008 Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings RMPs). The Big Dry and Powder River RMPs are the governing land use plans for the MCFO. The lease parcels to potentially be offered for sale are within areas determined to be open to oil and gas leasing in the Big Dry and Powder River RMPs. An electronic copy of the Big Dry RMP/EIS and the Powder River RMP/EIS, as amended, can be located via the internet on the BLM home page, www.blm.gov/mt. On the home page, locate the heading titled "*Montana/Dakotas*," then select "*What We Do*", then click on the "*Planning*" link.

A more complete description of activities and impacts, related to oil and gas leasing, development, production, etc. can be found at pages 111 to 156 of the Big Dry RMP and pages 55 to 77 of the 1994 Oil and Gas Amendment of the Powder River RMP (for leasing decisions), and pages 4-1 to 4-310 of the 2008 Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings RMPs (for development, production, etc).

Analysis of the 2 parcels is documented in this EA, and was conducted by MCFO resource specialists who relied on professional knowledge of the areas involved, review of current databases, file information, and some site visits to ensure that appropriate stipulations were recommended for a specific parcel. Analysis may have also identified the need to defer entire or partial parcels from leasing pending further environmental review.

At the time of this review it is unknown whether a particular parcel will be sold and a lease issued. It is unknown when, where, or if future well sites, roads, and facilities might be proposed. Assessment of potential activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development (RFD) Scenario developed for this environmental assessment (Appendix C), which is based on information contained in the MCFO RFD developed in 2005 and revised in 2012; it is an unpublished report that is available by contacting the MCFO. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in the MCFO area and used to analyze projected wells for the nominated lease parcels. Detailed site-specific analysis and mitigation of activities associated with any particular lease would occur when a lease holder submits an application for permit to drill (APD). A more complete description of mitigation, BMPs, and conditions of approval related to oil and gas lease activities can be found at pages 302-326 of the Big Dry RMP, pages

130-137 of the 1994 Oil and Gas Amendment of the Powder River RMP, pages 3-6 of the 2008 Record of Decision for the Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings RMPs, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development-The Gold Book, and online at http://www.blm.gov/wo/st/en/prog/energy/oil _and_gas/best_management_practices. html. Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

1.4 Public Scoping and Identification of Issues

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posted on the MCFO website National Environmental Policy Act (NEPA) notification log. Scoping was initiated March 26, 2013. No scoping comments were received.

The BLM coordinates with Montana Fish, Wildlife, and Parks (MFWP), and the United States Fish and Wildlife Service (USFWS) to manage wildlife habitat because BLM management decisions can affect wildlife populations which depend on the habitat. The BLM manages habitat on BLM lands, while MFWP is responsible for managing wildlife species populations. The USFWS also manages some wildlife populations but only those federal trust species managed under mandates such as the Endangered Species Act, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. Managing wildlife is factored into project planning at multiple scales and is to be implemented early in the planning process.

Coordination with MFWP was conducted for the 2 lease parcels being reviewed and in the completion of this EA in order to prepare the analysis, identify protective measures, and apply stipulations and lease notices associated with these parcels being analyzed. A letter was sent to the USFWS and MFWP during the 15-day scoping and 30-day public comment periods requesting comments on the 2 parcels being reviewed.

The BLM consults with Native Americans under various statues, regulations, and executive orders, including the American Indian Religious Freedom Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the National Environmental Policy Act, and Executive Order 13175-Consultation and Coordination with Indian Tribal Governments. BLM sent letters to tribes in Montana, North and South Dakota and Wyoming for the 15-day scoping period informing them of the potential for the 2 parcels to be leased and inviting them to submit issues and concerns BLM should consider in the environmental analysis. Letters were sent to the Tribal Presidents and the Tribal Historical Preservation Officer (THPO) or other cultural contacts for the Cheyenne River Sioux Tribe, Crow Tribe of Montana, Crow Creek Sioux Tribe, Eastern Shoshone Tribe, Ft. Peck Tribes, Lower Brule Sioux Tribe, the Mandan, Hidasta, and Arkira Nation, Northern Arapaho Nation, Northern Cheyenne Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe of Indians, Standing Rock Sioux Tribe, and Turtle Mountain Band of Chippewa. In addition to scoping letters, THPOs also received file search results from the preliminary review of parcels conducted by BLM. BLM sent a second letter with a copy of the EA to the tribes informing them about the 30 day public comment period for the EA and solicit any information BLM should consider before making a decision whether to offer any or all of the nominated parcels for sale.

No external issues were identified by the public during the 15-day scoping period. Site specific resource concerns were identified by the BLM through the preliminary review process conducted prior to a 15-day public scoping period. Lease stipulations (as required by Title 43 Code of Federal Regulations 3131.3) were added as necessary to each parcel as identified by the BLM to address site specific resource concerns.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Alternative A - No Action

For EAs on externally initiated Proposed Actions, the No Action Alternative generally means that the Proposed Action would not take place. In the case of a lease sale, this would mean that all expressions of interest to lease (parcel nominations) would be denied or rejected.

The No Action alternative would exclude all 2 lease parcels, covering 160.00 surveyed federal mineral acres administered by the BLM from the competitive oil and gas lease sale (Maps 1-3). Surface management would remain the same and ongoing oil and gas development would continue on surrounding federal, private, and state leases.

2.2 Alternative B – Proposed Action (BLM Preferred)

The BLM Preferred alternative would be to offer 2 lease parcels of federal minerals for oil and gas leasing, covering 160.00 surveyed federal mineral acres administered by the BLM in conformance with the existing land use planning decisions. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Maps 1-3 indicate the detailed location of each parcel.

2.4 Additional Considerations for Alternatives B

For split-estate lease parcels, the BLM provided courtesy notification to private landowners that the federal oil and gas estate under their surface would be included in this lease sale. In the event of activity on such split estate lease parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

The terms and conditions of the standard federal lease and federal regulations would apply to each parcel offered for sale in the Alternative. Stipulations shown in Appendix A would be included with identified parcels offered for sale. Standard operating procedures for oil and gas operations on federal leases include measures to protect the environment and resources such as groundwater, air, wildlife, historical and prehistorical concerns, and others as mentioned in the Big Dry and Powder River RMPs at pages 9 to 40 and 302 to 330 of the Minerals Appendix (Big Dry) and 2-1 to 2-28 and the Minerals Appendix Min-36 to Min-42 (2008 Final Supplement to the Montana Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings RMPs). Conditions of Approval (COAs) would be attached to permits issued to explore and develop the parcels to address site-specific concerns or new information. Standard operating procedures, best management practices (BMPs), COAs, and lease stipulations can change over time to meet RMP objectives, resource needs or land use compatibility.

Federal oil and gas leases would be issued for a 10-year period and would remain valid for as long thereafter as oil or gas is produced in paying quantities, required payments are made and lease operations are conducted in compliance with regulations and approved permits. If a lessee fails to produce oil and gas by the end of the initial 10 year period, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, ownership of the minerals leased would revert back to the federal government and the lease could be resold.

Drilling of wells on a lease would not be permitted until the lessee or operator secures approval of a drilling permit and a surface use plan as specified in 43 CFR 3162.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the existing environment (i.e., the physical, biological, social, and economic values and resources) within the analysis area, which includes the 2 nominated parcels in Richland and Fallon counties (Map 1), that could be affected by implementation of the alternatives described in Chapter 2.

The existing environment is described by the different resources found throughout the counties listed above. Unless otherwise stated, resource analysis in this chapter, and Chapter 4, will be described in approximate acres due to the scaling and precision parameters associated with the Geographic Information System (GIS), in addition to being referenced to a different land survey.

Most of the analysis area consists of open expanses characteristic of the Northern Great Plains. This area is largely comprised of herbaceous vegetation (e.g., grasses) with interspersed shrubs (e.g., sagebrush). Lands with greater moisture or slopes exhibit ponderosa pine, limber pine, limited Douglas fir, and juniper species. Some hardwood trees grow along riparian areas and are common along the Missouri, Yellowstone, and Powder Rivers. The analysis area experiences extreme weather variations on a yearly basis due to its semiarid continental climate. Most of the public lands are scattered throughout the analysis area. The public lands are rich in natural resources, such as wildlife and livestock forage, minerals, cultural resources, paleontological resources, recreation opportunities, and watershed values.

Only those aspects of the existing environment that are potentially impacted by this project are described in detail. The following aspects of the existing environment were determined to not be present or not potentially impacted by this project include: solid leasable minerals (e.g. coal), locatable minerals (e.g. gold), salable minerals (e.g. scoria, sand and gravel), lands with wilderness characteristics, cave and karst resources, wild and scenic rivers; wilderness study areas (WSAs); Special Status Species Plants, Special Recreation Management Areas (SRMAs), Special Designations, Forest and Woodland Resources, Areas of Critical Environmental Concern (ACECs), Native American Religious Concerns, and hazardous wastes or solids. These resources and resource uses will not be discussed further in this EA.

3.2 Air Resources

Air resources include air quality, air quality related values (AQRVs), and climate change. As part of the planning and decision making process, BLM considers and analyzes the potential effects of BLM and BLM-authorized activities on air resources.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven criteria air pollutants subject to National Ambient Air Quality Standards (NAAQS). Pollutants regulated under NAAQS include carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter with a diameter less than or equal to 10 microns (PM_{10}), particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2). Two additional pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOCs) are regulated because they form ozone in the atmosphere. Regulation of air quality is also delegated to some states. Air quality is determined by pollutant emissions and

emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

3.2.1 Air Quality

The EPA air quality index (AQI) is an index used for reporting daily air quality (http://www.epa.gov/oar/data/geosel.html) to the public. The index tells how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates the AQI for five criteria air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established NAAQS to protect public health. An AQI value of 100 generally corresponds to the primary NAAQS for the pollutant. The following terms help interpret the AQI information:

- **Good** – The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- **Moderate** – The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups** – When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- **Unhealthy** – The AQI is between 151 and 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- **Very Unhealthy** – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health effects.

AQI data show that there is little risk to the general public from air quality in the analysis area (Table 1). Based on available aggregate data for Richland County (the nearest county with monitoring data) for years 2009–2011, 93 percent of the days were rated "good" and the three-year median daily AQI was 32 for monitors in the analysis area.

Table 1. US EPA – Air Data Air Quality Index Report (2009-2011)

County[1]	# Days in Period	# Days Rated Good or No Data	Percent of Days Rated Good or No Data	# Days Rated Moderate	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy	# Days Rated Very Unhealthy
Richland	1,095	1,013	93%	82	0	0	0

[1]The Richland County monitor is located near Sidney, MT. Source: EPA Air Data website (http://www.epa.gov/airdata/ad_rep_aqi.html, accessed March 18, 2013).

The area managed by the MCFO is in compliance with all NAAQS. Based on monitoring data available for 2009 through 2011, maximum concentrations as a percentage of the NAAQS are summarized in Table 2. Data are not provided for CO and lead which are not monitored within the analysis area.

Table 2. Monitored Concentrations Representative of the Study Area [a]

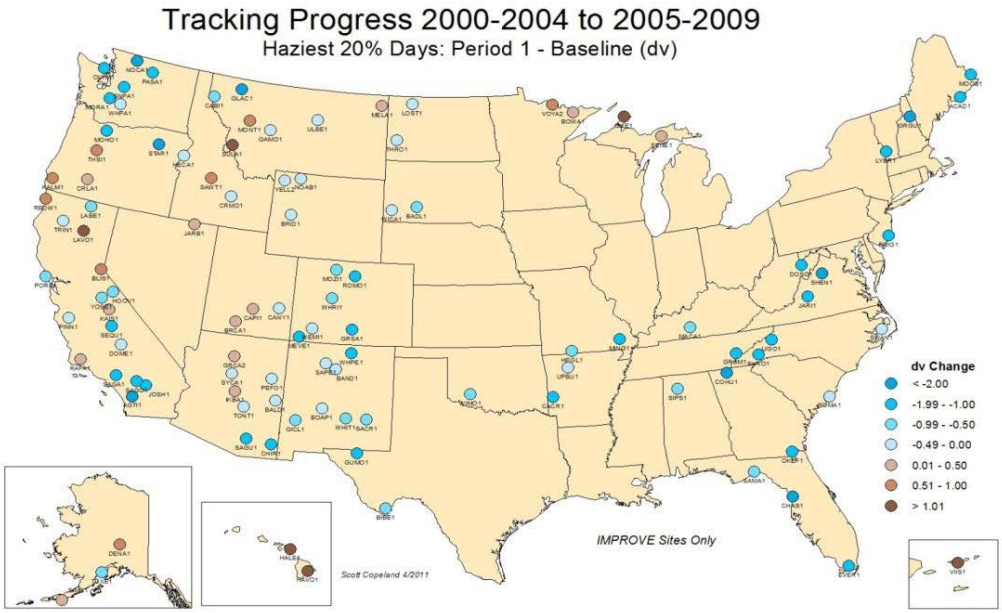
Pollutant	Averaging Time	Applicable Standard[b]	Concentration[c, d]
NO_2	1 hour	100 ppb	9 ppb (9%)
O_3	8 hour	0.075 ppm	0.056 ppm (75%)
PM_{10}	24 hour	150 µg/m^3	96 µg/m^3 (64%)
$PM_{2.5}$	24 hour	35 µg/m^3	14 µg/m^3 (40%)
	Annual	12 µg/m^3	6 µg/m^3 (50%)
SO_2	1 hour	75 ppb	6 ppb (77%) [e]
	24 hour	140 ppb	3 ppb (2%)

[a] Representative concentrations are based on data from the Sidney monitoring station in Richland County.
[b] Most restrictive national or state standard.
[c] Monitored concentrations are the 2nd highest for 24-hour PM_{10} and 24-hour SO_2; three-year average of the annual 4th highest daily maximum for 8-hour O_3; three-year average of the 98th percentile for 24-hour $PM_{2.5}$ and 1-hour NO_2; and three-year arithmetic mean for annual $PM_{2.5}$.
[d] Values in parentheses are monitored concentrations as a percentage of the most restrictive applicable standard.
[e] Only two years of recent data were available for SO_2. The two-year average is based on calendar years 2010 and 2011.
Source: EPA Air Data website (http://www.epa.gov/airdata/ad_rep_con.html, accessed March 18, 2013).

Although ozone concentrations above the NAAQS have been monitored in some rural areas in other states with oil and gas activity, moderate ozone concentrations have been monitored in Montana oil and gas areas. Based on 2010-2012 data from monitors located near Sidney and Broadus, Montana, ozone concentrations are approximately 75 percent of the ozone NAAQS (MDEQ 2013).

Hazardous air pollutants (HAPs) would also be emitted from oil and gas operations, including well drilling, well completion, and gas and oil production. Recent air quality modeling performed for the MCFO indicates that concentrations of benzene, ethylbenzene, formaldehyde, n-hexane, toluene, and xylene would be less than 14 percent of applicable health-based standards and that the additional risk of cancer would be less than 0.18 in one million (BLM 2013).

Air resources also include visibility, which can be degraded by regional haze due in part to sulfur, nitrogen, and particulate emissions. Based on trends identified during 2005-2009, visibility has degraded slightly at the Medicine Lake National Wildlife Refuge IMPROVE monitor in Sheridan County on the haziest days (20 percent worse days). On the 20 percent best (clearest) days, visibility at this monitor has been improving, as shown by decreasing haze in Figure A.



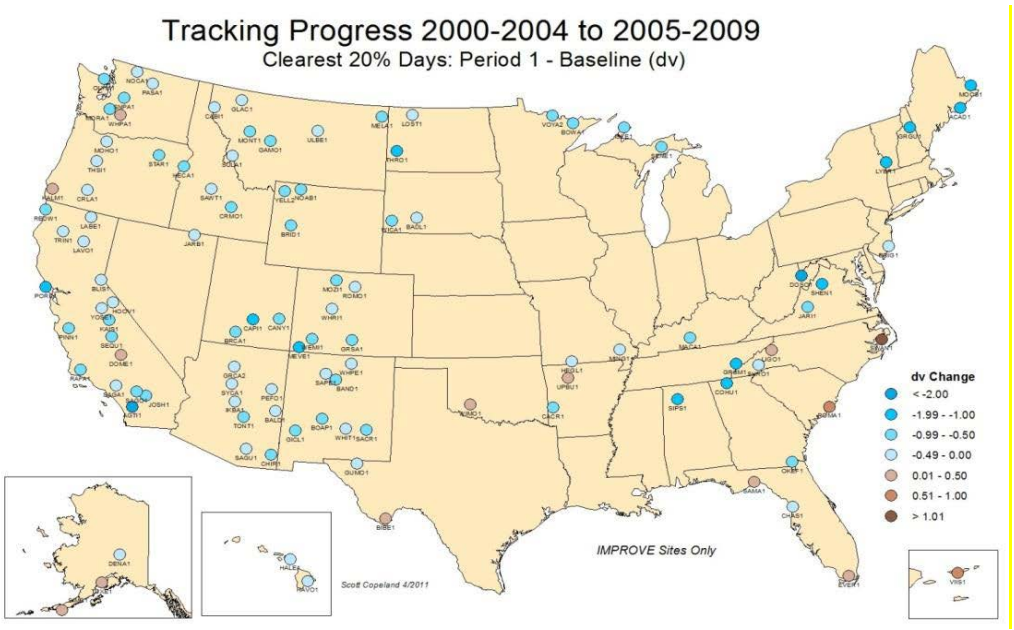


Figure A. Trends in haze index (deciview) on haziest and clearest days, 2005-2009. Source: IMPROVE 2011.

3.2.2 Climate Change

Climate change is defined by the Intergovernmental Panel on climate change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity." (IPCC 2007). Climate change and climate science are discussed in detail in the climate change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management (Climate Change SIR 2010). This document is incorporated by reference into this EA.

The Intergovernmental Panel on climate change (Climate Change SIR 2010) states, "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." Global average temperature has increased approximately 1.4°F since the early 20th century (Climate Change SIR 2010). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth). Other indications of global climate change described by the IPCC (Climate Change SIR 2010) include:

- Rates of surface warming increased in the mid-1970s and the global land surface has been warming at about double the rate of ocean surface warming since then;
- Eleven of the last 12 years rank among the 12 warmest years on record since 1850;
- Lower-tropospheric temperatures have slightly greater warming rates than the earth's surface from 1958-2005.

As discussed and summarized in the climate change SIR, earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, CO_2, methane, and N_2O absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (Climate Change SIR 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere (Climate Change SIR 2010). The buildup of GHGs such as CO_2, methane, N_2O, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO_2 and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO_2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR 2010).

With regard to statewide GHG emissions, Montana ranks in the lowest decile when compared to all the states (http://assets.opencrs.com/rpts/RL34272_20071205.pdf, Ramseur 2007). The estimate of Montana's 2005 GHG emissions of 37 million metric tons (MMt) of gross consumption-based carbon dioxide equivalent (CO_2e) account for approximately 0.6 percent of the U.S. GHG emissions (CCS 2007).

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the climate change SIR describes impacts of climate change in detail at various scales, including the state scale when appropriate. The EPA identifies eastern Montana as part of the Great Plains region. The following summary characterizes potential changes identified by the EPA (EPA 2008) that are expected to occur at the regional scale, where the Proposed Action and its alternatives are to occur.

- The region is expected to 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 would be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs would be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.

