United States Department of the Interior
Bureau of Land Management

Environmental Assessment MT-C040-2011-0010-EA

December 9, 2010

# Project Title:
# South Dakota
# Oil & Gas Leasing Document
# July 2011

***Location: Fall River and Harding Counties***

U.S. Department of the Interior
Bureau of Land Management
South Dakota Field Office
310 Roundup Street
Belle Fourche, SD 57717
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## Errata Sheet

This environmental assessment was updated on February 2, 2011, to include additional information regarding climate change. The added information did not change the range of alternatives being addressed or modifications to proposed stipulations or proposed deferrals. Because of this updated information, public comments on this environmental assessment will be accepted through March 3, 2011.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
South Dakota Field Office
310 Roundup Street
Belle Fourche, South Dakota 57717-1698
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In Reply Refer To:
1600/3100 (MTC040)

January 31, 2011

Dear Reader:

The Bureau of Land Management (BLM) South Dakota Field Office has prepared an environmental assessment (EA) to analyze the potential effects from offering 32nominated lease parcels for competitive oil and gas leasing in a sale tentatively scheduled to occur on July 12, 2011.

The EA with an unsigned Finding of No Significant Impact (FONSI) is available for a 30-day public comment period. Written comments must be postmarked by March 1, 2011 to be considered. Comments may be submitted using one of the following methods:

Email: MT_South_DakotaFO_Lease_EA@blm.gov

Mail: South Dakota Field Office
Attn: Marian Atkins
310 Roundup Street
Belle Fourche, SD 57717

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – will be available for public review. If you wish to withhold personal identifying information from public review or disclosure under the Freedom of Information Act (FOIA), you must clearly state, in the first line of your written comment, "CONFIDENTIALITY REQUESTED." While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations, from businesses, and from individuals identifying themselves as representatives of organizations or businesses, will be available for public review.

Upon review and consideration of public comments, the EA will be updated as needed. Based on our analysis, parcels recommended for leasing in our assessment would be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on July 12, 2011.

Prior to issuance of any leases, the Decision Record and FONSI will be finalized and posted for public review on our BLM website. Please refer to the Montana/Dakotas BLM website at www.blm.gov/mt. From this home page, go to the heading titled "Frequently Requested," where you will find a number of links to information about our oil and gas program. Current and updated information about our environmental assessments can be found on the link titled "Competitive Oil and Gas Lease Sale Information" listed under the heading "Frequently Requested". Once there, click on "2011", where you will find the SDFO EA for the July 12, 2011 lease sale for your review.

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 605-892-7001

Sincerely,

Marian M. Atkins
Field Manager

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# South Dakota Oil & Gas Leasing Document July 2011
# MT-C040-2011-0010-EA

## 1.0 PURPOSE & 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 in 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 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. Mineral leases can be sold on such lands as well. The Montana State Office has historically conducted five lease sales per year.

Oil and gas companies 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 (including those covered by this EA) are nominated by the oil and gas industry, and therefore represent areas of high interest.

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of leasing parcels located in the South Dakota Field Office, to be included in the July 2011 oil and gas lease sale as proposed by the Montana State Office of the Bureau of Land Management.

The project area covers the area of the proposed lease parcels in Fall River County in southwestern South Dakota and Harding County in northwestern South Dakota. The area is mostly rangeland with private surface with federal minerals (93%) but some BLM administered surface with federal minerals (1,723.24 acres for 7%).

SDM - 97300-K – 366.48 acres BLM administered surface - Harding County
SDM - 97300-L – 76.76 acres BLM administered surface – Harding County leased SDM 101090
SDM - 97300-M – 80 acres BLM administered surface – Harding County
SDM - 97300-J – 40 acres BLM administered surface – Harding County
SDM - 97300-JC – 320 acres BLM administered surface – Harding County

SDM - 97300-JH – 320 acres BLM administered surface – Harding County
SDM - 97300-G – 160 acres BLM administered surface - Harding County
SDM - 97300-JT – 80 acres BLM administered surface –Harding County
SDM - 97300-H – 280 acres BLM administered surface – Fall River County

Harding County – 21,819 acres BLM administered mineral estate
Fall River County – 1,402 acres BLM administered mineral estate

## 1.2 Purpose and Need for the Proposed Action

The purpose of offering parcels for competitive oil and gas leasing is to allow private individuals or companies to explore for and develop oil and gas resources for sale on 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 significant 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 parcels in question, and, if so, what stipulations would be identified as required for specific parcels at the time of lease sale.

## 1.3 Conformance with Land Use Plan(s):

This EA is tiered to the decisions, information and analysis contained in the South Dakota RMP of April 1986 and its associated Environmental Impact Statement and the Miles City District Oil and Gas EIS Amendment of February 1994. A more complete description of activities and impacts related to oil and gas leasing, development, production, etc. can be found in these documents. The Miles City District Oil and Gas RMP/EIS Amendment, 1994 was written for all public land and minerals in the State of South Dakota. While stipulations were developed for all lands in South Dakota, they were only applied to the mineral resources deemed most likely to be developed for oil and gas. The stipulations in the Miles City District Oil and Gas RMP/EIS Amendment were developed to be applied to unstipulated lands, as well as for changing conditions and resources.

The parcels to be offered are within areas open to oil and gas leasing. Site-specific analysis was conducted by South Dakota Field Office resource specialists who relied on personal knowledge of the areas involved, review of existing databases and file information, and site visits to ensure that appropriate stipulations had been attached to specific parcels.

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 projected activities and impacts was based on potential well densities

discerned from the Reasonable Foreseeable Development Scenario developed in October of 2009 and documented in conjunction with the revision of the South Dakota RMP. Detailed site-specific analysis of activities associated with any particular parcel would occur when a lease holder submits an Application for Permit to Drill (APD).

The proposed project would not be in conflict with any local, county, or state laws or plans. The proposed action is in conformance with the applicable LUPs because it is specifically provided for in the following LUP decisions: See the Summary on page iii of the Miles City District Oil and Gas RMP/EIS, which gives the lands subject to leasing under various stipulations provided for in the preferred alternative, the section in Appendix B, pages 139-175, which gives the lease forms and stipulations for alternatives, and map numbers 3, 4, and 5, which shows where stipulations apply. Lease terms will also be added to all the leases. See pages 166 and 167. Lease terms refer to the need to be in compliance with 43 CFR 3100, which provides its own protections.

### 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 posting on the Field Office website NEPA notification log. Scoping was initiated December 16, 2010. A letter received from a landowner concerned lease SDM 97300 F and the potential conflict between the historic Black Hills Ordinance Depot and unidentified disposal areas within the depot which could affect the safety of the drilling operation.

Planning issues identified through scoping related to oil and gas leasing include: green-house gas (GHG) emissions and impacts to climate change; protect wildlife and fisheries habitat and corridors; preserve wildlands/pristine landscapes; protect scenic quality/viewsheds; protect cultural areas; minimize surface (soil) disturbance; safety concerns; and identify mitigation measures to minimize impacts from operations.