- Drier conditions would reduce the range and health of ponderosa and lodgepole pine forests, and increase the susceptibility to fire. Grasslands and rangelands could expand into previously forested areas.
- Ecosystems would be stressed and wildlife such as the mountain lion, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

Other impacts could include:

- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
- Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs.

Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR. Some key aspects include:

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (USGCRP 2009, as cited by Climate Change SIR 2010). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff would increase fire risks.
- Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increases insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

More specific to Montana, additional projected changes associated with climate change described in Section 3.0 of the Climate Change SIR (2010) include:

- Temperature increases in Montana are predicted to be between 3 to 5°F at the mid-21st century. As the mean temperature rises, more heat waves are predicted to occur.
- Precipitation increases in winter and spring in Montana may be up to 25 percent in some areas. Precipitation decreases of up to 20 percent may occur during summer, with potential increases or decreases in the fall.
- For most of Montana, annual median runoff is expected to decrease between 2 and 5 percent. Mountain snowpack is expected to decline, reducing water availability in localities supplied by meltwater.
- Wind power production potential is predicted to decline in Montana based on modeling focused on the Great Falls area.
- Water temperatures are expected to increase in lakes, reservoirs, rivers, and streams. Fish populations are expected to decline due to warmer temperatures, which could also lead to more fishing closures.

- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in Montana based on a 1°C global average temperature increase to be 241 to 515 percent.

While long-range regional changes might occur within this analysis area, it is impossible to predict precisely when they could occur. The following example summarizing climate data for the West North Central Region (MT, ND, SD, and WY) illustrates this point at the regional scale. A potential regional effect of climate change is earlier snowmelt and associated runoff. This is directly related to spring-time temperatures. Over a 112-year record, overall warming is clearly evident with temperatures increasing 0.21 degrees per decade (Figure B). However, data from 1991-2005 indicate a 0.45 degree per decade cooling trend (Figure C). This example is not an anomaly, as several other 15-year windows can be selected to show either warming or cooling trends. Some of these year-to-year fluctuations in temperature are due to natural processes, such as the effects of El Niños, La Niñas, and the eruption of large volcanoes (Climate Change SIR 2010). This information illustrates the difficulty of predicting actual short-term regional or site-specific changes or conditions which may be due to climate change during any specific time frame.

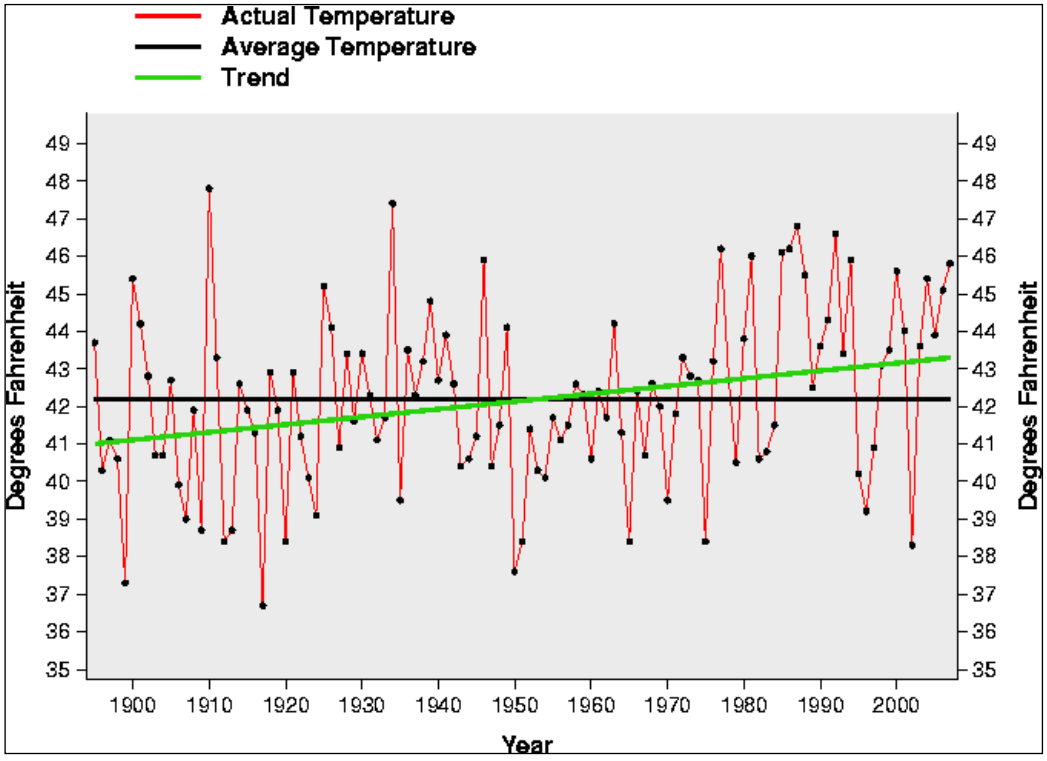


Figure B. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1895-2007. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html**)**

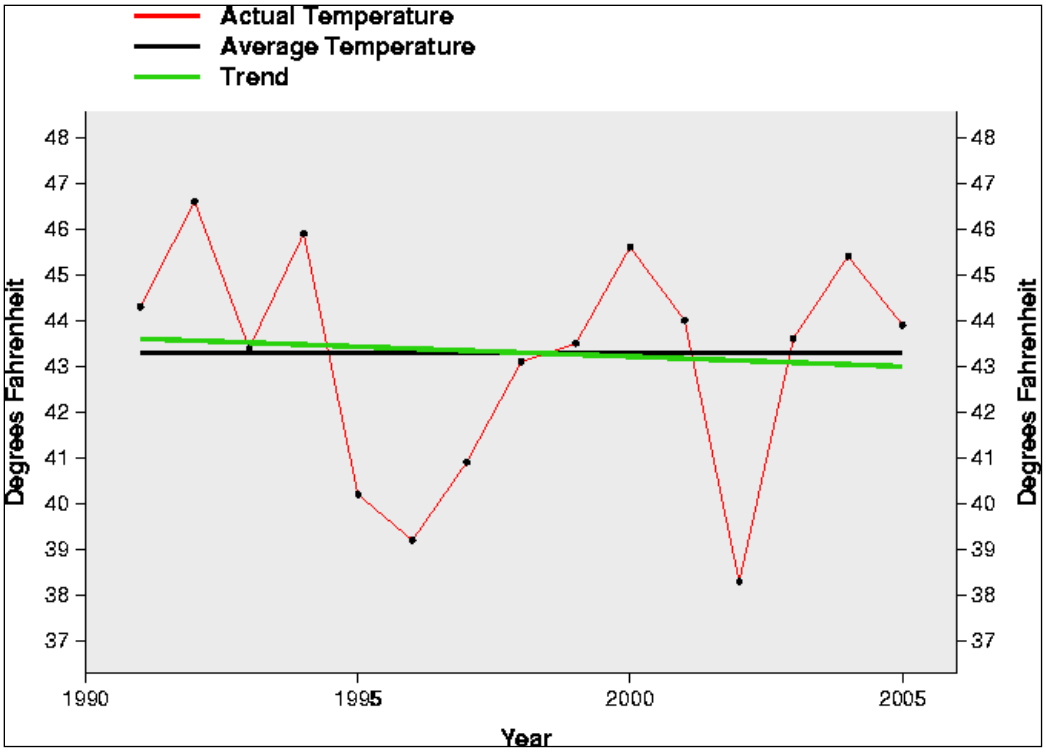


Figure C. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1991-2005. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html)

3.3 Soil Resources

The soil-forming factors (climate, parent material, topography, biota, and age) are variable across the planning area, which results in soils with diverse physical, chemical, and biotic properties. Important properties of naturally functioning soil systems include biotic activity, diversity, and productivity; water capture, storage, and release; nutrient storage and cycling; contaminant filtration, buffering, degradation, immobilization, and detoxification; and biotic system habitat.

Reclamation suitability describes the ability of the soil resource to restore functional and structural integrity following disturbance. The rate and degree of recovery is dependent on the action, time of year, and various site characteristics. Soils poorly suited to successful reclamation contain characteristics that include high salt content, poor water-holding capacity, inadequate rooting depth, or highly erosive qualities. Sites poorly suited to reclamation, would require unconventional and/or site-specific reclamation measures.

The lease parcels are located within 2 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Charles Little Muddy Creeks (HUC 10060005), and Beaver Creek (Little Missouri River) (HUC 10110204). The acreage of the lease parcels comprise less than one percent of each watershed. Soils considered prime farmlands if irrigated occur within the some watershed-lease parcel areas. The following describes the common soil properties of lease parcels within each watershed:

Charles Little Muddy Creeks (HUC 10060005) watershed contains proposed parcel MTM 102757- 6G; comprising less than one percent of the watershed. The lease parcel is located in

Richland County. Parcel soils generally developed from alluvium, colluvium residuum, or glacial till derived from the Hell Creek Formation and Tullock Member and Lebo Member of the Fort Union Formation. Surface soil textures are typically loam, silt loam and very fine sandy loam. Ecological sites are typically Silty (Si) and Silty Steep (SiStp) MLRA 58A, 10-14p.z or Silty (Si) MLRA 53A 10-14p.z. Slopes typically range from 2 to 65 percent. Soils on this site are moderately to highly suitable for reclamation.

Beaver Creek (Little Missouri River) (HUC 10110204) watershed contains proposed parcel MTM 102757- 6H; comprising less than one percent of the watershed. The lease parcel is located in Fallon County. Parcel soils generally developed from the Ludlow Member of the Fort Union Formation. Surface soils are typically moderately deep to very deep, moderately well and well drained, moderately fine and fine textured. Ecological sites are typically Clayey (Cy), Shallow (Sw), Shallow Clay (SwC), or Silty (Si) (MLRA 58A, 10-14 p. z.). Slopes are typically 2 to 15 percent. Soils on this site are moderately to highly suitable for reclamation.

3.4 Water Resources

3.4.1 Surface Hydrology

Surface water resources across the MCFO are present as lakes, reservoirs, rivers, streams, wetlands, and springs. Water resources are essential to the residents of eastern Montana to support agriculture, public water supplies, industry, and recreation. Water resources and riparian areas are crucial to the survival of many BLM-sensitive fish, reptiles, birds, and amphibians.

Perennial streams retain water year-round and have variable flow regimes. Intermittent streams flow during the part of the year when they receive sufficient water from springs, groundwater, or surface sources such as snowmelt or storm events. Ephemeral streams flow only in direct response to precipitation. Intermittent and ephemeral streams play an important role in the hydrologic function of the ecosystems within the lease parcels by transporting water, sediment, nutrients, and debris and providing connectivity within a watershed. They filter sediment, dissipate energy from snowmelt and storm water runoff, facilitate infiltration, and recharge groundwater (Levick et al. 2008). The pools of intermittent streams retain water in the summer months, supporting riparian vegetation and providing water resources for wildlife and livestock.

Stream morphology is influenced by a number of factors including: stream flow regime, geology, soils, vegetation type, climate, and land use history. Stream conditions reflect a number of historic and current impacts, ranging from agriculture to mining. Surficial geology is generally represented by Tertiary sandstones, siltstones, and shales, with some alluvium and glacial till which tends to form fine grain soils (loams to clays), that are highly erosive. Streambeds consist typically of sand and silt, with few bedrock channels. Stream morphology is highly influenced by the presence and type of riparian vegetation because streambeds and stream banks generally lack control features (e.g., rocks, cobles, bedrock).

The lease parcels are located within 2 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Beaver Creek (Little Missouri River) [10110204] and Charlie-Little Muddy Creeks (HUC 10060005). The acreage of the lease parcels comprise between 0.005 and 0.04 percent of each watershed (USGS 2009).

The Beaver Creek (Little Missouri River) watershed contains proposed parcel MTM 102757-6G; comprising 0.04 percent of the watershed. The lease parcel is located in Fallon County.

The Charlie-Little Muddy Creeks watershed contains proposed parcel MTM 102757-6H; comprising 0.005 percent of the watershed. The lease parcel is located in Richland County.

Any beneficial use of produced water requires water rights to be issued by Montana Department of Natural Resources and Conservation (MDNRC) as established by law. This water has been used for watering livestock, irrigation, drilling operations, and industrial applications. Most of the CBNG-produced water is pumped into temporary ponds, where the water evaporates or could potentially infiltrate the soil or shallow aquifers.

3.4.2 Groundwater

The quality and availability of groundwater varies greatly across the region. Residents in eastern Montana commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials, glacial outwash, or consolidated sedimentary rock formations and some coal beds.

Alluvial aquifers within the area generally consist of Quaternary alluvium and undifferentiated Quaternary/Tertiary sediments, which include sand and gravel deposits. Alluvial aquifers occur in terrace deposits and within the floodplains, and along the channels of larger streams, tributaries, and rivers, and are among the most productive sources of groundwater. They are typically 0-40 feet thick. The quality of groundwater from alluvial aquifers is generally good, but can be highly variable [approximately 100 mg/l to 2,800 mg/l TDS, specific conductance (SC) of 500 to 125,000 microsiemens/centimeter (uS/cm), and sodium adsorption ratio (SAR) of 5.0 to 10]. Wells completed in coarse sand and gravel alluvial aquifers can yield as much as 100 gallons per minute (gpm), although the average yield is 15 gpm. Alluvial deposits associated with abandoned river channels or detached terraces are topographically isolated and have limited saturation and yield as much as 20 gpm (Zelt et al. 1999).

Within the analysis area, the primary bedrock aquifers occur in sandstones and coal beds of the Tertiary Fort Union Formation (Cenozoic rocks). Wells within the Fort Union formation aquifers are typically 100 to 200 feet deep, but can be up to 1500 feet in depth. These wells may produce as much as 40 gpm, but yields of 15 gpm are typical. Where aquifers are confined and artesian conditions exist, wells in the Fort Union Formation will generally flow less than 10 gpm.

If a lease parcel is developed for CBNG, the natural gas must be desorbed from the coal so that it can flow to production wells. This is typically achieved by pumping groundwater from the coal bed aquifer to reduce the hydrostatic pressure within the coal, creating a pressure gradient within the aquifer which enables methane to flow towards the well. The amount of water produced varies from well to well and annually for each well. As wells operate over time, hydrostatic pressure drawdown occurs within the coal aquifer. For example, in the Canyon coal bed, the hydrostatic pressure has been lowered more than 600 feet, and in the Dietz and Canyon beds, a 20-foot groundwater drawdown extended about 1.0 to 1.5 miles beyond the boundary of the CX field. The quality of CBNG-produced water varies, but is generally characterized by elevated levels of salinity, SAR (36.8 to 66.3), and TDS (up to 2,029 mg/L) (Wheaton et al. 2008).

3.5 Vegetation Resources

The vegetation within the analysis area is characteristic of the Eastern Sedimentary Plains of Montana in the 10 to 14-inch precipitation zone and the Northern Dark Brown Glaciated Plains in the 10 to 14-inch precipitation zone, which lie within the Northern Great Plains. The Northern Great Plains is known for its diverse vegetation types, soil types, and topography. Vegetation is comprised of both tall and short grasses as well as both warm and cool season grasses. A variety of grass-like plants, forbs, shrubs and trees also add to the vegetation diversity of this rangeland type. Plant species diversity increases in woody draws and riparian/wetland zones.

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, management boundary fence lines, and soil salinity. Vegetation communities have been affected by human activities for over a century. Some of these activities include: infrastructure developments (roads, powerlines, pipelines, etc.), chemical applications, logging, livestock grazing, farming, and wildfire rehabilitation, prevention, manipulation, and suppression.

The BLM Standards of Rangeland Health (Standards) for BLM administered lands address upland health, riparian health, air quality, water quality, and habitat for native plants and animals. Meeting these Standards ensures healthy, productive, and diverse vegetative resources on public lands. The BLM's policy for implementing the Standards for Rangeland Health (43 CFR §4180.2) provides that all uses of public lands are to complement the established rangeland standards. Application of 43 CFR §4180.2 provides the mechanism to adjust livestock grazing to meet or progress towards meeting Standards for Rangeland Health. Effects of other uses such as oil and gas development or off- highway vehicle use are evaluated against the Standards to provide rationale directing management of these uses.

Three vegetation communities have been identified within the analysis area: native mixed grass prairie, sagebrush/mixed grasslands, and riparian-wetlands.

There are numerous ecological sites identified within the analysis area, but the primary ones include the following; Clayey (Cy), Shallow (Sw), Shallow Clay (SwC), Silty (Si), and Silty-Steep (SiStp). The total dry-weight production expected to be found on these sites during a normal growing season ranges from approximately 800 to 1,500 lbs. /acre.

The native mixed grassland community is dominated by perennial grasses. Perennial grasses can be both warm season and cool season grasses. These perennial grasses can also be both tall and short grasses. Some of the more common grasses include western wheatgrass (*Pascopyrum smithii)*, needle-and-thread (*Hesperostipa comata)*, green needlegrass (*Nassella viridula)*, blue grama (*Bouteloua gracilis)*, and prairie junegrass (*Koeleria macrantha)*. Various forbs and shrubs are present but, occur as a minor species composition component throughout the community.

The sagebrush/ mixed grassland community occurs on lower valley slopes near drainages, especially where soils are deeper. This community can include a combination of silver sagebrush (*Artemisia cana*) and Wyoming big sagebrush (*Artemisia tridentata ssp.*

wyomingensis). This setting is common throughout the analysis area. The sagebrush/grassland vegetation community has a perennial grass and forb understory, similar to the species found in a mixed native grassland community. The expected species composition on this community consists of 70-75% native grass species, 10-15% forbs, and 5-10% shrubs and half-shrubs.

Wetland areas are defined as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient, and which, under normal circumstances, do support, a prevalence of vegetation adapted for life in saturated soil conditions." Riparian areas are defined as "a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil" (Prichard et. al 1995).

Within the analysis area, riparian and wetland areas would be associated with lakes, reservoirs, potholes, springs, bogs, and wet meadows as well as ephemeral, intermittent, or perennial streams. Riparian and wetland areas are among the most productive and important ecosystems (Prichard et. al. 1995). Characteristically, riparian and wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Adequate, healthy riparian and wetland vegetative buffers protect associated waterbodies from accelerated erosion and sedimentation and reduce or eliminate non-point source pollution from upland areas (MDEQ 2007). Healthy riparian and wetland systems filter and purify water as it moves through the riparian-wetland zone, reduce sediment loads and enhance soil stability, provide micro-climate moderation when contrasted to temperature extremes in adjacent areas, and contribute to groundwater recharge and base flow (Eubanks, 2004).

Riparian areas are considered to be some of the most biologically diverse habitats (FSEIS 2008). Some of the more common vegetative species that occur in riparian-wetland areas include prairie cordgrass (*Spartina pectinata*), switchgrass (*Panicum virgatum*), Canada wildrye (*Elymus canadensis*), American licorice (*Glycyrrhiza lepidota*), sedges (*Carex spp.*), rushes (*Juncus spp.*), willow (*Salix spp.*), chokecherry (*Prunus virginiana*), buffaloberry (*Shepherdia argentea*), cottonwood (*Populus spp.*), needleleaf sedge (*Carex duriuscula*), sandbar willow (*Salix exigua*), Nebraska sedge (*Carex nebrascensis*), softstem bulrush (*Schoenoplectus tabernaemontani*), beaked sedge (*Carex rostrata*), yellow willow (*Salix lutea*), common three-square (*Schoenoplectus pungens*), and green ash (*Fraxinus pennsylvanica*). Weedy and invasive species common to riparian areas are knapweed (*Centaurea stoebe*), leafy spurge (*Euphorbia esula*), Russian olive (*Elaeagnus augustifolia*), saltcedar (*Tamarisk ramosissima*), kochia (*Bassia prostrata)*, thistle (*Cirsium arvense)*, sweet clover (*Melilotus officinalis*), cocklebur (*Xanthium strumarium)*, and gumweed (*Grindelia squarrosa)*.