## 2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

### 2.1 Alternative A - No Action

For Environmental Assessments (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 32 parcels in the South Dakota Field Office from the July 2011 lease sale. 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

The Proposed Action would be to offer and issue 32 parcels of federal minerals for oil and gas leasing, covering 23,221 acres of federal minerals administered by the South Dakota FO. The parcels are located in Harding County and western Fall River County. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A.

Of the approximately 23, 221 acres of federal mineral estate that are considered in this EA, approximately 1,723 acres are public surface with federal mineral estate and approximately 21,498 are split-estate (private surface with federal mineral estate). All parcels would be subject to leasing stipulations as per the oil and gas leasing decisions in the Miles City District Oil and Gas RMP/EIS,(1994) that would protect identified resources or resource uses that otherwise might be jeopardized by the proposed action.

Where the parcels are private surface overlying federal mineral estate the BLM provided courtesy notification to the surface owner that their lands would be included in this lease sale. In the event of activity on such split estate 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.

Standard lease terms, conditions, and operating procedures, as well as additional stipulations and lease notices as listed in Appendix A would apply to these parcels. Standard operating procedures in oil and gas fields include measures to protect the environment and resources including groundwater, air, wildlife, historical and pre-historical concerns, and others as mentioned in the Miles City District Oil and Gas RMP/EIS Amendment at pages 166 through 167.

Oil and gas leases would be issued for a 10-year period and would continue for as long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and gas, 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 lease owner or operator secures approval of a drilling permit and a surface use plan specified at 43 CFR 3162.

## 2.3 Alternative C – Preferred Alternative

Under this alternative, the BLM would not offer for oil and gas leasing portions of 3 parcels (SDM 97300-0 840 acres; SDM 97300-L – 76.76 acres; and SDM 97300-JJ – 720 acres) and 12 parcels (SDM 97300 – M, G, JK, JL, JM, JO, JP, JQ, JR, JT, H, and F) in their entirety based on resource concerns that cannot be resolved with current stipulations or the need to complete consultation with the Native American tribes. No lease stipulations would be added to the deferred parcels and acreage to address site-specific concerns or new information not previously

identified in the land use planning process. Standard terms and conditions as well as special stipulations listed in the RMP would not be applied to the deferred lease sale parcels. These parcels are listed in Appendix A.

Where the parcels are private surface overlying federal mineral estate the BLM provided courtesy notification to the surface owner that their lands would be included in this lease sale. In the event of activity on such split estate 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.

Standard lease terms, conditions, and operating procedures, as well as additional stipulations and lease notices as listed in Appendix A would apply to these parcels. Standard operating procedures in oil and gas fields include measures to protect the environment and resources including groundwater, air, wildlife, historical and pre-historical concerns, and others as mentioned in the Miles City District Oil and Gas RMP/EIS Amendment at pages 166 through 167.

Oil and gas leases would be issued for a 10-year period and would continue for as long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and gas, 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 lease owner or operator secures approval of a drilling permit and a surface use plan specified at 43 CFR 3162.

## 3.0 AFFECTED ENVIRONMENT

Within the project area, lands managed by the SDFO include public domain (lands which have never left federal ownership), private or state surface with federal mineral estate (subsurface) lands beneath, private lands with private mineral estate, and state land with state mineral estate. Numerous scattered, isolated tracts of public domain are present throughout western South Dakota. Ranging in size, with most between 40 to 320 acres of land, these tracts are intermingled with state and private lands. The fragmented land tenure pattern makes management of this land difficult.

Rivers nearby and within the project area include the Little Missouri River, South Fork of the Grand River, and Cheyenne River and their tributaries. With the exception of the Little Missouri River, these rivers and their tributaries mainly flow in a west-to-east direction across western South Dakota. Terrain in the planning area includes open rolling plains derived from sedimentary deposits, solitary buttes, river breaks, and some areas of badlands are located near the project area.

This chapter describes the affected existing environment (i.e., the physical, biological, social, and economic values and resources) that could be affected by implementation of the alternatives described in Chapter 2.

Specific components of the environment that may be affected by this project are discussed below. Only those aspects of the affected environment that are potentially impacted by this project are described in detail.

## 3.1 Air Resources

Air quality and climate are the components of air resources, which include applications, activities, and management of the air resource. Therefore, the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision making process.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. Regulation of air quality is also delegated to some states. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years.

### 3.1.1 Air Quality

Project area air quality is very good. The EPA air quality index (AQI) is an index used for reporting daily air quality (http://www.epa.gov/oar/data/geosel.html). It tells how clean or polluted an area's air is and whether associated health effects might be a concern. The AQI focuses on the potential health effects a person may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for the five major 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 national air quality standards to protect public health. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level EPA has set to protect public health. 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.

In the context of ozone, all areas throughout Montana and the Dakotas (including near Billings FO) are currently meeting federal standards in all locations. Light and dark blue circles in Figure 3.1.1 indicate standards being met in 2008. Open circles in Figure 3.1.2 indicate static trends.

For haze, trends appear to be improving for the clearest days (Figure 3.1.3), while there are no apparent trends for the haziest days (Figure 3.1.4).