Wetlands provide watering points for wildlife and livestock and provide habitat diversity. Species include sedges (*Carex spp.*), rushes (*Juncus spp.*), bulrush (*Schoenoplectus spp.)*, cattail (*Typha spp.)*, wild rose (*Rosa spp.)***,** and snowberry (*Symphoricarpos spp.)*. At higher

elevations they are associated primarily with springs, seeps, and intermittent streams. Precipitation-dependent wetland sites fluctuate annually, in a range from dry to wet, in direct response to seasonal moisture, temperature, and wind.

From the Montana Natural Heritage Program (MTNHP) provisional mapping GIS data and the USFWS National Wetland Inventory (NWI) GIS data, neither of the proposed lease parcels contain delineated riparian or wetland areas. However, aerial photos indicate the potential presence of freshwater emergent and/or riparian forested/shrub wetland types within lease parcel MTM 102757-6G.

Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the analysis area. Several invasive, non-native plant species are found in the analysis area including: crested wheatgrass (*Agropyron cristatum*), Japanese brome (*Bromus japonicas*), cheatgrass (*Bromus tectorum*), and foxtail barley (*Hordeum jubatum*). Crested wheatgrass occurs in areas as a result of being planted to increase forage production or to stabilize soils by reducing erosion. Cheatgrass, Japanese brome, and foxtail barley are all aggressive invasive species that out-compete desirable vegetation for water and soil nutrients.

Noxious weeds are invasive species and occur in scattered isolated populations throughout the analysis area. The most common species of noxious weeds are leafy spurge, Russian knapweed, spotted knapweed, field bindweed and Canada thistle. Noxious weed control is the responsibility of the land owner or land managing agency. Chemical and biological control methods are utilized, with chemical control being the more predominant.

3.6 Special Status Species

3.6.1 Special Status Plant Species

According to the MTNHP, there are no known threatened or endangered plant species located within the lease parcels. Fourteen plant species on the Montana Plant Species of Concern list have been identified as having suitable habitat in areas near the lease parcel (MTNHP, 2013). These species are listed in the Table 3 and have the potential to exist within the lease parcels. Twelve of these species are also identified as BLM "Sensitive" plants.

According to the MTNHP field guide, these plants are typically found in very specific habitats and do not occur predictably across the landscape. Following is a list of Montana's species of concern that may have existing populations and/or suitable habitat on or near the lease parcels by county:

Table 3. MT Species of Concern and BLM Sensitive Plants near lease parcels

Plant Name	Common Name	County	Habitat Description
Carex gravida*	Heavy Sedge	Richland	sandy sites
Dalea enneandra*	Nine-anther prairie clover	Richland, Fallon	grasslands (plains)
Solidago ptarmicoides*	Prairie Goldenrod	Richland	moist meadow
Dalea villosa*	Silky prairie clover	Richland, Fallon	sandy sites
Lobelia spicata	Pale-spiked Lobelia	Richland	moist meadow
Viburnum lentago*	Nannyberry	Richland	Riparian forests
Astragalus racemosus*	Raceme Milkvetch	Fallon	grasslands (plains)
Pysaria ludoviciana*	Silver Bladderpod	Fallon	sandy soils grasslands (plains)
Prunus pumila*	Sand Cherry	Fallon	heavy clay soils, grasslands (plains)

Penstemon angustifolius*	Narrowleaf Penstemon	Fallon	rolling grasslands (plains)
Phlox andicola*	Plains phlox	Fallon	open sites (sand to clay soils)
Cyperus schweinitzii*	Schweintz Flatsedge	Fallon	sandy sites
Chenopodium subglabrum	Smooth Goosefoot	Fallon	sandy sites
Asclepias stenophylla*	Narrowleaf Milkweed	Fallon	grasslands (plains)
*BLM Sensitive			

3.6.2 Special Status Animal Species

3.6.2.1 Aquatic Wildlife

For aquatic wildlife in the analysis area there are 3 amphibian species that are considered sensitive species (Table 4).

Table 4. Aquatic sensitive or special status wildlife species in the analysis area.

Species	USFWS Status	BLM Sensitive	In Range	Suitable Habitat Present
Pallid Sturgeon	Endangered	Special Status	No	NA
Blue Sucker	None	Sensitive	No	NA
Northern Redbelly X Finescale Dace	None	Sensitive	No	Yes
Paddlefish	None	Sensitive	No	Yes
Pearl Dace	None	Sensitive	No	Yes
Sauger	None	Sensitive	No	Yes
Iowa Darter *	None	None	No	Yes
Sicklefin Chub *	None	None	No	Yes
Sturgeon Chub	None	Sensitive	No	Yes
Snapping Turtle	None	Sensitive	No	NA
Spiny Softshell	None	Sensitive	No	NA
Northern leopard frog	None	Sensitive	Yes	Yes
Plains Spadefoot	None	Sensitive	Yes	Yes
Great Plains Toad	None	Sensitive	Yes	Yes

***Iowa Darter and Sicklefin chub are listed as species of concern by the Montana Fish, Wildlife, and Parks.**

3.6.2.2 Terrestrial Wildlife

Evaluating wildlife values at the landscape scale is key to understanding potential impacts of a project. Wildlife values, including terrestrial conservation species, species richness, game quality, and aquatic conservation connectivity, have been mapped at the landscape level for Montana by MFWP through their Crucial Areas Planning System (CAPS) 2010.

The lease parcels were reviewed in the CAPS GIS website as an overlay to potential aquatic, terrestrial, and habitat values. This course-scale landscape analysis of wildlife resources provides one tool for understanding the context of the wildlife values at a large scale. Fine-scaled tools, data, and resource information based on inventory and monitoring data, as well as local knowledge from BLM and MFWP employees, are used to further examine resource issues at the site-specific level for the specific resources contained in the lease parcels considered in this EA.

The analysis area covers habitat types consistent with the Northern Great Plains. Lease parcels are located within primarily short and mixed grass prairies and intermittent riparian hardwood draw habitats. Some of the parcels provide habitat for species considered as BLM "special status species". Special status species (SSS), collectively, are USFWS federally listed or proposed species, and the BLM sensitive species from the 2009 Montana/Dakota's sensitive species list. BLM sensitive species also include both federal candidate species and delisted species within 5 years of delisting. Table 5 presents the following: a list of species; whether the analysis area is within the current range of the species; and if so, whether suitable habitat is present within the lease parcels.

Table 5. Analysis area occurrence of BLM terrestrial sensitive species and USFWS threatened, endangered, candidate or proposed terrestrial species

Species	USFWS Status	BLM Status	In Current Range	Suitable Habitat Present
Mammals				
Gray Wolf*	None	Sensitive	No	Not applicable (N/A)
Grizzly Bear**	Threatened	Sensitive	No	N/A
Black-footed ferret	Endangered	Special Status Species (SSS)	No	No
Black-tailed prairie dog	None	Sensitive	Yes	No
Swift fox	None	Sensitive	Yes	Yes
Fisher	None	Sensitive	No	NA
Meadow Jumping Mouse	None	Sensitive	Yes	Yes
Great Basin Pocket Mouse	None	Sensitive	No	N/A
North American Wolverine	None	Sensitive	No	N/A
Pygmy rabbit	None	Sensitive	No	N/A
Long-legged Myotis	None	Sensitive	Yes	Yes
Long-eared Myotis	None	Sensitive	Yes	Yes
Fringed Myotis	None	Sensitive	No	N/A
Fringe-tailed Myotis	None	Sensitive	No	N/A
Pallid bat	None	Sensitive	No	N/A
Northern Myotis	None	Sensitive	Yes	Yes
Townsend's big-eared bat	None	Sensitive	Yes	Yes
White-tailed prairie dog	None	Sensitive	No	N/A
Birds				
Common loon	None	Sensitive	Yes	No
Franklin's gull	None	Sensitive	Yes	Yes
Interior least tern	Endangered	SSS	Yes	No
Black tern	None	Sensitive	Yes	No
White-faced ibis	None	Sensitive	Yes	No
Whooping crane	Endangered	SSS	Yes	No
Yellow rail	None	Sensitive	Yes	No
Piping plover	Threatened, with critical	SSS	Yes	No

Species	USFWS Status	BLM Status	In Current Range	Suitable Habitat Present
	habitat			
Mountain plover	None	Sensitive	Yes	No
Marbled godwit	Bird of Conservation Concern (BCC)	Sensitive	Yes	No
Long-billed curlew	BCC	Sensitive	Yes	Yes
Black-crowned night heron	None	Sensitive	Yes	No
Bobolink	None	Sensitive	Yes	Yes
Greater sage-grouse	Candidate	Sensitive	Yes	No
Burrowing owl	BCC	Sensitive	Yes	No
Great gray owl	None	Sensitive	No	NA
Three-toed woodpecker	None	Sensitive	No	NA
Trumpeter swan	None	Sensitive	yes	No
Flammulated owl	None	Sensitive	No	NA
Bald eagle***	BCC	Sensitive	Yes	Yes
Golden eagle	None	Sensitive	Yes	Yes
Ferruginous hawk	None	Sensitive	Yes	Yes
Swainson's hawk	None	Sensitive	Yes	Yes
Peregrine falcon	None	Sensitive	Yes	No
Northern goshawk	None	Sensitive	Yes	No
Sage thrasher	BCC	Sensitive	Yes	No
Sprague's pipit	Candidate	Sensitive	Yes	Yes
Sedge wren	None	Sensitive	Yes	No
Loggerhead shrike	BCC	Sensitive	Yes	Yes
Chestnut-collared longspur	BCC	Sensitive	Yes	Yes
McCown's longspur	BCC	Sensitive	Yes	Yes
Baird's sparrow	BCC	Sensitive	Yes	Yes
Brewer's sparrow	BCC	Sensitive	Yes	No
LeConte's sparrow	None	Sensitive	Yes	Yes
Nelson's Sharp-tailed sparrow	None	Sensitive	Yes	Yes
Horned grebe	BCC	None	Yes	No
American bittern	BCC	None	Yes	No
Prairie falcon	BCC	None	Yes	Yes
Upland sandpiper	BCC	None	Yes	Yes
Yellow-billed Cuckoo	BCC	Sensitive	Yes	No
Short-eared owl	BCC	None	Yes	Yes
Lewis's woodpecker	BCC	None	No	NA
Red-headed woodpecker	BCC	Sensitive	Yes	Yes
Black-backed woodpecker	None	Sensitive	No	NA
Sage sparrow	BCC	Sensitive	No	NA
Grasshopper sparrow	BCC	None	Yes	Yes
Dickcissel	BCC	Sensitive	Yes	Yes
Blue-gray natcatcher	None	Sensitive	No	N/A
Harlequin duck	None	Sensitive	No	N/A
Amphibians				
Great Plains toad	None	Sensitive	Yes	Yes
Northern leopard frog	None	Sensitive	Yes	Yes

Species	USFWS Status	BLM Status	In Current Range	Suitable Habitat Present
Plains spadefoot toad	None	Sensitive	Yes	Yes
Boreal/Western Toad	None	Sensitive	No	N/A
Coeur d'Alene salamander	None	Sensitive	No	N/A
Reptiles				
Snapping turtle	None	Sensitive	Yes	No
Spiny softshell	None	Sensitive	Yes	No
Greater short-horned lizard	None	Sensitive	Yes	Yes
Milk snake	None	Sensitive	Yes	Yes
Western hog-nosed snake	None	Sensitive	Yes	Yes

Table 5 sources: Montana Bird Distibution Committee 2012; Werner, Maxell, Hendricks, and Flath. 2004; Foresman 2001; MTNHP, 2010; BLM, 2009; USDA – NRCS Plants Database, 2010
*Gray wolf has been delisted so has been moved to the sensitive list
**Grizzly bear has been delisted for the Greater Yellowstone ecosystem. In that area it is a Bureau sensitive species.
***Bald eagle has been delisted so has been moved to the sensitive list.

3.6.2.3 Threatened, Endangered, Candidate, and Proposed Species

No threatened or endangered species would be expected to occupy habitat within the analysis area. However, one species, the Sprague's pipit, was recently classified as USFWS candidate species and may occupy habitat within the analysis area. Candidate species are those that warrant protection under the Endangered Species Act, but listing the candidate species is precluded by the need to address other listing actions of a higher priority. The USFWS will review the need for listing these species annually and will propose the species for protection when funding and workload for other listing actions allow.

Sprague's pipits were found warranted, but precluded as a threatened or endangered species on September 15, 2010. Sprague's pipits are strongly tied to native prairie (land which has never been plowed) throughout their life cycle (Owens and Myres 1973, pp. 705, 708; Davis 2004, pp. 1138-1139; Dechant et al. 1998, pp. 1-2; Dieni et al. 2003, p. 31; McMaster et al. 2005, p. 219). They are rarely observed in cropland (Koper et al. 2009, p. 1987; Owens and Myres 1973, pp. 697, 707; Igl et al. 2008, pp. 280, 284) or land in the Conservation Reserve Program (a program whereby marginal farmland is planted primarily with grasses) (Higgins et al. 2002, pp. 46-47). Sprague's pipits will use nonnative planted grassland (Higgins et al. 2002, pp. 46-47; Dechant et al. 1998, p. 3; Dohms 2009, pp. 77-78, 88). Vegetation structure may be a better predictor of occurrence than vegetation composition (Davis 2004, pp. 1135, 1137). (Federal Register: September 15, 2010 (Volume 75, Number 178)) Montana Natural Heritage Tracker has documented observations of Sprague's pipits in Daniels, Sheridan, Roosevelt, McCone, Richland, Dawson, Prairie, Custer, and Fallon Counties within the Miles City Field Office. As stated, both lease parcels have been identified as providing potential suitable habitat for Sprague's pipits based on a Sprague's pipit suitable habitat model utilized by the Montana Department of Fish, Wildlife, and Parks (http://apps.fwp.mt.gov/gis/maps/caps/). Ground-truthing of the parcels has not occurred to document actual habitat use by Sprague pipits.

3.6.2.4 Other Sensitive Species

As noted in Table 5 above, up to 32 wildlife species considered as BLM "sensitive" have the potential to occur within the analysis area. These include 20 birds, 6 mammals, 3 amphibians, and 3 reptiles. This list is a combination of recent and historic observations. In some instances, historic observations are the only known record. If a species is noted as in range, it signifies that habitat within the field office would be considered within the documented range of occupation of habitat by a particular species during some phase of its life cycle. This might be only for a short time frame, during migrations, seasonally, or possibly year-round. The table documents the potential for wildlife species occurrence if at least one lease parcel is located within a particular sensitive species' known range of habitat occupation based on available science and research.

Various bird surveys throughout different years have been conducted across the MCFO, which in some cases would have included similar habitats to the lease parcels. Surveys have been conducted by the United States Geological Survey, University of Montana Avian Science Center, Rocky Mountain Bird Observatory, MTNHP, and other interested "birders." Migratory bird species diversity varies across the MCFO area. According to P.D. Skaar's Montana Bird Distribution, 6th edition (Lenard et al., 2003) species diversity ranges from less than 40 species per "latilong" (~3,200 square miles) to more than 200 across the analysis area.

The analysis area provides potential nesting, foraging, and migratory habitat for various species of raptors; however, recent surveys for raptor nests have not occurred within these areas. Several species that would be expected within the analysis area include great-horned owls, red-tailed hawks, American kestrels, prairie falcons, ferruginous hawks, northern harriers, golden eagles, and Swainson's hawks. Peregrine falcons are also known to migrate through eastern Montana.

3.7 Fish and Wildlife

3.7.1 Aquatic Wildlife

The aquatic resources in the analysis area are limited, but would include some potential habitat for amphibians such as Great Plains and Woodhouse's toads, and frogs such as the northern leopard frog. Reptiles may include several species of snakes such as prairie rattlesnake, gopher snake, and racers and gartersnakes; turtles such as painted turtles, and lizards such as the greater short-horned lizard. Riparian habitats in the lease parcels consist of ephemeral drainages. No fish species would be expected to occur within these areas.

3.7.2 General Wildlife

Habitat within the lease parcels provide for a diversity of wildlife species. Current and historic land uses in or adjacent to these areas include grazing, farming, hunting, energy development, and others. Wildlife species and habitat surveys have been conducted across the field office at various times and for various species. Many areas including those in the vicinity of the lease parcels have not been comprehensively surveyed for all wildlife resources; however, past surveys in similar habitat types provides insight into what species can be expected to occur in the analysis area.

Mule deer are the most abundant big game species and use the greatest variety of habitats, generally preferring sagebrush, grassland, and conifer types (BLM 1984). Habitat diversity appears to be a good indicator of intensity of deer use. In mule deer habitats, diversity of vegetation usually followed topographic diversity; thus, rugged topography may be the ultimate factor influencing mule deer use of an area (Mackie et. al. 1998). Habitat such as riparian bottoms, agricultural areas, and forests are used as well, both yearlong or seasonally. Habitat to support mule deer exists within both of the lease parcels. Winter range habitat for mule deer has not been delineated within either of the parcels.

White-tailed deer may also utilize habitat within the parcels. White-tailed deer prefer riparian drainage bottoms, hardwood draws, and conifer areas, but they will also use a variety of other habitats including farmlands. Winter range habitat for white-tailed deer has not been delineated within either of the parcels.

Pronghorn antelope are generally associated with grasslands and shrublands, but they also seasonally use agricultural fields. Winter ranges for pronghorn antelope generally occur within sagebrush grasslands with at least greater densities of big sagebrush than the surrounding areas. The lease parcels do not contain habitat types conducive to providing pronghorn winter range.

The potential exists for other big game species to occupy these areas. Species include elk, moose, mountain lion, and black bear although presence would likely occur as individual's transition to preferred habitats elsewhere.

The potential for big game movements or migrations through eastern Montana are not fully understood. At a local level, it is reasonable to assume big game movements occur at least seasonally. Migration corridors have not been identified through any of the lease parcels.

Sharp-tailed grouse are a native prairie grouse species that would be expected to utilize habitat within the parcels. Sharp-tailed grouse generally prefer hardwood draws, riparian areas, and prairie grasslands intermixed with shrubs such as chokecherry and buffaloberry. Lease parcel 6H is located approximately 1.3 miles northeast of an active sharp-tailed grouse lek.
Wild turkeys, pheasants, and Hungarian partridge are all species that have been introduced to eastern Montana and may also utilize available habitats within some of the parcels.

3.8 Cultural Resources

BLM is responsible for identifying, protecting, managing, and enhancing cultural resources located on public lands or those that may be affected by BLM management actions on non-federal lands. Cultural resources include archaeological, historic, architectural properties, and traditional lifeway values important to Native Americans. Sites can vary with regard to their intrinsic value as well as their significance to scientific study; therefore, management practices employed are commensurate with their designation. Significant cultural resources values include; their use to gather scientific information on human culture, history, interpretive and educational value, values associated with important people and events of significance in history, and often aesthetic value, as in a prehistoric rock art panel or a historic landscape.