**Figure 3.1.1. Ozone concentrations in ppm, 2008 (fourth highest daily maximum 8-hour concentration).**

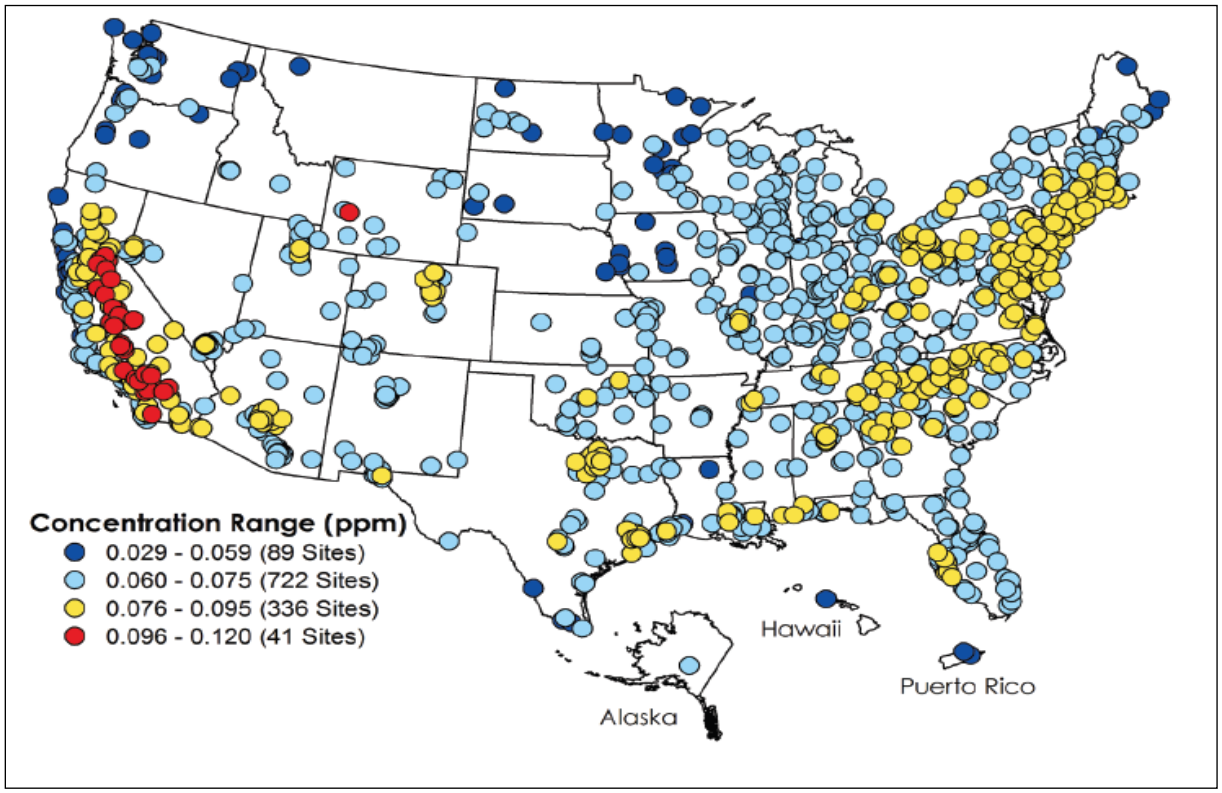


**Figure 3.1.2. Change in ozone concentrations in ppm, 2001-2003 vs. 2006-2008 (three-year average of the annual fourth highest daily maximum 8-hour concentrations).**