A generalized prehistory of eastern Montana can be categorized in a chronological framework, and time periods are distinguished on the basis of differences in material culture traits or artifacts and subsistence patterns: the PaleoIndian period (ca. 12,500 BP-7800 BP), Archaic period (ca. 7800 BP-1500 BP), Prehistoric period (ca. 1500 BP-200 BP), Protohistoric period (ca. 250 BP-100 BP), and Historic Periods (A.D. 1805-A.D. 1960) (Aaberg et al 2006).

Cultural properties are evaluated with reference to the National Register of Historic Places criteria for the purposes of assessing their historical values and public significance; such evaluations are carefully considered when cultural properties are allocated to use categories, although preservation and nomination of these properties must be weighted on a case-by-case basis.

A recent Class I overview of cultural resources was prepared for the analysis area (Aaberg et al 2006). The cultural environment of the MCFO as of May 2005 contained 7,065 prehistoric and 2,869 historic archeological sites as well as 1,929 paleontological localities. Archeological properties (historic and prehistoric sites) occur in all counties encompassed by the field office. The two counties with nominated lease parcels contain % percent of all prehistoric and 3% of all historic resources within the MCFO. Each county contains the following percentages of resource site types within its boundaries: Richland 2% prehistoric, 6.1% historic, Fallon County 4.7% prehistoric 3.7% historic. Percentages of both resource types have increased since 2005 reflecting increased energy exploration and development in both counties.

The overall archeological site density of the MCFO (historic and prehistoric) is estimated at one site per 93 acres (Aaberg et al 2006). Prehistoric sites are estimated to be distributed at one site per 130.8 acres (4.9 per square mile) and historic sites at one site per 322 acres (two per square mile) for all surveyed acres within the MCFO. Approximately 10% to 15% of all sites are found to be eligible for the National Register of Historic Places.

A review of the Montana State Historical Preservation Office (SHPO) Cultural Resource Information System (CRIS) and Cultural Resource Annotated Bibliography System (CRABS), as well as BLM Cultural Resource databases and GIS data indicated there are no previously recorded cultural sites or projects for Parcel MTM 102757-6H. The CRIS Database lists one cultural site in Parcel MTM 102757-6G. The CRABS Database lists no previous projects for Lease Parcel MTM 102757-6G. BLM Cultural Resource records show two inventories within or partially within Parcel MTM 102757-6G.

The first inventory was for a proposed land exchange. The inventory was conducted in 1984 and covered the entire parcel. One historic homestead site was recorded within the parcel. The exchange was cancelled and no report was written. The second inventory was for a 3-D seismic project in 2010. The seismic project covered source lines crossing the parcel. The one previously recorded site was relocated and avoided by the project. No new sites or isolates were recorded in the parcel by the seismic project (Hopkins and Kail 2010).

3.9 Paleontology

According to Section 6301 of the Paleontological Resource Protection Act of 2009 Omnibus Public Lands Bill, Subtitle D, SEC. 6301, paleontological resources are defined as “any

fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth" (Paleontological Resource Protection Act of 2009 Omnibus Lands Bill, Subtitle D, SEC. 6301-3612 (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 431-433). All vertebrate fossils, be they fossilized remains, traces, or imprints of vertebrate organisms, are considered significant. Paleontological resources do not include archaeological and cultural (typically human graves) resources.

The BLM utilizes the Potential Fossil Yield Classification (PFYC) as a planning tool for identifying areas with high potential to yield significant fossils. The system consists of numbers ranging from 1-5 (low to high) assigned to geological units, with 1 being low potential and 5 being high potential to have significant fossil resources. It should be pointed out that the potential to yield significant fossil resources is never 0. Rock units not typically fossiliferous can in fact contain fossils in unique circumstances.

BLM classified geologic formations that have a high Potential Fossil Yield Classification (PFYC) of 3 or higher should be specifically reviewed for paleontological resources prior to surface disturbing activities, and rankings of 4 and 5 may require on-site monitoring during surface disturbing activities. The MCFO has the following classifications on the relevant geologic units:

Ft Union	Class 4
Hell Creek	Class 5

All or part of lease parcels MTM 102757-6G and 6H include geologic units rated as PFYC 3-5.

3.10 Visual Resources

BLM Visual Resource classifications are only applied to BLM surface, as such, the affected environment for visual resources only consists of approximately 160.00 acres of BLM - administered surface in the analysis area (Table 6).

A Class IV VRM area classification means that the characteristic landscape can provide for major modification of the landscape. The level of change in the basic landscape elements can be high. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Table 6: VRM Classes for the analysis area by lease parcel

Leasing Areas	VRM Class IV Acres
FALLON COUNTY	
MTM 102757-6G	***120 total acres***
RICHLAND COUNTY	
MTM 102757-6H	***40 total acres***

3.11 Livestock Grazing

Parcel MTM 102757-6G is within the Ralston Allotment and parcel MTM 102757-6H is within the Melcher Allotment. Both are authorized for cattle with no restriction on the number of livestock or season of use; however, grazing within both allotments is not to exceed the capacity

of the public land addressed in the permit. Both allotments contain range improvement projects that include fences and reservoirs but none of the projects occur on the lease parcels.

3.12 Recreation and Travel Management

BLM only manages recreational opportunities and experiences on BLM-administered surface. The affected environment consists of approximately 160.00 acres of BLM-administered surface. Recreational activities enjoyed by the public on BLM lands within the analysis area include hunting, hiking, camping, fishing, photography, picnicking, and winter activities such as snowmobiling. Benefits and experiences enjoyed by recreational users include opportunities for solitude, spending time with families, enhancing leisure time, improving sports skills, enjoying nature and enjoying physical exercise.

The 160.00 BLM-administered acres proposed for lease consist of small and scattered tracts with limited legal public access (i.e., no public easements or rights-of-way across private property). The lack of public access limits use of the BLM parcels for recreational use by the general public. The types of limited public use on these lease parcels can be characterized as casual dispersed recreational activities including hiking, hunting (including outfitters), camping, and wildlife viewing.

3.13 Lands and Realty

The analysis area consists of two parcels that include 160.00 surveyed federal Bureau of Land Management (BLM) administered surface acres of which 120.00 acres are acquired Land Utilization Lands (LU) and 40.00 acres are Public Domain (PD). Table 7 below categorizes the two parcels by surface ownership and county.

There are no authorized BLM Rights-of Way (ROWs) or other Realty authorized Land Use Authorizations on the two lease parcels.

Table 7. Number of parcels, surface ownership, and acres by county.

County	Parcels	Ownership	Acres
FALLON			
	1 parcel (MTM-102757-6G)	BLM (LU)	120.00
	1 TOTAL		**120.00**
RICHLAND			
	1 parcel (MTM-102757-6H)	BLM (PD)	40.00
	1 TOTAL		**40.00**
TOTAL			**160.00**

3.14 Minerals

3.14.1 Fluid Minerals

It is the policy of the BLM to make mineral resources available for development and to encourage development of these resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable prices. At the same time, the BLM strives to assure that mineral development occurs in a manner which minimizes environmental damage and provides for the reclamation of the lands affected.

Currently there are 1,410 federal oil and gas leases covering approximately 1,076,113 acres in the MCFO. The number of acres leased and the number of leases can vary on daily basis as leases are relinquished, expired, or are terminated. Existing production activity occurs on approximately 25.6 {275,426 acres} percent of this lease acreage. Information on numbers and status of wells on these leases and well status and numbers of private and state wells within the external boundary of the field office is displayed in Table 8. Numbers of townships, leases acres within those townships, and development activity for all jurisdictions are summarized in Table 9.

Exploration and development activities would only occur after a lease is issued and the appropriate permit is approved. Exploration and development proposals would require completion of a separate environmental document to analyze specific proposals and site-specific resource concerns before BLM approved the appropriate permit.

Table 8. Existing Development Activity

	FEDERAL WELLS	PRIVATE AND STATE WELLS
Drilling Well(s)	23	163
Producing Gas Well(s)(including CBNG)	494	1374
Producing Oil Well(s)	333	1966
Water Injection Well(s)	74	130
Shut-in Well(s)	58	439
Temporarily Abandoned Well(s)	123	426

Table 9. Oil and Gas Leasing and Existing Development within Townships Containing Parcels

	Fallon County	Richland County
Number of Townships Containing Lease Parcels	1	1
Total Acres Within Applicable Township(s)	23,125	23,034
Acres of Federal Oil and Gas Minerals	3,245	4,977
Percent of Township(s)	14.0%	21.6 %
Acres of Leased Federal Oil and Gas Minerals	2,004	4,977
Percent of Township(s)	8.7%	21.6%
Acres of Leased Federal Oil and Gas Minerals Suspended	Zero	Zero
Percent of Township(s)	0.0%	0.0%
Federal Wells	No drilling, producing, SI, or TA wells	One drilling well and two producing wells

	Fallon County	Richland County
Private and State Wells	No Drilling, producing, shut in, or TA wells.	Nine producing wells, no drilling, SI or TA wells

3.15 Social and Economic Conditions

3.15.1 Social and Environmental Justice

The BLM is tasked with maintaining the health, diversity, and productivity of more than 6 million surface acres of public land and another 24.1 million of subsurface mineral estates in Montana. The relationship between these BLM-administered lands and nearby communities is often defined by local characteristics which may include the demographic make-up of local populations, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant land and water features, and amenities unique to the area. These characteristics define the types and level of social and economic activity which occurs in communities surrounding lands administered by the BLM.

Currently the Miles City Field Office (MCFO) manages more than 2.7 million surface acres and over 12.4 million acres of subsurface mineral estates in 16 eastern counties. The MCFO manages the resources of these lands for a wide range of uses, including energy development. As of March 2013 the field office leased 921,257 acres with an additional 160 acres of land in Fallon and Richland counties nominated for leasing during the upcoming lease sale. This document will analyze the potential impacts resulting from additional minerals leasing resulting from the October lease sale. Although the distribution of effects stemming from additional minerals leasing are likely to vary across the impact area, the distribution of economic effects stemming from the sale of additional leases will be based on the number of acres leased, levels of production, and the business patterns of these counties.

The social section focuses on the areas in the immediate vicinity of parcels proposed for leasing. This area includes two counties in eastern Montana (Fallon and Richland counties) which contain parcels nominated for leasing during the MCFO's upcoming lease sale. In 2010, these two counties reported to have a population of 12,636 people, with more than 70% of the region's population living within Richland County (9,746). Census data indicated that populations in this region have slowly been declining. Between 2000 and 2011 Fallon's population declined by 2 percent while Richland experienced a one percent decline in their population (U.S. Census, 2010).

Montana can be characterized as a rural state and was reported to have a population density of fewer than 7 people per square mile in 2010. Compared to the state, Fallon and Richland counties are even more rural with fewer than 2 and 5 people per square mile respectively. The county seats for these counties include Baker in Fallon County (1,741) and Sidney in Richland County (4,843) (U.S. Census, 2010).

Oil and gas leasing and production is already occurring on public and private lands in both of these counties. Approximately 75 percent of the acres nominated for leasing are acquired lands in Richland County, while the other parcel is 40 acres of public domain minerals in Fallon County. Interest in oil and gas development in this region has significantly increased over the last five years because of its proximity to the Bakken formation which extends from the Williston

Basin in western North Dakota to northeastern Montana. Richland, MT, which is adjacent to the Williston Basin, has had the highest oil and gas production on federal lands of any of county in eastern Montana. Most of the oil and gas industry support services for eastern Montana occur in Glendive, Sidney, and Miles City, Montana, and Williston and Dickinson, North Dakota.

Racial diversity in this region remains low relative to most of the United States. In 2011, 74 percent of the country's population identified themselves as White alone while individuals identifying themselves as White accounted for 90 percent of Montana's population. Fallon and Richland, the two counties with parcels nominated for leasing, tend to be even less racially diverse with Whites accounting for 97 and 96 percent of their respective populations. The remaining shares of county populations included individuals identifying themselves as Asian (1% in Fallon County), American Indian (2% in Richland County), and Two or more races (2% in Fallon and Richland) (Census Bureau 2012). While Richland County's population includes small concentrations of other racial groups, these individual racial groups accounted for less than 0.5 percent of the county's population. While the percent of Montana residents (14.6%) living below the poverty line in 2011 was comparable to the nation poverty rate (14.3%), the poverty rate of the two-county region in eastern Montana (11.7%) was well below that of the state and national. Within these counties Fallon reported 8.7 percent of individuals and 5.6 percent of families lived below the poverty level, while Richland reported 12.6 percent of individuals and 8.9 percent of families lived in poverty (U.S. Department of Commerce, 2012).

~~The social section focuses on the areas in the immediate vicinity of the parcels proposed for leasing. This area includes seven counties in eastern Montana: Daniels, Garfield. McCone, Prairie, Richland, Roosevelt, and Rosebud 80% of acres examined for leasing located in Prairie County. In 2010 this seven county region was reported to have a population of 35,274 people, with more than 80% of the region's population living within Richland (10,425), Roosevelt (9,746), and Rosebud (9,233) Counties. Smaller Populations were reported in Daniels (1,751), Garfield (1,206), McCone (1,734), and Prairie (1,179) Counties (U.S. Census, 2010). Census data indicated that populations within this region declined between 2000 and 2010. Although all seven counties reported population losses during this time period, losses in Daniels (13.2%), Garfield (5.7%) and McCone (12.3%) counties were substantially greater than those in Prairie (1.7%), Richland (0.8%), Roosevelt (1.8%), and Rosebud (1.6%) (US Department of Commerce, 2012). While Montana is often characterized as a rural state with a population density of 6.8 persons per square mile, all of the seven counties with land proposed for oil and gas leasing were reported to have fewer than 6.8 persons per square mile in 2010. Of these seven counties, only Daniels (1.2), Richland (4.7), Roosevelt (4.4), and Rosebud (1.8) had population densities greater than 1. The county seats for these counties include Scobey in Daniels County (1,107), Jordan in Garfield County (352), Circle in McCone County (526), Terry in Prairie County (605), Sidney in Richland County (4,843), Wolf Point in Roosevelt County (2,621), and Forsyth in Rosebud County (1,777) (U.S. Census, 2010).~~

~~Currently oil and gas leasing and production are taking place on public and private lands within these seven counties. Approximately half of the acres being considered for this lease sale are under BLM ownership, with an addition 2,876 acres under split ownership between BLM and private estates. Interest in oil and gas development in this region has significantly increased over the last five years because of its proximity to the Bakken formation which extends from the~~

~~Williston Basin in western North Dakota to northeastern Montana. Richland, MT, which is adjacent to the Williston Basin, has had the highest oil and gas production on federal lands of any of county in eastern Montana. Most of the oil and gas industry support services for eastern Montana occur in Glendive, Sidney, and Miles City, Montana, and Williston and Dickinson, North Dakota.~~

~~According to the 2010 Census populations in the seven counties with land proposed for oil and gas leasing were made up of individuals who identified with one of three racial groups: White alone, American Indian alone, or of Two or more races. While 70% of the total population in this seven-county region identified themselves as White alone, individuals identifying themselves at White accounted for more than 95% of the total population in five of the seven counties (Daniels, Garfield, McCone, Prairie, and Richland) (U.S. Department of Commerce, 2012). Populations in Roosevelt and Rosebud counties were more diverse in 2010 with large American Indian populations from the Cheyenne and Sioux tribes. Roosevelt and Rosebud counties 2010 populations were made up of 37% and 61% White alone, 49% and 33% American Indian alone, and 13% and 3% two or more races (U.S. Department of Commerce, 2012). While the percent of Montana residents (14.5%) living below the poverty line in 2010 was comparable to the nation poverty rate (13.8%), the poverty rate of the seven-county region in eastern Montana (17%) was above state and national levels. The relatively high regional poverty rate was driven by poverty levels in Prairie (16.9%), Roosevelt (21.5%), and Rosebud (18.5%) counties; while poverty in Daniels (14.1%), Garfield (10.7%), McCone (8.6), and Richland (13.5%) counties remained relatively low in 2010 (U.S. Department of Commerce, 2012).~~

The social environment of these counties is described in detail in the Socioeconomic Baseline Report for the Miles City Field Office RMP and EIS (prepared for the DOI, BLM, MCFO, June, 2005).

3.15.2 Economics

Though the field office has only received nominations for two parcels (one in Fallon County and another in Richland County) for the October 2013 Lease Sale, business patterns between these parcels and local communities extend well beyond parcel boundaries. In order to accurately portray the relationship between BLM management and the local economy, and examine the economic effects of leasing two additional parcels for fluid minerals exploration and development, the geographic scope of the analysis has been expanded to encompass a five county impact area which includes: Dawson, Fallon, Richland, Wibaux and Williams, North Dakota. Though Williams is in a neighboring state, it lies just east of Richland, MT and contains Williston, ND which is the epicenter of the oil and gas boom taking place along the Bakken formation of Eastern Montana and Western North Dakota.

The 5-county local economy had an estimated 2010 population of about 42,592 people. Total employment was estimated to be 36,710 jobs; there were an estimated 18,255 households; there were 175 industrial sectors represented in the local economy; average income per household was $123,401; and total personal income was an estimated $2.25billion (IMPLAN, 2010). Williston, ND (population about 14,700 in 2010) is the largest population and business center in the area (U.S. Census Bureau, 2010). There were 0.86 people per job within the local economy and 2.01 households per job (IMPLAN, 2010).

Fallon and Richland counties continue to be Montana's top two oil and gas producing counties. Production in these counties accounted for 21.6 and 35.4 percent, respectively, of statewide production in 2010 (IPAA, 2012). Over the 5-year period between 2007 and 2011, Fallon averaged 58 new wells while Richland averaged 55 new wells a year. Of the 113 wells completed on annual average, less than 1 percent are dry wells and the remaining 99 percent is equally split between oil and gas wells (MT DNRM, Oil and Gas Conservation Commission, 2012). Statewide average wellhead prices in 2010 were $70.24 per bbl. for crude oil and $3.64 per MCF for natural gas (IPAA, 2012). The estimated average cost of drilling and equipping a well in the Bakken formation was $8,908,325 for oil, $33,953 for gas, and $201,912 for dry holes in 2010 (IPAA, 2012).

Local economic effects of leasing federal minerals for oil and gas exploration, development, and production are influenced by the number of acres leased and estimated levels of production. The acres leased, number of wells drilled, and level of production all influence local employment, income, and public revenues (indicators of economic impacts).

As of March 11, 2013, there were 151,520.4 acres of BLM federal minerals leased for oil and gas development. Of the acres leased in Fallon and Richland, roughly 71,057 acres were held by production Annual lease rental is paid on the 80,445.6 acres which are not held by production. Total annual lease bonus and rental revenue to the federal government from leasing federal minerals in these counties averages an estimated $140,780. Lease rents are not paid on acres that are held by production. Instead, royalties are paid on oil and gas production from these leases.

Federal oil and gas leases generate a one-time lease bonus bid as well as annual rents. The minimum competitive lease bid is $2.00 per acre. If parcels do not receive the minimum bid they may be leased later as noncompetitive leases that don't generate bonus bids. Within the two counties with lease parcels, the weighted average bonus bid was $20.66 per acre on federal leases issued in fiscal year 2012.

Lease rental is $1.50 per acre per year for the first five years and $2.00 per acre per year thereafter. Typically, oil and gas leases expire after 10 years unless held by production. During the lease period annual lease rents continue until one or more wells are drilled that result in production and associated royalties. Within the two counties with lease parcels, 71,057 acres of federal minerals are held by production.

Approximately 95 percent of minerals leased within the MCFO are public domain minerals while the remaining 5 percent are minerals which have been acquired from private individuals. Forty-nine percent of federal leasing revenue from public domain minerals is distributed directly back to the state of Montana where the state then distributes 25 percent of this revenue back to the counties where the leases exist. With federally acquired minerals (acquired under Bankhead Jones authority), 25 percent of federal revenues are distributed directly to the appropriate counties. The federal government collected an estimated $140,780 in federal lease bonus bids and rent from leasing in the two counties with nominated parcels in 2012. Of the federal

revenue, an estimated $65,533 was redistributed back to the state and $18,143 was returned to Fallon and Richland counties.

There is considerable variation in the level and type of oil and gas activity taking place in the two counties with parcels proposed for leasing. In general, activity in Fallon County has a greater focus on natural gas resources while exploration and development in Richland focuses almost entirely on extracting crude oil (all natural gas extracted in 2012 was a byproduct of oil extraction). In 2012 Fallon County produced approximately 4.6 million barrels of oil and 12.7 million MCF of natural gas while Richland County produced nearly 12.4 million barrels of oil and14.4 MCF of natural gas (Montana Board of Oil & Gas Conservation 2013). Since federal minerals are not evenly distributed across counties, oil production will vary within and across the region of interest.

Federal oil and gas production in Montana is subject to production taxes or 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). Forty-nine percent of these royalties from public domain minerals are distributed to the state, of which 25 percent is distributed back to the county of production (Title 17-3-240, MCA). If production comes from acquired federal minerals under the Bankhead Jones authority, 25 percent of the federal revenues are distributed directly to the counties of production.

Local economic contributions of leasing, exploring, and developing federal minerals:
The economic contribution to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) local royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in other sectors. Extraction of oil and natural gas (NAICS sector 20), drilling oil and gas wells (NAICS sector 28), and support activities for oil and gas operations (NAICS sector 29) supported an estimated 6,225 total jobs and $536.5 million in total employee compensation and proprietor income in the 5-county local economy (IMPLAN, 2010).

Currently 151,502 acres of federal minerals are leased within Fallon and Richland counties. Total federal revenues from federal oil and gas leasing, rents, and royalty payments in Fallon and Richland counties were estimated to generate $123 million in federal revenue during 2012, $57 million of this federal revenue was redistributed back to the state of Montana and $15 million was estimated to have be returned to Fallon and Richland counties. These revenues help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and/or keeping records. Other county functions that may be funded include administering primary and secondary education and operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

The estimated annual local economic contribution associated with BLM-managed federal leases, rents, drilling, production, and royalty payments combined to support a total of 355 local jobs

(full and part-time) and about $16.69 million in local labor income, respectively within the five county local economy. This amounts to about 0.97 percent of the local employment and 0.92 percent of local labor and proprietor's income. Table 10 shows the current contributions of leasing federal oil and gas minerals and the associated exploration, development, and production of federal oil and gas minerals to the seven counties that make up the local economy.

Table 10. Current Contributions of Federal Oil and Gas Leasing, Exploration, Development, and Production to the 5-County Local Economy

	Employment (jobs)		Labor Income (Thousands of 2010 dollars)	
Industry	Area Totals	BLM-Related	Area Totals	BLM-Related
Agriculture	3,154	0	$51,637	$3
Mining	6,407	57	$555,175	$5,201
Utilities	250	1	$25,676	$75
Construction	2,242	3	$122,554	$159
Manufacturing	719	0	$33,204	$7
Wholesale Trade	1,868	5	$139,529	$389
Transportation & Warehousing	1,992	3	$168,578	$211
Retail Trade	3,215	14	$92,293	$364
Information	352	2	$15,941	$100
Finance & Insurance	1,387	6	$53,143	$234
Real Estate & Rental & Leasing	1,169	4	$54,458	$107
Prof, Scientific, & Tech Services	991	6	$67,071	$395
Mngt of Companies	41	0	$2,664	$10
Admin, Waste Mngt & Rem Serv	1,033	6	$21,801	$138
Educational Services	218	1	$6,004	$29
Health Care & Social Assistance	3,405	17	$132,174	$650
Arts, Entertainment, and Rec	509	2	$8,726	$35
Accommodation & Food Services	2,025	13	$31,620	$195
Other Services	1,743	7	$53,131	$213
Government	3,989	206	$181,900	$8,182
Total	36,710	355	1,817,278	16,696
BLM as Percent of Total	---	0.97%	---	0.92%

IMPLAN, 2010 database

4.0 ENVIRONMENTAL IMPACTS

4.1 Assumptions and Reasonably Foreseeable Development Scenario Summary

At this stage of the leasing process, the act of leasing parcels would not result in any activity that might affect various resources. Even if lease parcels are leased, it remains unknown whether development would actually occur, and if so, where specific wells would be drilled and where facilities would be placed. This would not be determined until the BLM receives an APD in which detailed information about proposed wells and facilities would be provided for particular leases. Therefore, this EA discusses potential effects that could occur in the event of development.

Upon receipt of an APD, the BLM would initiate a more site-specific NEPA analysis to more fully analyze and disclose site-specific effects of specifically identified activities. In all potential exploration and development scenarios, the BLM would require the use of BMPs documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (USDI and USDA 2007), also known as the "Gold Book." The BLM could also identify APD COAs, based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

For split-estate leases, the BLM would notify the private landowners that oil and gas exploration or development activities are proposed on their lands and they are encouraged to attend the onsite inspection to discuss the proposed activities. In the event of activity on such split estate leases, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

Environmental consequences are discussed below by alternative to the extent possible at this time for the resources described in Chapter 3. As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts are identified by resource below.

4.1.1 Reasonably Foreseeable Development Scenario Summary

The RFD for this EA (Appendix C) is based on information contained in the RFD developed in 2005 and revised in 2012 for the MCFO RMP. The RFD prepared for the MCFO RMP contains the number of possible oil and gas wells that could be drilled and produced in the MCFO area and used to analyze the possible number of well drilled for the 2 nominated lease parcels. These well numbers are only an estimate based on historical drilling and geologic data. A detailed description of the RFD forecast for this EA is found in Appendix C.

4.1.2 Alternative B Assumptions

The following assumptions are from the RFD developed for the MCFO RMP. The RFD forecasts the following level of development in the MCFO area.

No surface disturbance would occur as a result of issuing leases. For analysis purposes, the potential number of acres disturbed by exploration and development activities is shown in Tables D-1 in Appendix D. The potential acres of disturbance reflect acres typically disturbed by construction, drilling, and production activities, including infrastructure installation throughout the MCFO. Typical exploration and development activities and associated acres of disturbance were used as assumptions for analysis purposes in this EA. (Note: The assumptions were not applied to Alternative A because the lease parcels would not be offered for lease; therefore, no wells would be drilled or produced on the lease parcel, and no surface disturbance would occur on those lands from exploration and development activities).

4.2 Alternative A (No Action Alternative)

4.2.1 Direct Effects Common to All Resources, not including Economics

Under Alternative A, the 2 parcels, 160.00 surveyed federal mineral acres administered by the BLM would not be offered for competitive oil and gas lease sale. Under this alternative, the state and private minerals could still be leased in surrounding areas. Surface management would remain the same and ongoing oil and gas development would continue on surrounding federal, private, and state leases.

There would not be new impacts from oil and gas exploration or production activities on the federal lease parcel lands. No additional natural gas or crude oil would enter the public markets, and no royalties would accrue to the federal or state treasuries from the parcel lands. The No Action Alternative would result in the continuation of the current land and resource uses on the lease parcels.

Except for Economic resources, described below, no further analysis of the No Action Alternative is presented for resources on parcel lands.

4.2.2 Economics

4.2.2.1 Direct and Indirect Effects:

The basis for economic impacts is the number of acres leased, rents paid, and level of production by alternative. The economic contribution to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in other sectors.

Economic effects are summarized and displayed in comparative form in Table 11. Under Alternative A, no additional parcels would be leased. Consequently, no federal, state, or local revenues would be generated from leasing, rents, or royalties associated with leasing or production on these parcels. If neither of the two nominated parcels are lease, there would be no change in local income or employment.

Table 11 Summary Comparison of Estimated Average Annual Economic Impacts

Alternative	Acres Leased	Change in Local Revenue to Counties	Change in Total Employment (full and part-time jobs)	Total Labor Income ($1,000)	Change in Population	Change in Number of Households
A	0	0	0	0	0	0
B	160	$18,250	4	$280,000	0	0

These impacts would be in addition to impacts from existing federal leases, rents, royalties and related activities.

4.2.2.2 Cumulative Effects:

Cumulative economic impacts associated with Alternative A would be similar to those described in the economic section of the Affected Environment. The cumulative effects of federal mineral leasing, exploration, development and production within the local economy are summarized in Table 12 and Table 13. The cumulative demographic and economic characteristics of the local economy could not change if none of the proposed parcels are leased.

Table 12 Summary Comparison of Cumulative Annual Economic Impacts by Alternative

	Alternative	
Activity	**A**	**B**
Existing Acres leased	151,502	151,502
Acres that would be leased based on this EA	0	160
Total acres leased	151,502	151,662
Acres held by production	71,057	71,057
Total acres leased for which lease rents would be paid	80,446	80,606
Total average annual federal lease and rental revenue	$123,523,504	$123,665,118
Average annual distribution to State*	$57,500,191	$57,566,112
Average annual distribution to Counties	$15,919,092	$15,937,342
Average annual oil production (bbl)**	12,974,975	12,988,678
Average annual gas production (MCF)**	20,796,578	20,818,541
Total Average annual Federal O&G royalties	$123,382,724	$123,513,027
Average annual distribution to State*	$57,434,658	$57,495,314
Average annual distribution to Counties	$15,900,949	$15,917,741
Total average annual Federal Revenues	$123,523,504	$123,665,118
Total average annual State/Local Revenues	$57,500,191	$57,566,112
Total average annual revenue distributed to counties	$15,919,092	$15,937,342

*25 percent of state revenue from public domain minerals is redistributed back to the counties which generated the revenue

**Estimated as BLM's share of federal minerals production in Montana

Table 13 Summary Comparison of Employment and Income by Alternative

Industry	Total Jobs Contributed		Total Income Contributed ($1000)	
	Alt. A	Alt. B	Alt. A	Alt. B
Total Contribution	355	359	16,696	16,976

IMPLAN, 2010 database

4.3 Alternative B (BLM Preferred)

Under Alternative B, the 2 parcels, 160.00 surveyed federal mineral acres administered by the BLM would be offered for competitive oil and gas lease sale. No parcels would be deferred.

4.3.1 Direct Effects Common to All Resources

The action of leasing the parcels in Alternative B would, in and of itself, has no direct impact on resources. Any potential effects on resources from the sale of leases would occur during lease exploration and development activities. At the time of this review it is unknown whether a particular lease parcel would be sold and a lease issued.

4.3.2 Indirect Effects Common to All Resources

Oil and gas exploration and development activities such as construction, drilling, production, infrastructure installation, vehicle traffic and reclamation are indirect effects from leasing the lease parcels in Alternative B. 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. The potential impacts from exploration and development activities would be analyzed after receipt of an APD or sundry notice.

Typical impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the Miles City Oil & Gas Amendment/EIS (1994), the Big Dry RMP (1996), the Montana Statewide Oil & Gas Amendment/EIS (2003) and the Supplement (2008) to that document.

4.3.3 Air Resources

4.3.3.1 Direct and Indirect Effects

4.3.3.1.1 Air Quality

Leasing the parcels would have no direct impacts on air quality. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

Potential impacts of development could include increased airborne soil particles blown from new well pads or roads; exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHGs and VOCs during drilling or production activities. The amount of increased emissions cannot be precisely quantified at this time since it is not known for certain how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g., compressor,

separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact would also vary according to the characteristics of the geologic formations from which production occurs, as well as the scope of specific activities proposed in an APD.

Current monitoring data show that criteria pollutants concentrations are below applicable air quality standards, indicating good air quality. The potential level of development and mitigation described below is expected to maintain this level of air quality by limiting emissions. In addition, pollutants would be regulated through the use of state-issued air quality permits or air quality registration processes developed to maintain air quality below applicable standards.

4.3.3.1.2 Greenhouse Gas Emissions at the MCFO and Project Scales

Sources of GHGs associated with development of lease parcels could include construction activities, operations, and facility maintenance in the course of oil and gas exploration, development, and production. Estimated GHG emissions are discussed for these specific aspects of oil and gas activity because the BLM has direct involvement in these steps. However, the current proposed activity is to offer parcels for lease. No specific development activities are currently proposed or potentially being decided upon for any parcels being considered in this EA. Potential development activities would be analyzed if the BLM receives an APD on any of the parcels considered here.

Anticipated GHG emissions presented in this section are taken from the Climate Change SIR, 2010. Data are derived from emission calculators developed by air quality specialists at the BLM National Operations Center in Denver, Colorado, based on methods described in the Climate Change SIR (2010). Based on the assumptions summarized in the SIR for the MCFO RFD, Table 14 discloses projected annual GHG source emissions from BLM-permitted activities associated with the RFD.

Table 14. BLM Projected Annual GHG Emissions Associated With Oil and Gas Exploration and Development Activity in the MCFO.

Source	BLM Long-Term GHG Emissions in tons/year				Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	CO_2e	CO_2e
Conventional Natural Gas	158,154.7	1,572.8	1.2	190,984.1	173,817.6
Coal Bed Natural Gas	268,477.4	5,194.6	0.9	377,826.5	342.855.24
Oil	91,689.0	562.6	0.5	103,663.3	94,068.3
Total	**518,321.1**	**7,330**	**2.6**	**672,473.9**	**610,741.1**

To estimate GHG emissions associated with the action alternatives, the following approach was used:

1. The proportion of each alternative relative to the total RFD was calculated based on total acreage of parcels under consideration for leasing relative to the total acreage of federal mineral acreage available for leasing in the RFD.

2. This ratio was then used as a multiplier with the total estimated GHG emissions for the entire RFD (with the highest year emission output used) to estimate GHG emissions for that particular alternative.

Under Alternative B, approximately 160 acres of lease parcels with federal minerals would be leased. These acres constitute approximately 0.0028 percent of the total federal mineral estate of approximately 5,798,000 acres identified in the MCFO RFD. Therefore, based on the approach described above to estimate GHG emissions, 0.0028 percent of the RFD for this EA total estimated BLM emissions of approximately 610,741 metric tons/year would be approximately 17 metric tons/year of CO_2e if the parcels within Alternative B were to be developed.

4.3.3.1.3 Climate Change

The assessment of GHG emissions and climate change is in its formative phase. As summarized in the Climate Change SIR, climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty reliably simulating and attributing observed temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (Climate Change SIR 2010).

It is currently not possible to know with certainty the net impacts from lease parcel development on climate. The inconsistency in results of scientific models used to predict climate change at the global scale, coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. It is therefore beyond the scope of existing science to relate a specific source of GHG emission or sequestration with the creation or mitigation of any specific climate-related environmental effects. Although the effects of GHG emissions in the global aggregate are well-documented, it is currently impossible to determine what specific effect GHG emissions resulting from a particular activity might have on the environment. For additional information on environmental effects typically attributed to climate change, please refer to the cumulative effects discussion below.

While it is not possible to predict effects on climate change of potential GHG emissions discussed above in the event of lease parcel development for alternatives considered in this EA, the act of leasing does not produce any GHG emissions in and of itself. Releases of GHGs could occur at the exploration/development stage.

4.3.3.2 Mitigation

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. Measures may also be required as COAs on permits by either the BLM or the applicable state air quality regulatory agency. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

Some of the following measures could be imposed at the development stage:

- flaring or incinerating hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- emission control equipment of a minimum 95 percent efficiency on dehydration units, pneumatic pumps, produced water tanks;
- vapor recovery systems where petroleum liquids are stored;
- tier II or greater, natural gas or electric drill rig engines;
- secondary controls on drill rig engines;
- no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing VOCs);
- gas or electric turbines rather than internal combustions engines for compressors;
- NO_x emission controls for all new and replaced internal combustion oil and gas field engines;
- water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.
- co-located wells and production facilities to reduce new surface disturbance;
- directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- gas-fired or electrified pump jack engines;
- velocity tubing strings;
- cleaner technologies on completion activities (i.e. green completions), and other ancillary sources;
- centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- forward looking infrared (FLIR) technology to detect fugitive emissions; and
- air monitoring for NO_x and ozone.

More specific to reducing GHG emissions, Section 6 of the Climate Change SIR identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas, coal bed natural gas, and oil production operations. Technologies discussed in the Climate Change SIR and as summarized below in Table 15 (reproduced from Table 6-2 in Climate Change SIR) display common methane emission technologies reported under the EPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

Table 15. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program [1]

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Wells					
Reduced emission (green) completion	7,000 [2]	$1K – $10K	>$1,000	1 – 3 yr	$3
Plunger lift systems	630	$2.6K – $10K	NR	2 – 14 mo	$7
Gas well smart automation system	1,000	$1.2K	$0.1K – $1K	1 – 3 yr	$3
Gas well foaming	2,520	>$10K	$0.1K – $1K	3 – 10 yr	NR
Tanks					
Vapor recovery units on crude oil tanks	4,900 – 96,000	$35K – $104K	$7K – $17K	3 – 19 mo	$7
Consolidate crude oil production and water storage tanks	4,200	>$10K	<$0.1K	1 – 3 yr	NR
Glycol Dehydrators					
Flash tank separators	237 – 10,643	$5K – $9.8K	Negligible	4 – 51 mo	$7
Reducing glycol circulation rate	394 – 39,420	Negligible	Negligible	Immediate	$7
Zero-emission dehydrators	31,400	>$10K	>$1K	0 – 1 yr	NR
Pneumatic Devices and Controls					
Replace high-bleed devices with low-bleed devices					
End-of-life replacement	50 – 200	$0.2K – $0.3K	Negligible	3 – 8 mo	$7
Early replacement	260	$1.9K	Negligible	13 mo	$7
Retrofit	230	$0.7K	Negligible	6 mo	$7
Maintenance	45 – 260	Negl. to $0.5K	Negligible	0 – 4 mo	$7
Convert to instrument air	20,000 (per facility)	$60K	Negligible	6 mo	$7
Convert to mechanical control systems	500	<$1K	<$0.1K	0 – 1 yr	NR
Valves					
Test and repair pressure safety valves	170	NR	$0.1K – $1K	3 – 10 yr	NR
Inspect and repair compressor station blowdown valves	2,000	<$1K	$0.1K – $1K	0 – 1 yr	NR
Compressors					
Install electric compressors	40 – 16,000	>$10K	>$1K	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	$324K	Negligible	10 mo	$7
Flare Installation	2,000	>$10K	>$1K	None	NR

Source: Multiple EPA Natural Gas STAR Program documents. Individual documents are referenced in Climate Change SIR (2010).