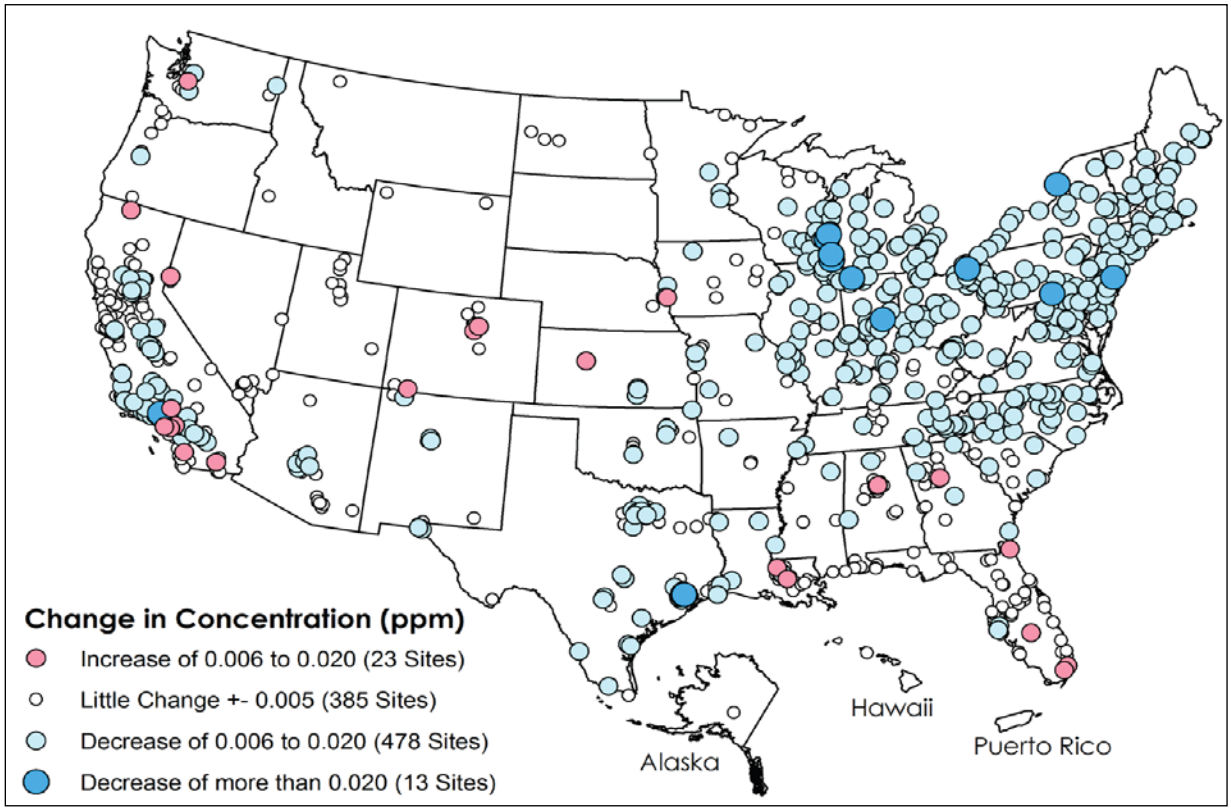


**Figure 3.1.3. Trends in haze index (deciview) on clearest days, 1998-2007.**

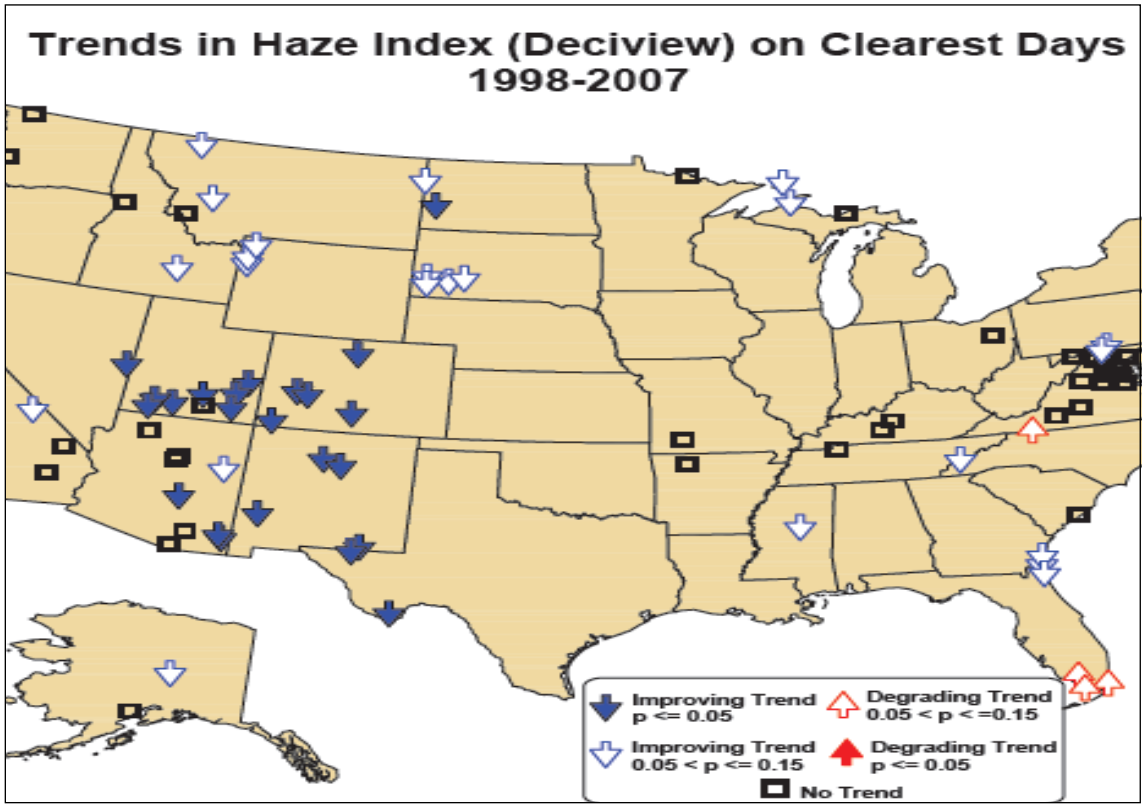
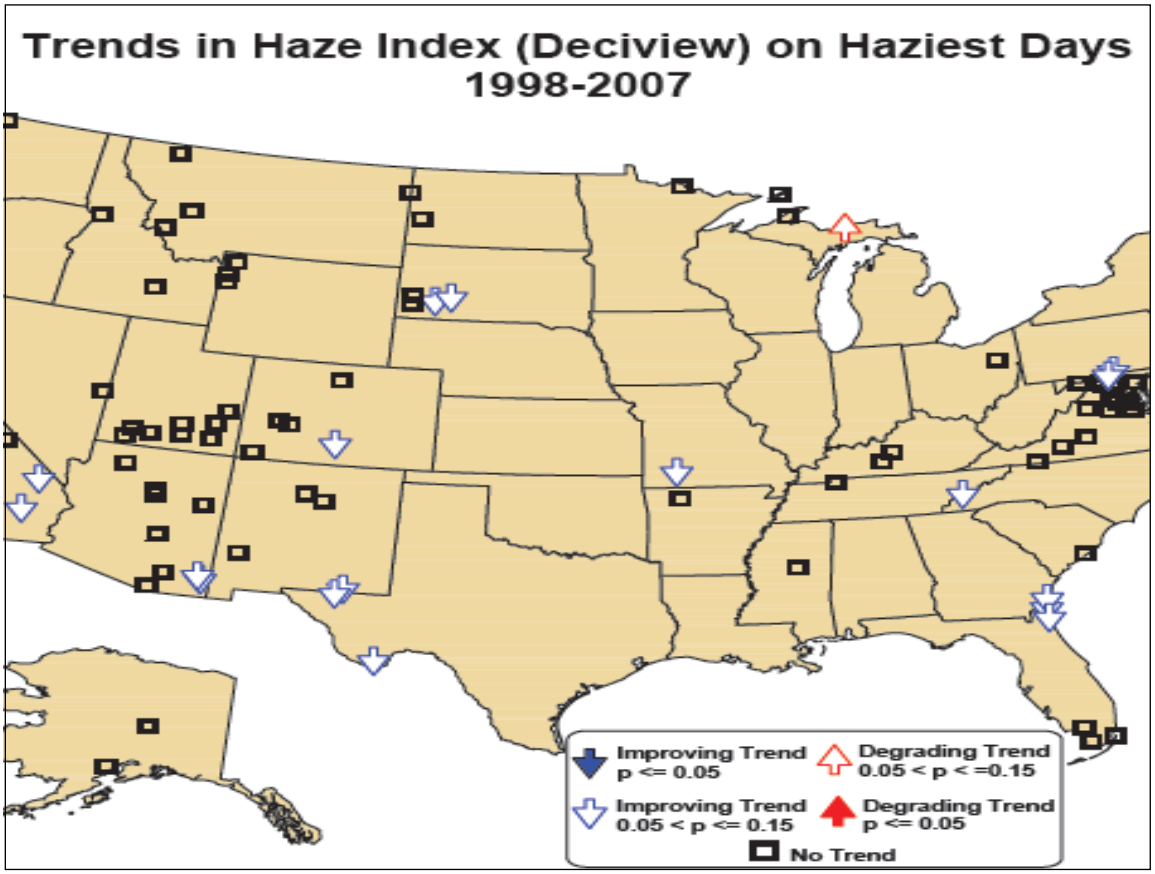


**Figure 3.1.4. Trends in haze index (deciview) on haziest days, 1998- 2007.**




The AQI data shows that there is little risk to the general public from air quality in the South Dakota Field Office (Table 3.1.1). Between 1999 and 2008, 89 percent of the monitored days rated "good" with 11 percent being "moderate". While there have been days that posed a health risk for sensitive groups (primarily in Pennington County), the occurrence is very rare (0.2 percent of all records) and short term. The pollutants that caused these elevated risks were $PM_{2.5}$ and $PM_{10}$.

| Table 3.1.1. US EPA - AirData Air Quality Index Report – Field Office Summary (1999-2008) | | | | | | | |
|---|---|---|---|---|---|---|---|
| County | State | # Days with Data | # Days rated Good | Percent of Days Rated Good | # Days Rated Mod | # Days Rated Unhealthy for Sensitive Groups | # Days Rated Unhealthy |
| Custer | SD | 1,920 | 1,778 | 93 | 138 | 4 | 0 |
| Jackson | SD | 2,429 | 2,310 | 95 | 118 | 1 | 0 |
| Meade | SD | 1,332 | 1,307 | 98 | 25 | 0 | 0 |
| Pennington | SD | 3,369 | 2,623 | 78 | 732 | 13 | 1 |
| Field Office | SD | 9,050 | 8,018 | 89 | 1,013 | 18 | 1 |
| Field Office Percentages | | - | - | 88.6 percent | 11.2 percent | 0.2 percent | < 0.015 percent |

Monitoring data show that the primary pollutants for this project area are ozone and particulate matter ($PM_{2.5}$ and $PM_{10}$). A review of emissions from Butte, Custer, Fall River, Haakon, Harding, Lawrence, Meade, Pennington, Perkins, and Stanley counties (where most 99% of BLM lands are located) show that agriculture and forestry (29 percent), fugitive dust (25 percent), and mineral products (19 percent) are the largest contributors of $PM_{2.5}$. Coarse particulate matter ($PM_{10}$) comes primarily from fugitive dust (44 percent), agriculture and forestry (34 percent), and mineral products (15 percent). Both fugitive dust and agriculture and forestry are temporary in nature and do not pose a significant threat to human health due to limited exposure. An inventory does not exist for ozone. It's important to note that the presence of a source does not automatically mean that air quality is impaired. As shown above, these emissions do not necessarily lead to impaired air quality. The emissions information is simply intended to identify those sectors which have the greatest likelihood to influence current and future air quality for this project area.

There are two Class 1 areas in South Dakota; Badlands National Park and Wind Cave National Park. Both of these areas are located at least 100 miles to the southeast from the Harding County project location. The prominent wind direction for Wind Cave and Badlands National Park is from the southwest therefore any disturbance from the Harding County project area would not likely affect these areas.

The Fall River parcels are located 28 to 45 miles southwest of Wind Cave National Park and 55 to 60 miles west of Badland National Park. The prominent wind direction for Wind Cave and Badlands National Park is from the southwest therefore there is potential for some impact from these parcels but the total acres of the Fall River County leases are 3,202.16 acres in Alternative B and 192.14 in Alternative C. Within South Dakota there are no non-attainment areas, which makes South Dakota one of only 13 states to comply with all federal ambient air quality standards.

### 3.1.2 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 2007a). 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 20$^{th}$ 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 in the Climate Change SIR 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 believed by scientists to be linked to 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 carbon dioxide and methane) from fossil fuel development, large wildfires, and 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, $CO_2$ proper may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR, 2010).

North Dakota, Montana, and South Dakota are all in the lower third of GHG emitting states (by volume). North Dakota ranks 37, Montana ranks 42, and South Dakota ranks 43. Only Hawaii and Idaho have lower emissions than Montana and South Dakota among western states (http://assets.opencrs.com/rpts/RL34272_20071205.pdf, Ramseur 2007). Montana, North Dakota, and South Dakota combine for 1.8 percent of the United States' (U.S.) greenhouse gas emissions.

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 following bullet points summarize 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 take place. The EPA identifies this area as part of the Mountain West and Great Plains region (http://www.epa.gov/Region8/climatechange/pdf/ClimateChange101FINAL.pdf):

- 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 patters 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 (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 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 has increased 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.

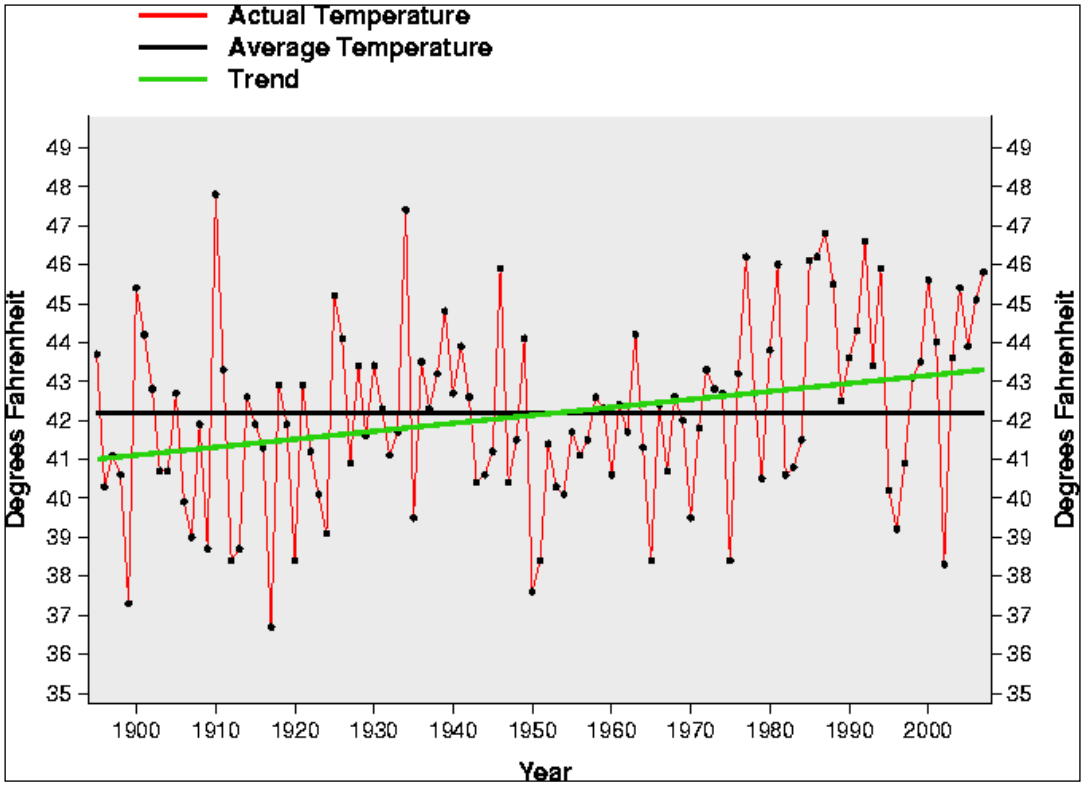
More specific to South Dakota, additional projected changes associated with climate change described in Section 3 of the Climate Change SIR, 2010 include:

- Temperature increases in South Dakota are predicted to be between 3 to 5°F at mid-21$^{st}$ century and between 5 to 10°F at the end of the 21$^{st}$ century over most of the state. As the mean temperature rises, more heat waves are predicted to occur. In the late 21$^{st}$ century, the number of days per year with temperatures above 100°F is predicted to be between 30 and 60, depending on the level of GHG emissions, with the largest increase in the number days over 100°F occurring in the southern portion of the state.
- Precipitation increases are predicted to be 15-25 percent and 10-20 percent in spring in South Dakota by the late 21$^{st}$ century. Precipitation is also predicted to decrease slightly (up to 10 percent) in summer and remain relatively unchanged in the fall.
- Throughout the state, annual median runoff is expected to decrease between 2 and 5 percent by mid-21$^{st}$ century.
- Crop yields may increase in South Dakota associated with predicted temperature increases.
- South Dakota's wetland extent and quality is predicted to remain fairly stable if temperature increases are limited to approximately 2°C or if a temperature increase of up to 4°C were accompanied by a 10 percent increase in precipitation. A temperature increase of approximately 4°C without a significant precipitation increase is predicted to cause wetland degradation.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study (Climate Change SIR, 2010) predicted an increase in median annual area burned by wildland fires in the western portion of South Dakota/ Montana based on a 1°C global average temperature increase to be 393 percent.