[1] Unless otherwise noted, emission reductions are given on a per-device basis (e.g., per well, per dehydrator, per valve, etc).

[2] Emission reduction is per completion, rather than per year.

K = 1,000

mo = months

Mcf = thousand cubic feet of methane

NR = not reported

yr = year

In the context of the oil sector, additional mitigation measures to reduce GHG emissions include methane reinjection and CO_2 injection. These measures are discussed in more detail in Section 6.0 of the Climate Change SIR (2010).

In an effort to disclose potential future GHG emission reductions that might be feasible, the BLM estimated GHG emission reductions based on the RFD for the MCFO. For emission sources subject to BLM (federal) jurisdiction, the estimated emission reductions represent approximately 51 percent reduction in total GHG emissions compared to the estimated MCFO federal GHG emission inventory (Climate Change SIR, as updated October 2010, Section 6.5 and Table 6-3). The emission reductions technologies and practices are identified as mitigation measures that could be imposed during development. Furthermore, the EPA is expected to promulgate new federal air quality regulations that would require GHG emission reductions from many oil and gas sources.

4.3.4 Soil Resources

4.3.4.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on soil resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

Land uses associated with oil and gas exploration and development could cause surface disturbances. Such acts result in reduced ground cover, soil mixing, compaction, or removal, exposing soils to accelerated erosion by wind and water, resulting in the irretrievable loss of topsoil and nutrients and potentially resulting in mass movement or sedimentation. Surface disturbances also change soil structure, heterogeneity (variable characteristics), temperature regimes, nutrient cycling, biotic richness, and diversity. Along with this, mixed soils have decreased bulk density, and altered porosity, infiltration, air-water relationships, salt content, and pH (Perrow and Davy, 2003; Bainbridge 2007). Soil compaction results in increased bulk density, and reduced porosity, infiltration, moisture, air, nutrient cycling, productivity, and biotic activity (Logan 2001; 2003; 2007). Altering such characteristics reduces the soil system's ability to withstand future disturbances (e.g., wildfire, drought, high precipitation events, etc.).

The probability and magnitude of these effects are dependent upon local site characteristics, climatic events, and the specific mitigation applied to the project. Within 2-5 years following reclamation, vegetative cover and rates of erosion would return to pre-disturbance conditions (USDI BLM 2008). Exceptions would be sites poorly suited to reclamation, which could require unconventional and/or site-specific reclamation measures.

4.3.4.2 Mitigation

Measures would be taken to reduce, avoid, or minimize potential impacts to soil resources from exploration and development activities. Prior to authorization, proposed actions would be evaluated on a case-by-case basis and would be subject to mitigation measures in order to maintain the soil system. Mitigation would include avoiding areas poorly suited to reclamation, limiting the total area of disturbance, rapid reclamation, erosion/sediment control, soil salvage, decompaction, revegetation, weed control, slope stabilization, surface roughening, and fencing.

4.3.5 Water Resources

4.3.5.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on water resources. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

The magnitude of the impacts to water resources would be dependent on the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success. Surface disturbance effects typically are localized, short-term, and occur from implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so could the effects on water resources.

Oil and gas exploration and development of a lease parcel could cause the removal of vegetation, soil compaction, and soil disturbance in uplands within the watershed, 100-year floodplains of non-major streams, and non-riparian, ephemeral waterbodies. The potential effects from these activities could be accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. Erosion potential can be further increased in the long term by soil compaction and low permeability surfacing (e.g. roads and well pads) which increases the energy and amount of overland flow and decreases infiltration, which in turn changes flow characteristics, reduces groundwater recharge, and increases sedimentation and erosion (DEQ 2007).

Spills or produced fluids could potentially impact surface and ground water resources in the long term. Oil and gas exploration/development could contaminate aquifers with salts, drilling fluids, fluids and gases from other formations, detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004). Groundwater removal could result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features. Typically produced water from conventional oil and gas wells is from a depth below useable aquifers or coal seams (FSEIS 2008).

Ground Water: The eventual drilling of the proposed parcels 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 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. When this occurs, drilling fluids can be introduced into groundwater without proper cementing and casing. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted. In addition to changing the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore; hydraulic fracturing can also introduce chemical additives into the producing formations. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. These additives are not

always used in these drilling activities and some are likely to be benign such as bentonite clay and sand. Concentrations of these additives also vary considerably since different mixtures can be used for different purposes in oil and gas development and even in the same well bore. If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and residential wells that are sourced from the affected aquifers. Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones.

Known water bearing zones in the lease area are protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely. Casing along with cement is extended well beyond fresh-water zones to insure that drilling fluids remain within the well bore and do not enter groundwater.

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.

All water used would have to comply with Montana state water rights regulations and a source of water would need to be secured by industry that would not harm senior water rights holders.

4.3.5.2 Mitigation

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would minimize potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, measures would be taken to reduce, avoid, or minimize potential impacts to water resources including application of appropriate mitigation. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, and expedite rapid reclamation (including interim reclamation) would maintain water resources.

Methods to reduce erosion and sedimentation could include: reducing surface disturbance acres; installing and maintaining adequate erosion control; proper road design, road surfacing, and culvert design; road/infrastructure maintenance; use of low water crossings; and use of isolated or bore crossing methods for waterbodies and floodplains. In addition, applying mitigation to maintain adequate, undisturbed, vegetated buffer zones around waterbodies and floodplains could reduce sedimentation and maintain water quality. Appropriate well completion, the use of Spill Prevention Plans, and Underground Injection Control regulations would mitigate groundwater impacts. Site-specific mitigation and reclamation measures would be described in the COAs.

4.3.6 Vegetation Resources

4.3.6.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on vegetation resources. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

Impacts to vegetation depend on the vegetation type/community, soil community and the topography of the lease parcels. Disturbance to vegetation is of concern because protection of soil resources, maintenance of water quality, conservation of wildlife habitat, and livestock production capabilities could be diminished or lost over the long-term through direct loss of vegetation (including direct loss of both plant communities and specific plant species).

Other direct impacts, such as invasive species invasion, could result in loss of desirable vegetation. Invasive species and noxious weeds could also reduce livestock grazing forage, wildlife habitat quality, and native species diversity. In addition, invasive species are well known for changing fire regimes.

Additionally, surface disturbing activities directly affect vegetation by destroying habitat, churning soils, disrupting seedbanks, burying individual plants, and generating sites for competitive species. In addition, other vegetation impacts could also be caused from soil erosion and result in loss of the supporting substrate for plants, or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful as both current and future generations would be affected.

Fugitive dust generated by construction activities and travel along dirt roads could affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil, fuel, wastewater or other chemical spills could contaminate soils as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less successful, longer term vegetation damage could be expected.

Oil and gas development activity could reduce BLM's ability to manage livestock grazing while meeting or progressing towards meeting the Standards of Rangeland Health. Development and associated disturbances could reduce available forage or alter livestock distribution leading to overgrazing or other localized excess grazing impacts. Construction of roads, especially in areas of rough topography could cause significant changes in livestock movement and fragment suitable habitat for some plant communities.

If development activity is reducing vegetative resources for livestock grazing and the grazing activity is resulting in the allotment not meeting the standards for rangeland health, then the authorized officer would have to take action prior to the next grazing season to ensure the BLM lands are progressing towards meeting the standards. This could result in the change of livestock grazing activities in order to improve vegetative conditions.

4.3.6.2 Mitigation

Mitigation would be addressed at the site specific APD stage of exploration and development. If needed, COAs would potentially include, but not limited to, revegetation with desirable plant species, soil enhancement practices, direct live haul of soil material for seed bank revegetation, reduction of livestock grazing, fencing of reclaimed areas, and the use of seeding strategies consisting of native grasses, forbs, and shrubs.

4.3.7 Riparian-Wetland Habitats

4.3.7.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on riparian-wetland habitats. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

The exploration and development of oil and gas within uplands or adjacent to riparian-wetland areas could reduce riparian/wetland functionality by changing native plant productivity, composition, richness, and diversity; accelerating erosion; increasing sedimentation; and changing hydrologic characteristics. Impacts that reduce the functioning condition of riparian and wetland areas could impair the ability of riparian/wetland areas to reduce nonpoint source pollution (MDEQ 2007) and provide other ecosystem benefits. The magnitude of these effects would be dependent on the specific activity, season, proximity to riparian-wetland areas, location in the watershed, upland and riparian-wetland vegetation condition, mitigation applied, and the time until reclamation success. Erosion increases typically are localized, short term, and occur from implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so could the effects on riparian-wetland resources.

4.3.7.2 Mitigation

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of major rivers, and riparian areas would minimize potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, site-specific mitigation measures would be identified which would avoid or minimize potential impacts to riparian-wetland areas at the APD stage. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, maintain biodiversity, maintain vegetated buffer zones, and expedite rapid reclamation (including interim reclamation) would maintain riparian/wetland resources.

4.3.8 Special Status Plant Species

4.3.8.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on special status plant species. Any potential effects from the sale of leases could occur at the time the leases are developed.

4.3.8.2 Mitigation

Stipulations applied to wildlife resources, steep slopes, waterbodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would likely also provide protections for special status plant species. Proposed development would be analyzed on a site-specific basis prior to approval of oil and gas exploration or development activities at the APD stage**.** Mitigation would also be addressed at the site-specific APD stage. If needed at the time of development, special status species plants would be managed in accordance with BLM Manual 6840. The manual provides guidance for the BLM to manage species status species in a manner which would not cause these species to become threatened or endangered. Surveys to determine the existence of federally listed species could occur on BLM-administered surface or minerals prior to approval of exploration and development activities at the APD stage.

4.3.8 Wildlife

4.3.8.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on wildlife. Any potential effects from the sale of lease parcels would occur at the time the leases are developed.

The use of standard lease terms and stipulations on these lands (Appendix A) would minimize, but not preclude impacts to wildlife. Oil and gas development which results in surface disturbance could directly and indirectly impact aquatic and terrestrial wildlife species. These impacts would include loss or reduction in suitability of habitat, improved habitat for undesirable (non-native) competitors, species or community shift to species or communities more tolerant of disturbances, nest abandonment, mortalities resulting from collisions with vehicles and power lines, electrocutions from power lines, barriers to species migration, habitat fragmentation, increased predation, habitat avoidance, and displacement of wildlife species resulting from human presence. The scale, location, and pace of development, combined with implementation of mitigation measures and the tolerance of the specific species to human disturbance all influence the severity of impacts to wildlife species and habitats, including threatened, endangered, candidate, proposed, and other special status species.

4.3.8.1.1 Threatened, Endangered, and Candidate Species

Habitat within the lease parcels exists to support the Sprague's pipit, classified as a USFWS candidate species.

Energy development (oil, gas, and wind) and associated roads and facilities increase the fragmentation of grassland habitat. A number of studies have found that Sprague's pipits appear to avoid non-grassland features in the landscape, including roads, trails, oil wells, croplands, woody vegetation, and wetlands (Dale et al. 2009, pp. 194, 200; Koper et al. 2009, pp. 1287, 1293, 1294, 1296; Greer 2009, p. 65; Linnen 2008, pp. 1, 9-11, 15; Sutter et al. 2000, pp. 112-114). Sprague's pipits avoid oil wells, staying up to 350 meters (m) (1148 feet (ft)) away (Linnen 2008, pp. 1, 9-11), magnifying the effect of the well feature itself. Oil and gas wells, especially at high densities, decrease the amount of habitat available for breeding territories. (Federal Register: September 15, 2010 (Volume 75, Number 178))

Potential suitable habitat exists for the Sprague's pipit across both of the proposed lease parcels; however, inventories have not been conducted within the parcels. Therefore, inventories would be conducted at the APD stage of development to determine the presence or absence of Sprague's pipits. The Sprague's pipit lease notice, LN 14-15, is issued with those leases and would be applied if Sprague's pipits are found in the area. If Sprague's pipits are found, protective measures would be applied as conditions of approval to minimize impacts to Sprague's pipits and their habitat. In the event oil and gas development is proposed within Sprague's pipit habitat, at the APD stage BLM would conference with the USFWS pursuant to section 7(a)(4) of ESA, or if the Sprague's pipit has been listed as threatened or endangered, BLM would consult with the USFWS pursuant to section 7(a)(2).

4.3.8.1.2 Other Special Status Species

As noted, up to 32 wildlife species that BLM has designated as "sensitive" have the potential to occur within the parcel areas. Stipulations are not provided for all BLM sensitive species in the

current RMPs. Stipulations are provided for 5 out of the 32 "non-TE&P" sensitive species. For those species afforded some protections through existing stipulations, impacts could be minimized, but not eliminated. Impacts to BLM sensitive species would be similar to those described above, unless they are afforded protective measures from other regulations such as the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703.) or the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668c). BLM does not consult with the USFWS on "sensitive" species and likewise would not receive terms and conditions from USFWS requiring additional protections of those species.

Numerous species of birds were identified as potential inhabitants across the analysis area. With the impacts associated with development, it is reasonable to assume there would be impacts to nesting and migrating bird species. The primary impacts to these species would include disturbance of preferred nesting habitats, improved habitat for undesirable competitors and/or a species shift to disturbance associated species, and increased vehicle collisions.

Stipulations do not exist specifically for the protection of BLM sensitive songbirds. The MBTA prohibits the take, capture or kill of any migratory bird, any part, nest or eggs of any such bird (16 U.S.C 703 (a)). NEPA analysis pursuant to Executive Order 13186 (January 2001) requires BLM to ensure that MBTA compliance and the effects of Bureau actions and agency plans on migratory birds are evaluated, should reduce take of migratory birds and contribute to their conservation.

Effects to migratory birds from oil and gas development at the APD stage could include direct loss of habitat from roads, well pads and other infrastructure, disturbance, powerline strikes and unintended direct mortality, fragmentation of habitat, change in use of habitats, and potential threats and competition from edge species. Field surveys for nesting birds at proposed development sites would be conducted for activities planned in between April 15 and July 15. Mitigation measures would be assigned at the APD stage to minimize negative effects on migratory bird populations, in compliance with Executive Order 13186 and MBTA. These mitigation measures would be required as COAs.

Take of bald and golden eagles and any other migratory raptors would not occur as a result of the act of leasing parcels. However, as development occurs after permits to drill are issued, there would be potential for take to occur as a result of raptor collisions with vehicles, power lines, and other development-related actions. Therefore, field surveys for raptors at proposed development sites would be conducted for activities planned between March 1 and August 1. To comply with MBTA and BGEPA, BLM would require protective measures and stipulations at the APD stage to prevent or minimize impacts to individual raptors and raptor populations, including bald and golden eagles. The protective measures would be required as COAs.

4.3.8.1.3 Other Fish and Wildlife

The types and extent of impacts to other wildlife species and habitats from development are similar to those described above for other species. Based on the RFD scenarios, direct habitat loss is possible. Initial disturbance could change the occupation of those areas to disturbance-oriented species (e.g., horned larks), or species with more tolerance for disturbances. These changes could also be expected to decrease the diversity of wildlife. Although bladed corridors

would be reclaimed after the facilities are constructed, some changes in vegetation could occur along the reclaimed areas. The goal of reclamation is to restore disturbed areas to pre-disturbed conditions. The outcome of reclamation, unlike site restoration, will therefore not always mimic pre-disturbance conditions and offer the same habitat values to wildlife species.
It is anticipated that some development could occur adjacent to existing disturbances of some type. Depending on proximity and species tolerance, wildlife species within these areas could either have acclimated to the surrounding conditions, previously been displaced by construction activities, or could be caused to be displaced to other areas with or without preferred habitat.

Potential impacts to aquatic wildlife from development could include: overland oil spills, underground spills from activities associated with horizontal drilling or other practices, spills from drilling mud or other extraction and processing chemicals, and surface disturbance activities that create a localized erosion zone. Oil spills and other pollutants from the oil extraction process could harm the aquatic wildlife species in two different ways if the spill substances enter the habitat. First, toxicological impacts from direct contact could have immediate lethal effects to eggs, larvae, juveniles, and adults. Second, toxic effects to lower food web levels (e.g. aquatic macro-invertebrates) could indirectly affect fish, amphibian, and reptile species by degrading water quality and degrading or eliminating food resources.

Mule deer, white-tailed deer, and pronghorn could be impacted by this project from habitat fragmentation and disturbance. It would be expected that at least some individuals in a population would be displaced out to some distance from the activities, if preferred habitat exists. Over time, some level of acclimation may also occur with other individuals.

Lease parcel MTM 102757-6H is located within 2 miles of a sharp-tailed grouse lek where timing stipulations from March 1 to June 15 were applied. This timing does not apply to operation and maintenance of production facilities. Although limited research exists that documents impacts to sharp-tailed grouse from development activities, it is expected that sharp-tailed grouse could be by this project from habitat fragmentation and disturbance. Vehicles and human activity during breeding and nesting seasons could reduce breeding activity, displace nesting hens and reduce the suitability of habitat for brood-rearing. Mortality could increase as a result of collisions with vehicles.

Wild turkeys, pheasants, and hungarian partridge could also be affected by disturbance and direct mortality through nest destruction and vehicle collisions during the development stages.

4.3.8.2 Mitigation
Measures would be taken to prevent, minimize, or mitigate impacts to fish and wildlife animal species from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could include rapid revegetation, project relocation, or pre-disturbance wildlife species surveying. If oil and gas development is proposed in suitable habitat for threatened or endangered species, consultation with the USFWS would occur to determine if additional terms and conditions would need to be applied.

4.3.9 Cultural Resources

4.3.9.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on cultural resources. Any potential effects from the sale of leases would occur at the time the leases are developed.

Potential effects from surface disturbances associated with exploration and development activities have the potential to alter the characteristics of a significant cultural or historic property by diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Other effects to cultural resources from proposed surface disturbance activities include the destruction, damage, or alteration to all or part of the cultural resource and diminishing the property's significant historic features as a result of the introduction of visual, atmospheric, or audible elements. This could alter or diminish the elements of a National Register eligible property and diminish the property's eligibility status. Cultural resource investigations associated with development potentially adds to our understanding of the prehistory/history of the area and discovery of sites that would otherwise remain undiscovered due to burial or omission.

Previous inventory of parcel MTM 102757-6G, in Fallon County, shows one reported cultural site that is not eligible for listing on the National Register of Historic Places.

Parcel MTM 102757-6H, in Richland County, does not contain reported cultural resources.

4.3.9.2 Mitigation

Application of standard lease terms, stipulations, and cultural lease notices provide mechanisms to protect vulnerable significant cultural resource values on lease parcels. Specific mitigation measures, including but not limited to, possible site avoidance, excavation or data recovery would have to be determined when site-specific development proposals are received. However, in most surface-disturbing situations cultural resources would be avoided by project redesign or relocation. Should a cultural property be unavoidable, significant properties would be site-specifically mitigated prior to implementation of a project.

4.3.10 Paleontology

4.3.10.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on paleontological resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

Indirect impacts from the sale of leases would be from the surface disturbances associated with oil and gas exploration and development activities. It is anticipated that most significant fossil resources are located in those geologic units with a Potential Fossil Yield Classification (PFYC) of 3 or higher. However, significant fossil resources could be discovered anywhere. Surface-disturbing activities could potentially alter the characteristics of paleontological resources through damage, fossil destruction, or disturbance of the stratigraphic context in which paleontological resources are located, resulting in the loss of important scientific data. Identified paleontological resources could be avoided by project redesign or relocation before project approval which would negate the need for the implementation of mitigation measures.