While long-range regional changes might occur within this project 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, 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 3.1.5). This would suggest that runoff may be occurring earlier than in the past. However, data from 1991-2005 indicates a 0.45 degree per decade cooling trend (Figure 3.1.6). This example is not an

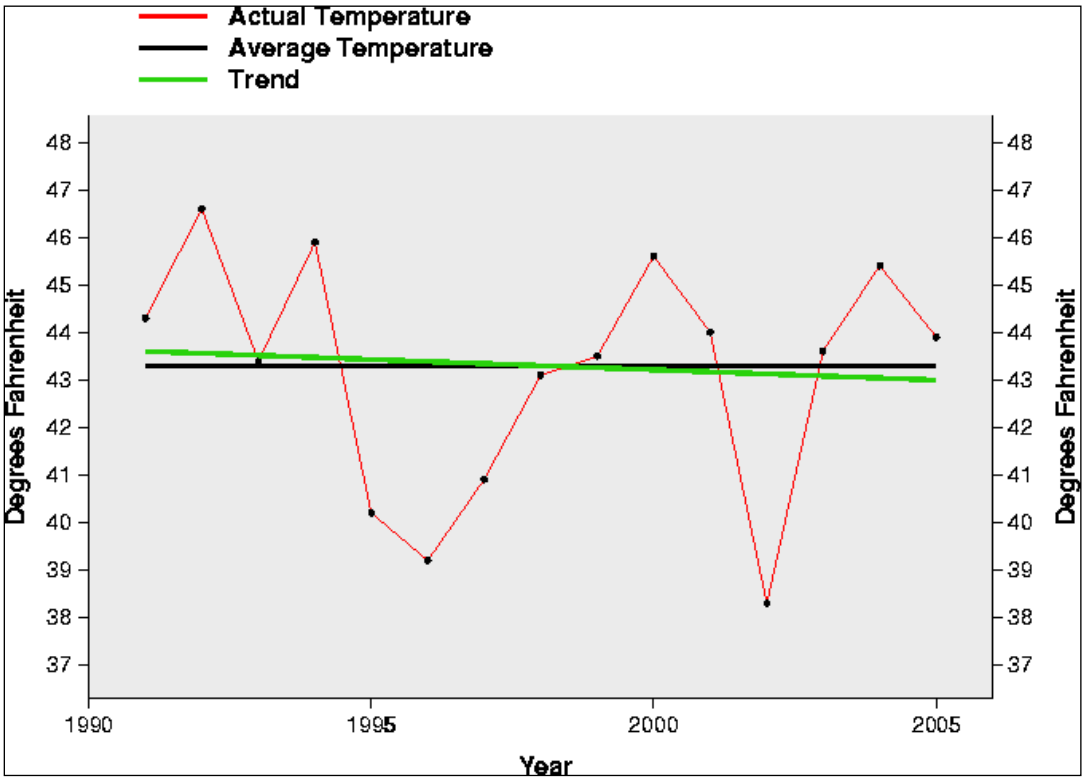
anomaly, as several other 15-year windows can be selected to show either warming or cooling trends. Some of t - - , and the eruption of large volcanoes (Climate Change SIR, 2010). This information illustrates the difficulty of predicting actual regional or site-specific changes or conditions which may be due to climate change during any specific time frame.

**Figure 5. 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 6. 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**)**

## 3.2 Soil Resources

Soils in the lease parcels usually have some limitations resulting in difficulties in establishing vegetation and reclaiming a disturbed surface. Limitations shown in Reclamation Potential do not necessarily apply to all soils in the mapping unit, but they do apply to at least one major constituent in the mapping unit.

Soil associations used in Table 3.2.1 are general soil associations from the county soil survey.

3.2.1 Reclamation Potential of Soils, using general soil map units

| **Lease Parcel Number** | **Primary Soil Associations and Symbol** | **Reclamation Potential** |
|---|---|---|
| ____ | *Harding County general soil map units* | ____ |
| 97300-O | 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| 97300-K | mostly 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| | some 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-L | half 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| | half 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-M | 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| 97300-J | mostly 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| | some 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-JA | nearly all 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| | a little 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-JB | 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-J1 | 8-Twilight-Parchin-Cabbart | Poor due to shallow soils, sodic subsoil, steep |

| | | |
|---|---|---|
| | Association | slopes, poor available water capacity |
| 97300-JC | 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-JD | mostly 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| | much 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| 97300-JE | nearly all 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| | a very little 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-JF | nearly all 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| | a very little 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-JG | mostly 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| | a little 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| 97300-J2 | 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| 97300-J3 | mostly 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| | a very little 8-Twilight-Parchin-Cabbart Association | Poor due to shallow soils, sodic subsoil, steep slopes, poor available water capacity |
| 97300-JH | 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| 97300-J4 | 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |

| | | |
|---|---|---|
| 97300-G | 13-Cohagen-Rock outcrop association | Poor due to shallow soils, steep slopes, rock outcrop |
| 97300-JI | nearly all 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| | a little 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| 97300-JJ | 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| 97300-JK | mostly 3-Hanly-Korchea-Glendive association | Poor due to wind erosion, low available water capacity |
| | a little 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| 97300-JL | mostly 6-Zeona-Trey association | Poor due to wind erosion, low available water capacity, steep slopes, shallow soils |
| | some 7-Bullock-Parchin association | Poor due to shallow soils, sodic subsoil, poor available water capacity |
| 97300-JM | mostly 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| | a little 10-Cabba-Amor-Rhoades association | Poor due to shallow soils, sodic subsoil, steep slopes |
| | a little 12-Reva-Rockoa association | Poor due to shallow soils, steep slopes, poor available water capacity |
| 97300-JO | 12-Reva-Rockoa association | Poor due to shallow soils, steep slopes, poor available water capacity |
| 97300-JP | half 11-Cabbart-Rock outcrop-Delridge association | Poor due to shallow soils, steep slopes, rock outcrop |
| | half 12-Reva-Rockoa association | Poor due to shallow soils, steep slopes, poor available water capacity |
| 97300-JQ | 14-Marmarth-Twilight-Cabbart | Poor due to shallow soils, steep slopes, |

| | | |
|---|---|---|
| | association | erosivity, and poor available water capacity |
| 97300-JR | half 13-Cohagen-Rock outcrop association | Poor due to shallow soils, steep slopes, rock outcrop |
| | half 10-Cabba-Amor-Rhoades association | Poor due to shallow soils, sodic subsoil, steep slopes |
| 97300-JS | 10-Cabba-Amor-Rhoades association | Poor due to shallow soils, sodic subsoil, steep slopes |
| 97300-JT | mostly 10-Cabba-Amor-Rhoades association | Poor due to shallow soils, sodic subsoil, steep slopes |
| | some 3-Hanly-Korchea-Glendive association | Poor due to wind erosion, low available water capacity |
| ____ | *Fall River County general soil map units* | ____ |
| 97300-H | mostly 8-Minnequa-Grummit Association | Poor due to shallow soils, steep slopes, poor available water capacity, acidic |
| | some 6-Dailey-Ascalon Association | Poor due to erosivity and poor available water capacity |
| 97300-A | 8-Minnequa-Grummit Association | Poor due to shallow soils, steep slopes, poor available water capacity, acidic |
| 97300-F | 8-Minnequa-Grummit Association | Poor due to shallow soils, steep slopes, poor available water capacity, acidic |

### 3.3 Water Resources

A number of ephemeral streams cross parcels, as do a few perennial streams. The Cheyenne River crosses parcels number SDM 97300-H.

### Hydrology – Ground Water

The quality and availability of ground water varies greatly across South Dakota. Residents in western South Dakota commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials or consolidated sedimentary rock formations.

Aquifers that residents most commonly use in this area include the Fort Union, Hell Creek, and the Fox Hills formations. In much of the project area, near-surface thick shale deposits such as the Pierre, Mowry, and Belle Fourche, severely limit the economic availability of water wells, or provide water of quality too poor for most uses. The water in some shallow aquifers is suitable only for livestock consumption. Shallow western South Dakota aquifers typically yield less water and water produced is more salty, or mineralized compared to some moderately deep formations that are more expensive to drill but produce more palatable water.

### 3.4.1 Vegetation Communities

The mixed grassland community is dominated by perennial grasses. Perennial grasses can be both warm season and cool season grasses. Furthermore, these perennial grasses can be both tall and short grasses. The mixed grass prairie within the planning area consists of multiple ecological sites, varying from clayey and shallow clay to thin upland and sandy ecological sites.

#### 3.4.1.1 Western Wheatgrass (Clayey Ecological Sites)

The identified clayey ecological sites primarily have a climax plant cover of western wheatgrass **(***Pascopyrum smithii***)** and green needlegrass (*Nassella viridula)***.** The deeper soils have an understory of blue grama **(***Bouteloua gracilis***)**, buffalograss (*Bouteloua dactyloides*), and sedges (*Carex sp*.). Forbs such as black sampson (*Echinacea angustifolia*) and American vetch (*Vicia americana*) may be present on some of the sites.

Wyoming big sagebrush (*Artemisia tridentata ssp. Wyomingensis*) is a minor component of the clayey ecological sites and may become significant on the claypan sites. The low lying Wyoming big sagebrush is often found in the slick spots. While Wyoming big sagebrush is a minor component of the plant community, it is an important habitat component for many wildlife species. The shallow clay ecological sites in Fall River County may have rocky mountain juniper on the north and east exposures.

#### 3.4.1.2 Sandreed and Bluestem ( Sandy Ecological Sites and Thin Claypan Ecolgical Sites)

The sandy ecological sites contain a more unique climax plant cover. The dominant warm season grasses are prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*), and little bluestem (*Schizachyrium scoparium*). Cool season grasses primarily include needle-and-thread (*Hesperostipa comata*) and western wheatgrass. Shrubs can include sand sagebrush (*Artemisia filifolia*). Thin claypan ecological sites may contain little bluestem along with needle-and-thread, blue grama, sideoats grama (*Bouteloua curtipendula*), threadleaf sedge (*Carex filifolia*), western wheatgrass, prairie sandreed and forbs such as sageworts (*Artemisia* spp.).

### 3.4.1.3 Wetland-Riparian

Riparian-wetland areas are a small part of a larger area composed primarily of the rolling prairies of the Great Plains. In localized areas trees, shrubs, and other vegetation types occur where topography, elevation, climate, or local water sources allow. In the planning area, woodland vegetation is confined to stream courses or to other locations such as the foothills where combinations of soil and topography cause greater than average accumulation of moisture. Wetlands provide watering points for wildlife and livestock and provide habitat diversity. Riparian-wetland areas are among the most productive and important ecosystems, comprising approximately one percent of the public lands. Characteristically, riparian-wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Some of the more common vegetative species that occur in riparian-wetland areas include prairie cordgrass (*Spartina pectinata*), inland saltgrass (*Distichlis spicata*), and baltic rush (*Juncus balticus*). Many riparian areas in the analysis area do not support woody vegetation, however sandbar willow (*Salix exigua*), plains cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*) and boxelder (*Acer negundo*) can be found in some sites. Healthy riparian 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 ground water recharge and base flow (Hansen et. al. 1995).

### 3.4.1.9 Invasive, Non-Native Species

Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the project area. Several invasive, non-native plant species occupy the project area including: Canada thistle (*Cirsium arvense),* leafy spurge (*Euphorbia esula),* crested wheatgrass *(Agropyron cristatum*), Japanese brome *(Bromus japonicas),* cheatgrass/downy brome *(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/downy brome, Japanese brome, and foxtail barley are all aggressive invasive species that out-compete desirable vegetation for water and soil nutrients. These species may also reduce cattle grazing performance, wildlife habitat quality, and native species diversity. Cheatgrass/downy brome is an invasive species well known for completely replacing native vegetation and changing fire regimes.

### 3.4.1.10 Noxious Weeds

Noxious weeds occur in scattered isolated populations throughout the planning area. The most common species of noxious weeds are leafy spurge, Canadian thistle and saltcedar. Noxious weed control is the responsibility of the Surface Management Agency in cooperation with the local weed control board. Chemical and biological control methods are utilized with chemical control being the more predominant.

## 3.5 Special Status Species

A number of bird, fish, mammal, and insect species are considered special status species for BLM within the planning area. The State of South Dakota's sensitive species are given the designation of state listed or species of management concern. BLM's special status species include sensitive, state listed, federally listed, proposed to be listed, and candidate species.

### 3.5.1 Special Status Animal Species

#### Birds

There are two species of birds that are listed as endangered that is found within the planning area, The Interior Least Tern (*Sterna antillarum)* occurs along some of the rivers within the planning area but has little potential to occur in the lease units. The other species is the whooping crane (*Grus Americana)* that migrates through the area to its nesting grounds or wintering areas and has some potential of occurring in fields or wetlands during those periods.

There is one threatened species of bird that is found within the planning area (piping plover (*Charadrius melodus*)) but is not known to occur on the lease units. The piping plover nests along some of the rivers within the planning area but has little potential to occur within the lease units, because of lack of wetland habitat.

The greater sage grouse (*Centrocercus urophasianus*) was recently listed as a candidate species. Greater sage-grouse are found mainly in the two northwestern South Dakota counties of Butte and Harding. The South Dakota population is considered non-migratory and is mainly associated with big and silver sagebrush communities.

The Sprague's pipit (*Anthus spragueii* ) in September 2010 became warranted (for listing) but precluded, making it a candidate species. This pipit is known to occur in Harding, Perkins, and Stanley counties and could potentially be found in other northwestern South Dakota counties. Sprague's pipit use grasslands of intermediate height and sparse to intermediate vegetation densities with other habitat features of low visual obstruction, moderate litter cover and little or no woody vegetation (Dechant et al 2001). The occurrence of this species on BLM administered surface or minerals is unknown.

#### Mammals

Two species of mammals that are listed as endangered may be found within the planning area but not within the proposed lease units. The Black-footed Ferret (*Mustela nigripes*) has been reintroduced in South Dakota into parts of their former range from a captive breeding population. These reintroduction sites are not within the proposed lease units. The historic range of the ferret in South Dakota corresponds to the range of the black-tailed prairie dog (see discussion under sensitive mammal species). The historic range of gray wolves (*Canis lupus)* included all of South Dakota; currently, breeding populations of wolves exist in the adjoining states of

Wyoming, Minnesota, and Montana, and some individuals move from these populations into and through South Dakota.

**Fish**

Two fish species listed as endangered occur in the South Dakota RMP planning area. These species are not known to occupy BLM lands and would not occupy the proposed lease units or be affected by BLM management of federal minerals. Of these two species, the Pallid Sturgeon *(Scaphirhynchus albus)* is found in the Missouri River in South Dakota. The other, the Topeka shiner *(Notropis Topeka)* is found mainly in eastern rivers and tributaries of South Dakota.