Conversely, surface-disturbing activities could potentially lead to the discovery of paleontological localities that would otherwise remain undiscovered due to burial or omission during review inventories. The scientific retrieval and study of these newly discovered resources would expand our understanding of past life and environments of Montana.

4.3.10.2 Mitigation

The application of lease terms, the paleontological no surface occupancy stipulation (NSO 11-12), and the paleontological lease notice (LN 14-12) at leasing, provides protection to paleontological resources during development. The paleontological lease notice is applied to those lease parcels that fall within the PFYC 3 or higher geologic units, requiring a field survey prior to surface disturbance. These inventory requirements could result in the identification of paleontological resources. Avoidance of significant paleontological resources or implementation of mitigation prior to surface disturbance would protect paleontological resources. However, the application of lease terms only allows the relocation of activities up to 200 meters, unless documented in the NEPA document, and cannot result in moving the activity off lease.

Specific mitigation measures could include, but are not limited to, site avoidance or excavation. Avoidance of paleontological properties would be a best management practice. However, should a paleontological locality be unavoidable, significant fossil resources must be mitigated prior to implementation of a project. Also, significant fossil resources could be discovered in areas that had not been surveyed (PFYC of less than 3) during surface disturbance. Those resources must also be professionally mitigated. These mitigation measures and contingencies would be determined when site specific development proposals are received.

In order to protect paleontological resources both parcels are recommended to have the Paleontological lease notice 14-12 applied per guidance identified in IM 2009-011 and 2008-009. No parcels are recommended for the no surface occupancy lease stipulation (NSO 11-12) based upon paleontological resources. See section 3.10 Paleontology for list of parcels.

4.3.11 Visual Resources

4.3.11.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on visual resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

The lease parcels fall into VRM class IV, as demonstrated in Section 3.11, Visual Resources, Table 6. While the act of leasing federal minerals produces no visual impacts, development of a lease parcel could result in some level of modification to the existing landscape at the time of development.

4.3.11.2 Mitigation

All new oil and gas development would implement, as appropriate for the site, BLM BMPs for VRM, regardless of the VRM class. This includes, but would not be limited to, proper site selection, reduction of visibility, minimizing disturbance, selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development. Wherever practical, no new development would be allowed on ridges or mountain

tops. Overall, the goal would be to not reduce the visual qualities or scenic value that currently exists.

4.3.12 Livestock Grazing

4.3.12.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on livestock grazing. Any potential effects from the sale of leases could occur at the time the leases are developed.

Oil and gas development could result in a loss of vegetation for livestock grazing (e.g., direct removal, introduction of unpalatable plant species, etc.), decrease the palatability of vegetation due to fugitive dust, disrupt livestock management practices, involve vehicle collisions, and decrease grazing capacity. Direct losses of forage could also result from construction of roads, well pads and associated infrastructure and would vary depending on the extent of development. These impacts could vary from short-term impacts to long-term impacts depending on the type of exploration or development, the success of reclamation, and the type of vegetation removed for the oil and gas activities.

4.3.12.2 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to livestock grazing from oil and gas exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could potentially include controlling livestock movement by maintaining fence line integrity, fencing of facilities, revegetation of disturbed sites, and fugitive dust control.

4.3.13 Recreation and Travel Management

4.3.13.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on recreation and travel management. Any potential effects from the sale of leases could occur at the time the leases are developed.

Recreation indirect effects could exist where oil and gas development and recreational user conflicts could occur. More specifically, in areas of high oil and gas development potential, there could be user conflicts between motorized recreationists (OHV activities), hunting, target shooting, camping, fishing, river use, picnicking, and winter activities (e.g., snowmobiling) and associated oil and gas activities. These impacts could exist in both the short-term (exploration and construction phases of oil and gas development) and in the long-term (producing wells, maintenance of facilities, etc.). Recreationists could lose some benefit outcomes such as loss of importance sense of place, solitude and possible increase of stress.

Areas frequented by recreationists, where there are other land use activities occurring, in addition to oil and gas development, the public could perceive these areas as inaccessible or unavailable because of the existing facilities. As oil and gas development occurs, new routes are created which often attract recreationists seeking additional or new areas to explore for motorized recreational opportunities. Motorized recreational opportunities could be enhanced through the additional opportunities to explore; however, user conflicts and public safety issues could result from the use of the new travel routes. The creation of routes from oil and gas activities could

lead to a proliferation of user-created motorized routes, resulting in adverse impacts to the scenic qualities of the area and increased level of surface disturbance.

For those areas with isolated tracks of BLM public lands that generally do not have existing public access, recreation opportunities that occur in these areas are limited to use with adjacent land owner permission or hunting by an outfitter; therefore, oil and gas activities would have little or no impact on recreational experiences in these isolated tracks.

Foreseeable changes in recreation use levels would be an increase on the demand for recreational use of public land. Increases could be expected in, but not limited to, hunting, fishing, hiking, camping, wildlife viewing, and dispersed recreational uses. This could increase the incidence of conflict between recreationists involved in motorized activities and non-motorized activities.

4.3.13.2 Mitigation

Additional measures would be taken to minimize, avoid, or mitigate impacts to recreation from oil and gas exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation measures could potentially include, but are not limited to, reclamation of industrial routes/areas when no longer needed, fencing of facilities, and installing signs along roads.

4.3.14 Lands and Realty

4.3.14.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on lands and realty. Any potential effects from the sale of leases could occur at the time the leases are developed.

There are no BLM authorized ROWs or other land use authorizations located on the two lease parcels. New ROWs could be required across federal surface for “off-lease” or third party facilities required for potential development of the parcels.

4.3.14.2 Mitigation

Any new “off-lease” or third party rights-of-way required across federal surface for exploration and/or development of the two parcels would be subject to lands and realty stipulations to protect other resources as determined by environmental analyses.

4.3.15 Minerals

4.3.15.1 Fluid Minerals

4.3.15.1.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on fluid minerals. Any potential effects from the sale of leases could occur at the time the leases are developed.

Issuing a lease provides opportunities to explore for and develop oil and gas. Additional natural gas or crude oil produced from any or all of the 2 parcels could enter the public markets. There could be a reduction in the known amount of oil and gas resources. Royalties and taxes could accrue to the federal and state treasuries from the lease parcel lands.

Under Alternative B, all of the lease parcels would be offered for lease subject to major (NSO) or moderate (CSU) constraints and/or standard lease terms and conditions.

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use could affect oil and gas exploration and development, both on and off the federal lease parcel. Leases issued with major constraints (NSO stipulations) could decrease some lease values, increase operating costs, and require relocation of well sites, and modification of field development. Leases issued with moderate constraints (timing limitation and controlled surface use (CSU) stipulations) could result in similar but reduced impacts, and delays in operations and uncertainty, on the part of operators, regarding restrictions.

Fracking on BLM Montana Well Sites

Fracturing (known as "fracking" in the oil and gas industry) is a process that uses high pressure pumps to develop pressure at the bottom of a well to crack the hydrocarbon formation. This aids extraction of oil and gas deposits that might be left behind by conventional oil and gas drilling and pumping technology.

Hydraulic fracturing is a 60-year-old process that is now being used more commonly as a result of advanced technology.

Wells are often treated during completion to improve the recovery of hydrocarbons by increasing the rate and volume of hydrocarbons moving from the natural oil and gas reservoir into the wellbore. These processes are known as well-stimulation treatments, which create new fluid passageways in the producing formation or remove blockages within existing passageways. They include fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other. This makes it possible to introduce fluids carrying sand, walnut hulls, or other small particles of material into the newly created crevices to keep the fractures open when the pressure is relieved. This process increases the flow rate and volume of reservoir fluids that move from the producing formation into the wellbore. The fracking fluid is typically more than 99 percent water and sand, with small amounts of readily available chemical additives used to control the chemical and mechanical properties of the water and sand mixture.

The State of Montana, Department of Natural Resource and Conservation, Oil and Gas Conservation Division, Board of Oil and Gas Conservation (MBOGC), regulations ensure that all resources including groundwater are protected. The MBOGC regulations require new and existing wells which will be stimulated by hydraulic fracturing must demonstrate suitable and safe mechanical configuration for the stimulation treatment proposed. If the operator proposes hydraulic fracturing through production casing or through intermediate casing, the casing must be tested to the maximum anticipated treating pressure. The MBOGC considers a casing pressure test to be considered successful if the pressure applied has been held for 30 minutes with no more than ten percent pressure loss. A pressure relief valve(s) must be installed on the treating lines between pumps and wellhead to limit the line and the well must be equipped with a remotely controlled shut-in device unless waived by the board administrator. Finally, the surface casing valve must remain open while hydraulic fracturing operations are in progress; the annular

space between the fracturing string and the intermediate or production casing must be monitored and may be pressurized to a pressure not to exceed the pressure rating of the lowest rated component that would be exposed to pressure should the fracturing string fail.

To ensure that hydraulic fracturing is conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance on Federal public lands. Operators must submit Applications for Permit to Drill (APDs) to the agency. Prior to approving an APD, the BLM identifies all potential subsurface formations that will be penetrated by the wellbore. This includes all groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures.

Once the geologic analysis is completed, the BLM reviews the company's proposed casing and cementing programs to ensure the well construction design is adequate to protect the surface and subsurface environment, including the potential risks identified by the geologist and all known or anticipated zones with potential risks.

Before hydraulic fracturing takes place, all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. If the fracturing of the well is considered to be a "non-routine" fracture for the area, the BLM will always be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

4.3.16 Social and Economic Conditions

4.3.16.1 Social

4.3.16.1.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on social resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

While the act of leasing an addition 160 acres of Federal minerals would have no social impact, subsequent exploration and development may generate affect people living near or using the area in the vicinity of these leases. Exploration, drilling or production could create an inconvenience to people living adjacent to leases due to increased traffic and traffic delays, and light, noise and visual impacts. This could be especially noticeable in rural areas where oil and gas development has not occurred previously. The amount of inconvenience would depend of the activity affected, traffic patterns within the area, noise and light levels, length of time and season these activities occur, etc. In addition, competition for housing could occur in some communities. However, residents living in areas that have been experiencing ongoing population losses may support the increased employment and population related to oil and gas development. Residents of counties where the development actually occurs would also benefit from the additional revenues to counties due to oil and gas leasing and development.

4.3.16.2 Economics

4.3.16.2.1 Direct and Indirect Effects

The basis for economic impacts is the number of acres leased, rents paid, and level of production by alternative. The economic contribution to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in other sectors. Table 13 is a summary of local revenues, employment, income, population, and household impacts of each alternative.

Leasing an additional 160 acres of federal minerals would increase average annual oil and gas leasing and rent revenues to the federal government by an estimated $11,310. Average annual leasing and rent revenues redistributed to state could increase by an estimated $5,265, while Fallon and Richland may receive an additional $1,458. In addition to revenue collected from bonus bids and annual rent, leasing these two parcels will likely increase production and royalty payments. If leased, these parcels are estimated to increase annual average oil and gas royalties paid to the federal government by $130,303, generating $60,656 in revenue distributed to the state of Montana which is estimated to increase payment to counties by $18,250.

Total average annual federal revenue resulting from leasing 160 additional acres of federal minerals in Fallon and Richland counties is estimated to generate an additional $141,614 in annual rent and royalty payments. Of this new federal revenue, an estimated $65,921 could be disbursed to the state and $18,250 is estimated to be redistributed back to the counties where these leases exist.

As shown in Table 10, total average annual employment is estimated to increase by 4 jobs across the study area and the additional federal oil and gas leasing, distributions of royalties to local governments, drilling wells, and production would support an additional $280,000 in personal income across the 5-county local economy (IMPLAN, 2010).

Total federal contribution of Alternative B and anticipated related exploration, development, and production of oil and gas could affect local population, total local employment, number of households, average income per household, and total personal income. The economic effects would be spread unevenly among the counties. Leasing 160 additional acres and associated exploration, development, and production under Alternative B would provide additional funds (about $18,250) for county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that could be funded include administering primary and secondary education and operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems. Demand for these services would also increase. Leasing 160 additional acres and anticipated exploration, development, and production would not change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), and economic stability (as indicated by seasonal unemployment, sporadic population changes and

fluctuating income rates) across the 5-county area because oil and gas exploration, development, and production is well established in the local economy.

Disclosure of the direct, indirect, and cumulative effects of GHG emissions provides information on the potential economic effects of climate change including effects that could be termed the "social cost of carbon" (SCC). The EPA and other federal agencies developed a method for estimating the SCC and a range of estimated values (EPA 2013b). The SCC estimates damages associated with climate change impacts to net agricultural productivity, human health, property damage, and ecosystems. Using a 3 percent average discount rate and year 2020 values, the incremental SCC is estimated to be $46 per metric ton of annual CO_2e increase. Based on the GHG emission estimate provided in Section 4.3.3.1.2, the annual SCC associated with potential development on lease sale parcels is $782 (in 2011 dollars). Estimated SCC is not directly comparable to economic contributions reported above, which recognize certain economic contributions to the local area and governmental agencies but do not include all contributions to private entities at the regional and national scale. Direct comparison of SCC to the economic contributions reported above is also not appropriate because costs associated with climate change are borne by many different entities.

4.3.17 Cumulative Impacts- Alternative B

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). This section describes cumulative impacts associated with this project on resources. The ability to assess the potential cumulative impacts at the leasing stage for this project is limited for many resources due to the lack of site-specific information for potential future activities. Upon receipt of an APD for any of the lease parcels addressed in this document, more site-specific planning would be conducted in which the ability to assess contributions to cumulative impacts in a more detailed manner would be greater due to the availability of more refined site-specific information about proposed activities.

4.3.17.1 Past, Present and Reasonably Foreseeable Future Actions

Past, present, or reasonably foreseeable future actions that affect the same components of the environment as the Proposed Action are: grazing, roads, wildfire and prescribed fire, range improvement projects, and utility right-of-ways.

4.3.17.2 Cumulative Impacts by Resource

Cumulative effects for all resources in the MCFO are described in the final Big Dry RMP/EIS (pgs. 111 to 156) and the 1992 Oil and Gas Amendment of the Billings, Powder River, and South Dakota Resource Management Plans and Final Environmental Impact Statement and the 1994 Record of Decision and the 2008 Final Supplement to the Montana Statewide Oil and Gas Environmental Impact with a development alternative for coal bed natural gas production (4-1 to 4-310). Anticipated exploration and development activities associated with the lease parcels considered in this EA are within the range of assumptions used and effects described in this cumulative effects analysis for resources other than air, climate, and socio-economics resources. This previous analysis is hereby incorporated by reference for resources other than for air, climate, and economics resources.

4.3.17.2.1 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change

The cumulative effects analysis area is the MCFO, with additional discussion at state-wide, national, and global scales for GHG emissions and climate change.

This section incorporates an analysis of the contributions of the Proposed Action to GHG emissions, followed by a general discussion of potential impacts to climate change. Potential emissions relate to those derived from potential exploration and development of fluid minerals. Additional emissions beyond the control of the BLM, and outside the scope of this analysis, would also occur during any needed refining processes, as well as end uses of final products.

Projected GHG emissions for this project and the MCFO RFD are compared below with recent, available inventory data at the state, national, and global scales. GHG emissions inventories can vary greatly in their scope and comprehensiveness. State, national, and global inventories are not necessarily consistent in their methods or in the variety of GHG sources that are inventoried (Climate Change SIR 2010). However, comparisons of emissions projected by the BLM for its oil and gas production activities are made with those from inventories at other scales for the sake of providing context for the potential contributions of GHGs associated with this project.

As discussed in the Air Quality section of Chapter 4, total projected BLM GHG emissions from the RFD are 610,741.1 metric tons/year CO_2e. Potential emissions under Alternative B would be approximately 0.0028 percent of this total. Table 15 displays projected GHG emissions from non-BLM activities included in the Miles City RFD. Total projected emissions of non-BLM activities in the RFD in Appendix B are 1,382,890 metric tons/year of CO_2e. When combined with projected annual BLM emissions, this totals 1,993,631 metric tons/year CO_2e. Potential GHG emissions under Alternative B would be 0.0009 percent of the estimated emissions for the entire RFD. Potential incremental emissions of GHGs from exploration and development of fluid minerals on parcels within Alternative B, would be minor in the context of projected GHG contributions from the entire RFD for the MCFO.

Table 16. Projected non-BLM GHG Emissions Associated With the MCFO Reasonably Foreseeable Development Scenario for Fluid Mineral Exploration and Development.

Source	Non-BLM Long-Term GHG Emissions in tons/year				Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	Co_2e	CO_2e
Conventional Natural Gas	545,689.1	5425.9	2.1	658,344.3	599,170.7
Coal Bed Natural Gas	274,925.2	5,330.5	0.9	387,135.7	351,302.8
Oil	422,033.9	2,576.2	1.2	476,522.7	432,416.3
Total	**1,242,648.3**	**13,332.6**	**4.2**	**1,522,002.7**	**1,382,889.8**

Montana's Contribution to U.S. and Global GHGs

Montana's GHG inventory (http://www.eia.doe.gov/oiaf/1605/archive/gg04rpt/emission.html, Center for Climate Strategies [CCS] 2007) shows that activities within the state contribute 0.6 percent of U.S and 0.076 percent of global GHG emissions (based on 2004 global GHG emission data from the IPCC, summarized in the Climate Change SIR 2010). Based on 2005 data in the state-wide inventory, the largest source of Montana's emissions is fossil fuel combustion to

generate electricity, which accounts for approximately 27 percent of Montana's emissions. The next largest contributors are the agriculture and transportation sectors (each at approximately 22 percent) and fossil fuel production (13.6 percent).

GHG emissions from all major sectors in Montana in 2005 added up to a total of approximately 36.8 million metric tons of CO_2e (CCS 2007). Potential emissions from development of BLM lease parcels included in Alternative B would represent approximately 0.007 percent of the state-wide total of GHG emissions based on the 2005 state-wide inventory (CCS 2007).

The EPA published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,822 million metric tons, and net emissions of 5,747 million metric tons (when CO_2 sinks were considered) of CO_2e in 2010 (EPA 2012). Potential annual emissions under Alternative B of this project would amount to approximately 2.5E-07 percent of gross U.S. total emissions. Global GHG emissions for 2004 (IPCC 2007, summarized by the Climate Change SIR 2010) indicated approximately 49 gigatonnes (10^9 metric tons) of CO_2e emitted. Potential annual emissions under Alternative B would amount to approximately 3.5E-08 percent of this global total.

As indicated above, although the effects of GHG emissions in the global aggregate are well-documented, it is currently not possible to determine what specific effect GHG emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under Alternative B, potential GHG emissions described above could incrementally contribute to the total volume of GHGs emitted to the atmosphere, and ultimately to climate change.

Mitigation measures identified in the Chapter 4 Air Quality section above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development on lease parcels under Alternative B. This is likely because many operators working in Montana, South Dakota, and North Dakota are currently USEPA Natural Gas STAR Program Partners and future regulations may require GHG emission controls for a variety of industries, including the oil and gas industry (Climate Change SIR 2010).

4.3.17.2.2 Cumulative Impacts of Climate Change

As previously discussed in the Air Quality section of Chapter 4, it is impossible to identify specific impacts of climate change on specific resources within the analysis area. As summarized in the Climate Change SIR (2010), climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty reliably simulating and attributing observed temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (IPCC 2007, as cited by the Climate Change SIR 2010). Effects of climate change on resources are described in Chapter 3 of this EA and in the Climate Change SIR (2010).

4.3.17.3 Cumulative Impacts to Wildlife

For wildlife species, past and presently on-going oil and gas development, fire, farming, livestock grazing, traffic, and any other form of human and natural disturbances result in cumulative impacts to wildlife.

Construction of roads, production well pads, and other facilities would result in long term (>5 years) loss of habitat and forage in the analysis area. This would be in addition to acres disturbed, or habitats fragmented from various other adjacent activities. As new development occurs, direct and indirect impacts could continue to stress wildlife populations, most likely displacing the larger, mobile animals into adjacent habitat, and increasing competition with existing local populations. Non-mobile animals could be affected by increased habitat fragmentation and interruptions to preferred habitats.

Certain species are localized to some areas and rely on very key habitats during critical times of the year. Disturbance or human activities that could occur in winter range for big game, nesting and brood-rearing habitat for grouse and raptors could displace some or all of the species using a particular area or disrupt the normal life cycles of species. Wildlife and habitat in and around the project could be influenced to different degrees by various human activities. Some species and/or a few individuals from a species group could be able to adapt to these human influences over time

4.3.17.4 Cumulative Impacts to Economic Conditions

The cumulative effects of federal mineral leasing within the local economy as well as the specific effects of leasing an additional 160.00 acres under Alternative B are summarized in Table 12 and 13. These tables also display in comparative form the cumulative effects of alternatives A and B.

The annual SCC associated with oil and gas development is $393,962 (in 2011 dollars) based on 80,606 cumulative acres. As noted earlier, the estimated SCC is not directly comparable to economic contributions.

5.0 CONSULTATION AND COORDINATION:

5.1 Persons, Agencies, and Organizations Consulted

Coordination with MFWP was conducted for the 2 lease parcels being reviewed and in the completion of this EA in order to prepare the analysis, identify protective measures, and apply stipulations and lease notices associated with these parcels being analyzed. A letter was sent to the USFWS and MFWP during the 15-day scoping and 30-day public comment periods requesting comments on the 2 parcels being reviewed.

The BLM consults with Native Americans under Section 106 of the National Historic Preservation Act. BLM sent letters to tribes in Montana, North and South Dakota and Wyoming at the beginning of the 15 day scoping period informing them of the potential for the 2 parcels to be leased and inviting them to submit issues and concerns BLM should consider in the environmental analysis. Letters were sent to the Tribal Presidents and THPO or other cultural contacts for the Cheyenne River Sioux Tribe, Crow Tribe of Montana, Crow Creek Sioux Tribe, Eastern Shoshone Tribe, Ft. Peck Tribes, Lower Brule Sioux Tribe, the Mandan, Hidasta, and Arkira Nation, Northern Arapaho Nation, Northern Cheyenne Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe of Indians, Standing Rock Sioux Tribe, and Turtle Mountain Band of Chippewa. In addition to scoping letters, THPOs also received file search results from the preliminary review of parcels conducted by BLM. BLM sent a second letter with a copy of the EA to the tribes informing them about the 30 day public comment period for the EA and solicit any information BLM should consider before making a decision whether to offer any or all of the 2 parcels for sale.

5.2 Summary of Public Participation

5.2.1 Scoping

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posting on the field office website NEPA notification log. Scoping was initiated March 26, 2013. Surface ownership included only BLM surface, so no surface owner notification letters were distributed. No written or verbal comments were submitting during the 15-day scoping period.

5.2.2 Public Comment Period

In response to scoping and preliminary EA/draft FONSI comments the BLM Montana State Office website was modified to more clearly reflect opportunities for the public to comment on lease sale documents. The modifications include links to documents and clearly defined dates for comment submittal.

On May 20, 2013, the EA, along with an unsigned FONSI, was made available for a 30-day public comment period. Notification letters were distributed to external entities, local agencies, and tribes to explain that an EA and the unsigned FONSI were available for review and comment. Tribes also received a copy of the EA and unsigned FONSI for their review.

A total of 1 written submission was received after the 30-day comment period, which resulted in 84 individually-coded substantive comments. After review and consideration of the comments,

some modifications have been made to the EA. Changes made to the analysis are noted with gray-scale shading and/or strikeout so the modifications to the EA can easily be identified.

The following is a summary of some of the issues and/or changes made to the EA as a result of the 30-day public comment period:

- Clarification of the MSO website which has been modified to provide clear information regarding opportunities for public participation
- Consideration of hydraulic fracturing
- Further discussion of air quality and climate change
- Additional data regarding ozone and hazardous air pollutants

Consideration of the social cost of carbon (SCC)

After the 30-day protest period, but before lease issuance, the BLM will issue the Decision Record and signed Finding of No Significant Impact for this EA. This information, along with other updates and Lease Sale Notice information can be found on the Montana/Dakotas BLM website http://blm.gov/h2kd. Current and updated information about our EAs, Lease Sale Notices, and corresponding information pertaining to this sale can be found at the link referenced above.

Table 17. List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Susan Bassett	Air Resource Specialist	Air Resources
Bobby Baker	Wildlife Biologist	Wildlife
Chris Robinson	Hydrologist	Water Resources/Riparian Vegetation
Josh Halpin	Range Management Specialist	Soils/Livestock Grazing/Vegetation/Invasive Species
Dena Lang	Outdoor Recreation Planner	Recreation/VRM/Travel Management
Sarah Young	Natural Resource Specialist	GIS
Doug Melton	Archeologist	Native American Religious Concerns/ Cultural/Special Designations
Greg Liggitt	Paleontologist	Paleontology
Pam Wall	Realty Specialist	Lands/Realty
Nate Arave	Geologist	Solid Minerals
Paul Helland	Petroleum Engineer	Fluid Minerals/RFD
Jennifer Dobb (FS)	Planning &Environmental Specialist	Economic Analysis/Social Analysis
Irma Nansel	Natural Resource Specialist	EA Lead/Forestry
Kathy Bockness	Planning & Environmental Coordinator	NEPA
Lane Carano	Legal Land Examiner-Sale Lead	Expressions of Interest/Lease Sale

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7.0 DEFINITIONS

The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. NAICS was developed under the auspices of the Office of Management and Budget (OMB), and adopted in 1997 to replace the Standard Industrial Classification (SIC) system and to allow for a high level of comparability in business statistics among the North American countries.

IMPLAN: The IMPLAN Model is the most flexible, detailed and widely used input-output impact model system in the U.S. It provides users with the ability to define industries, economic relationships and projects to be analyzed. It can be customized for any county, region or state, and used to assess "multiplier effects" caused by increasing or decreasing spending in various parts of the economy. This can be used to assess the economic impacts of resource management decisions, facilities, industries, or changes in their level of activity in a given area. The current IMPLAN input-output database and model is maintained and sold by MIG, Inc. (Minnesota IMPLAN Group). The 2010 data set was used in this analysis.

APPENDIX A

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING IF EA INCLUDES ALTERNATIVE C	PROPOSED FOR DEFERRAL-NO LEASING
MTM 102757-6H	T. 26 N, R. 52 E, PMM, MT SEC. 27 NWNW; RICHLAND COUNTY 40.00 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-1** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-3** (ALL LANDS)		
MTM 102757-6G	T. 10 N, R. 59 E, PMM, MT SEC. 14 NWNE,N2NW; FALLON COUNTY 120.00 AC ACQ	**CR 16-1** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **NSO 11-2** SEC. 14 N2NW; **TES 16-2** (ALL LANDS)		NONE

Appendix B – Miles City Field Office Stipulation Descriptions

Stipulation Number	Stipulation Name/Brief Description
CR 16-1	**CULTURAL RESOURCES LEASE 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.
CSU 12-1	**CONTROLLED SURFACE USE STIPULATION** Surface occupancy or use is subject to the following special operating constraint: Prior to surface disturbance on slopes over 30 percent, an engineering/reclamation plan must be approved by the authorized officer.
LN 14-12	**LEASE NOTICE PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT** This lease has been identified as being located within geologic units rated as being moderate to very high potential for containing significant paleontological resources. The locations meet the criteria for class 3, 4 and/or 5 as set forth in the Potential Fossil Yield Classification System, WO IM 2008-009, Attachment 2-2. The BLM is responsible for assuring that the leased lands are examined to determine if paleontological resources are present and to specify mitigation measures. Guidance for application of this requirement can be found in WO IM 2008-009 dated October 15, 2007, and WO IM 2009-011 dated October 10, 2008. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or project proponent shall contact the BLM to determine if a paleontological resource inventory is required. If an inventory is required, the lessee or project proponent will complete the inventory subject to the following: • the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory. • the project proponent will, at a minimum, inventory a 10-acre area or larger to incorporate possible project relocation which may result from environmental or other resource considerations. paleontological inventory may identify resources that may require mitigation to the satisfaction of the BLM as directed by WO IM 2009-011.incorporate possible project relocation which may result from environmental or other resource considerations. paleontological inventory may identify resources that may require mitigation to the satisfaction of the BLM as directed by WO IM 2009-011.
LN 14-15	**LEASE NOTICE SPRAGUE'S PIPIT** The lease area may contain habitat for the federal candidate Sprague's pipit. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on Sprague's pipits, their habitat, and overall population. Such measures would be developed during the application for permit to drill and environmental review processes, consistent with lease rights. If the US Fish and Wildlife Service lists the Sprague's pipit as threatened or endangered under Endangered Species Act, the BLM would enter into formal consultation on proposed permits that may affect the Sprague's pipit and its habitat. Restrictions, modifications, or denial of permits could result from the consultation process.
NSO 11-2	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams.

Stipulation Number	Stipulation Name/Brief Description
TES 16-2	**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. BLM may recommend modifications to exploration and development, and require modifications to or disapprove proposed activity that is likely to result in jeopardy to proposed or listed threatened or endangered species or designated or proposed critical habitat.
TL 13-3	**TIMING LIMITATION STIPULATION** No surface use is allowed from March 1 to June 15 in grouse nesting habitat within two miles of a lek. This stipulation does not apply to operation and maintenance of production facilities.

Appendix C – Reasonably Foreseeable Development (RFD) Scenario Forecast for the Area Analysis

The RFD is based on information contained in the MCFO RFD developed in 2005 and revised in 2012; it is an unpublished report that is available by contacting the MCFO. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in the MCFO area and used to analyze projected wells for the 2 nominated lease parcels. These well numbers are only an estimate based on historical drilling and mineral resources present, and may change in the future if new technology is developed or new fields and formations are discovered.

A total of 2 lease parcels, located in Richland and Fallon Counties, are proposed for the October, 2013 leases sale. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in each of the three development potential areas where the proposed lease parcels are located. These development potential areas are specified as high, moderate, and low potential areas.

High Potential
All 40 acres of lease parcel MTM 102575-6H, in Richland County, are in the High Potential Development area. ~~acres, located in Richland County, are in high potential development.~~ The RFD scenario forecasts a range of 856 to1711 oil wells and 1004 to 2009 gas wells in this development area. The range for federal wells is 197 to 394 oil wells and 231 to 462 gas wells. The 40 acres is approximately 0.000662% of the High Potential Development ~~project~~ area identified in the RFD.

Moderate Potential
All 120 acres of lease parcel MTM 102575-6G, in Fallon County, are in the Moderate Potential Development area. ~~acres, located in Fallon County, are in moderate potential development.~~ The RFD scenario forecasts a range of 440 to 1099 oil wells and 516 to 1291 gas wells in this development area. The range for federal wells is 101 to 253 oil wells and 119 to 297 gas wells. The 120 acres is approximately 0.0048% of the Moderate Potential Development ~~project~~ area identified in the RFD.

Low Potential
No lease parcels nominated lie within the area of low development potential.

The MBOGC sets the spacing requirements for oil and gas wells in the state of Montana. Current well spacing for wildcat gas wells is set at 640 acres per well for each producing formation. For oil wells spacing is set based on the well depth. Currently, for oil wells set at a depth between 0 and 6,000 feet the spacing is one well per 40 or 80 acres, for 6,001 to 11,000 feet the spacing is one well per 160 acres, and for wells greater than 11,001 feet in depth the spacing is one well per 320 acres. MBOGC also sets the spacing for CBNG wells, which is currently one well per 640 acres. In the case of CBNG, multiple wells within the standard 640-acre spacing unit are typically required to efficiently produce CNBG. The MBOGC will review spacing when a new field is discovered and the exploration company requests the establishment of permanent spacing unit that is different from the standard statewide spacing. Well spacing can be changed by the MBOGC after lease operators provide geologic, engineering, and economic data to the Board for review. A decision is generally rendered at a Board hearing and

a Board Order is issued establishing the new spacing requirements. Board orders for existing fields are available on the MBOGC website.

Appendix D - Potential Surface Disturbance Associated with Oil & Gas Exploration and Development

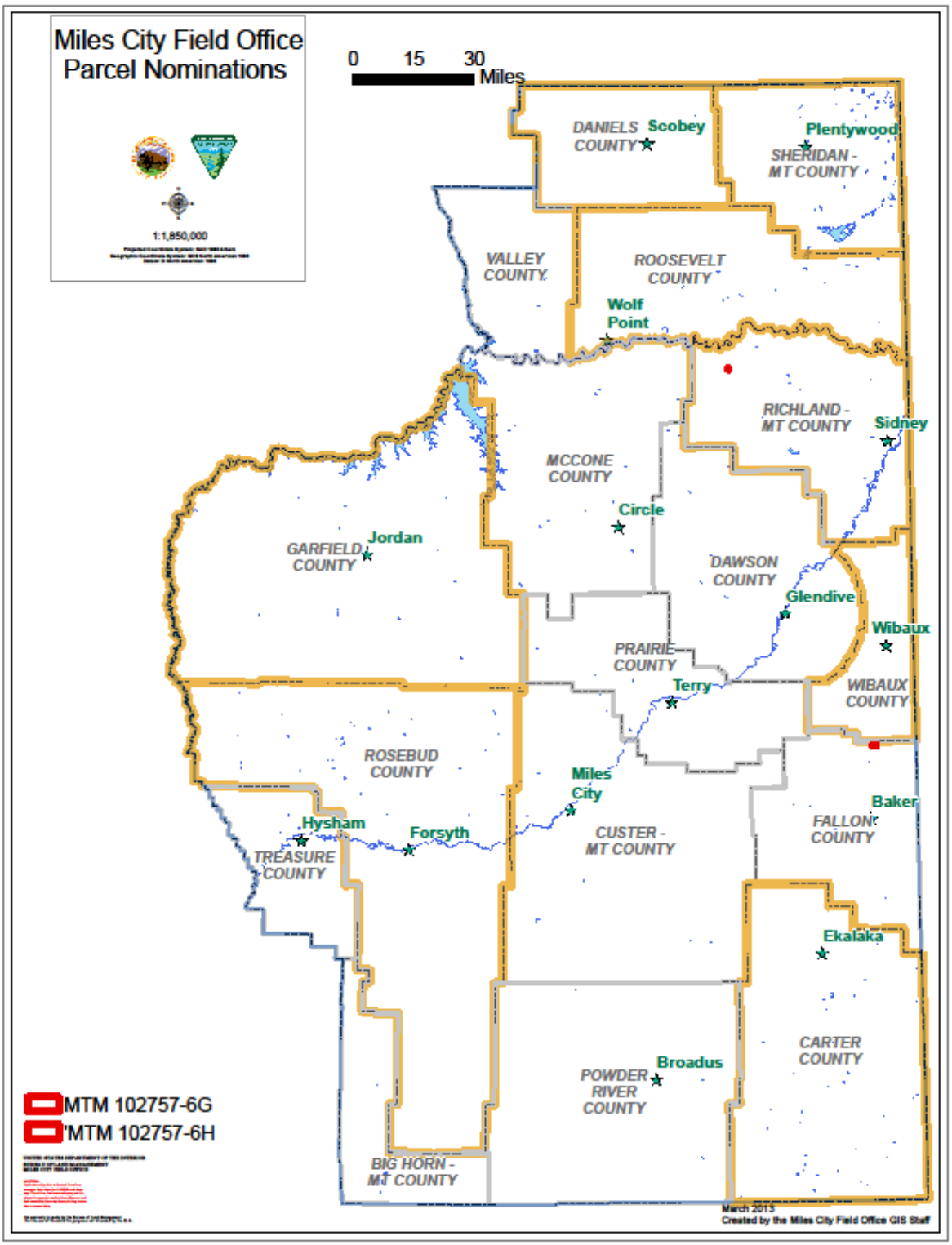
The potential number of acres disturbed by exploration and development activities is shown in Table D-1. The potential acres of disturbance reflect acres typically disturbed by construction, drilling, and production activities, including infrastructure installation throughout the MCFO. Typical exploration and development activities and associated acres of disturbance were used as assumptions for analysis purposes in this EA. The assumptions were not applied to Alternative A because the lease parcel would not be recommended for lease; therefore, no wells would be drilled or produced on the lease parcel and no surface disturbance would occur on those lands from exploration and development activities.

Table D-1. Total RFD Projected Disturbance for Oil and Gas Wells and Associated Production Facilities

Facilities		Exploratory Well Disturbance (acres/well)	Construction Disturbance (acres/well)	Operation/Production Disturbance (acres/well)
		Short-Term – 2 Years		Long-Term
Well Pad (360-foot by 360-foot pad during drilling and construction reduced to 200-foot by 200 foot pad during operation)		3	3	1
Access Roads and Routes to Well Sites	Two-track (12-foot wide by 0.21 miles long)	N/A	0.30	0.30
	Graveled (12-foot wide by 0.075 miles long)	0.5	0.10	0.10
	Bladed (12-foot wide by 0.05 miles)	0.5	0.075	0.075
Utility Lines	Water lines (15-foot by 0.20 miles)	N/A	0.35	1
	Overhead Electric (10-foot by 0.15 miles	N/A	0.20	0.20
	Underground Electric (15-foot by 0.20 miles)	N/A	0.35	0
Transportation Lines	Intermediate Pressure Gas Line to and from field compressor (25-foot by 0.08 miles)	N/A	0.25	0.001
	High Pressure Gas or Crude Oil Gathering Line (25-foot by 0.3 miles)	N/A	0.9	0.2
Processing Area	Tank Battery (one 0.50-acre tank battery per 12.5 wells)	N/A	0.020	0.04
	Access Roads (25-foot by 0.05 miles)	N/A	0.15	0.15
	Field Compressor (0.5-acre pad per 12.5 wells)	N/A	0.2	0.04
	Sales Compressor (2-acre pad for 240 wells)	N/A	0.01	0.01
	Sales Line (25-foot by 6 miles per 240 wells)	N/A	0.075	0.075
Produced Water Management	Produced Water Pipeline (25-foot by 0.3 miles)	N/A	0.9	0.2

	Water Plant/Injection Well (6 acres site per 12.5 wells)	N/A	0.25	0.5
Total Disturbance per Conventional Oil or Gas Well (acres)		4	7.1	3

Map 1. All Nominated Lease Parcels



Map 2. Fallon County Lease Parcel

Map 3. Richland County Lease Parcel