**Insects**

Insects that are considered under the special status species include the American Burying Beetle(*Nicrophorus americanus)* (a threatened species) and the Dakota Skipper Butterfly( *Hesperia dacotae* (a candidate species). They do occur in the SDFO planning area but are not known to occur on the proposed lease areas.

## Sensitive Species

There are 33 bird species considered sensitive by BLM in the South Dakota planning area, with almost all of them having the potential to occur on BLM surface or federal mineral, split-estate parcels. They include birds that use grasslands, water, or forested areas.

**Grassland birds**.

The proposed lease parcels have good habitat for a large number of the sensitive bird species that use the shrub-steppe, short, and midgrass prairie habitats. These birds may occur on these units for some or all of their life cycle.

Baird's Sparrow (*Ammodramus bairdii*)
Brewer's Sparrow (*Spizella breweri*)
Le Conte's Sparrow (*Ammodramus leconteii*)
Sage sparrow (*Amphispiza belli*)
Chestnut-collared longspur (*Calcarius ornatus*)
Dickcissel (*Spiza americana*)
Sage Thrasher (*Oreoscoptes montanus*)
Bobolink (*Dolichonyx oryzivorus*)
Loggerhead shrike (*Lanius ludovicianus*)
Long-billed Curlew (*Numenius americanus*)
Marbled Godwit (*Limosa fedoa*)
Swainson's hawk (*Buteo swainsoni*)
Ferruginous Hawk (*Buteo regalis*)
Golden Eagle (A*quila chrysaetos*)

Burrowing Owl (*Athene cunicularia*)
Trumpeter Swan (*Cygnus buccinators*)

**Mammals**

The two sensitive mammal species that have the potential to occur in the proposed lease parcels are the Swift Fox and the Black-tailed Prairie Dog. Both species are associated with prairie communities and are found in western South Dakota.

Swift fox are found within the western part of South Dakota and have the potential to occur in the proposed lease area. There is a small native population in Fall River County and a re-introduced population on the Bad River Ranch in Stanley County in central South Dakota. There also has been documented movement of individuals across western South Dakota. The Swift fox uses large tracts of short or mid-grass prairie for its habitat.

The Black-tailed Prairie Dog is found in colonies in the open grasslands of the planning area. There are no known prairie dog colonies in the proposed lease units but there is potential for them to occur.

**Reptiles and Amphibians**

There are four sensitive species of reptiles and amphibians listed by BLM that have potential to occur on the proposed lease units.

The snapping turtle is highly aquatic and found mainly in permanent water with soft mud bottoms and aquatic vegetation across South Dakota. This species inhabits aquatic areas across the planning area and has the potential to occur in all lease units.

The Western hog-nosed snake generally uses open prairies or sandy areas near floodplains or water but will burrow in grasslands with well-drained soils. It can be observed throughout the planning area and has the potential to occur in all lease units.

The short-horned lizard is a ground-dwelling lizard that inhabits semiarid shortgrass or sage prairies with rocky or sandy areas. This species is distributed over the northwest and southwest corners of South Dakota, inhabiting many of the butte and badland areas. It can be observed throughout the planning area and has the potential to occur in all lease units.

The plains spadefoot, which inhabits grassland and floodplain areas with sandy or loose soil, are sporadically distributed throughout western South Dakota in most west river counties. They have the potential to occur on all proposed lease units.

**Fish**

Nine sensitive fish species live in the planning area but do not occur on the proposed lease units. The species are banded killifish, blacknose shiner, blue sucker, longnose sucker, northern redbelly dace x finescale dace hybrid, paddlefish, pearl dace, sicklefin chub, and sturgeon chub.

### 3.5.2 Special Status Plant Species

There are no known sensitive plant species within the proposed lease parcels.

## 3.6 Fish and Wildlife Resources

Falling within the Northern Great Plains ecosystem, the proposed lease parcels are important to many wildlife species due to habitat diversity which supports breeding populations.

The assortment of topography, vegetation, and climate occurring in the planning area provides habitats for a variety of wildlife species. The presence of any species may be seasonal or year-round based on individual species requirements. Wildlife found within this area is representative of those species found within the Northern Great Plains ecosystem, including grasslands, sagebrush, and riparian habitats. Sagebrush habitats provide perennial habitat for mule deer, sage-grouse, and pronghorn antelope and other sagebrush obligate species.

Riparian and wetland habitats are used extensively by wildlife, including neotropical migrant birds (species that breed in North America and over-winter in Central and South America), such as finches, warblers, thrushes, and orioles in the spring and fall. Buttes and rock areas are utilized by roosting and nesting golden eagles and prairie falcons, along with many other bird species. These butte and rock areas also provide important cover for large mammals, such as mountain lions and bobcats and for small mammals such as ground squirrels and rabbits.

### Raptors

Approximately 25 species of raptors could use the proposed lease parcels during migration and as breeding habitat. Raptors (predatory birds such as hawks, eagles, owls, and falcons) can be found throughout much of the area.

Common breeding species include the red-tailed hawk *(Buteo jamaicensis)*, prairie falcon *(Falco mexicanus)*, American kestrel *(Falco sparverius)*, northern harrier *(Circus cyaneus)*, and great-horned owl *(Bubo virginianus)*. Other less common breeding species that may be found locally include the ferruginous hawk *(Buteo regalis)*, and long-eared owl *(Asio otus)*. Nesting habitats are found across the grassland, shrub-land, and buttes, and in cottonwood, ash, and ponderosa pine where available. Prey species are more likely to be available for a wide range of raptors when plant communities are structurally diverse and support mixtures of grasses, forbs, and shrubs. Some of the breeding species also winter within the planning area; however, the rough-legged hawk *(Buteo lagopus)* only uses the proposed lease units for its wintering grounds.

### Grassland and Neotropical Birds

The proposed lease units support a wide variety of grassland and neotropical migrant bird species (more than 250 species). Populations of some of these species are declining as a consequence of land use practices and other factors. Many species of grassland birds nest and raise their young

on these lease parcels. Neotropical migrants exhibit quite variable habitat requirements and are found in most habitat types. Most birds found here are or have the potential to be migrant birds.

**Upland birds**

The upland game bird species are the most popular game birds in the South Dakota planning area and are hunted in parts of this area. The sharp-tailed grouse *(Tympanuchus phasianellus) is* native to the proposed lease areas along with the greater sage grouse (discussed in the sensitive species section). The other upland gamebird that may occur is gray partridge *(Perdix perdix).* These species are generally in the area yearlong.

**Waterfowl, Shorebirds and Wading Birds**

Approximately 70 species of birds use the proposed lease parcel wetlands when surface water is present during migration and as breeding habitat. Representative breeding species include the Canada goose *(Branta canadensis)*, mallard *(Anas platyrhynchos)*, gadwall *(A. strepera)*, American avocet *(Recurvirostra americana),* and Wilson's phalarope *(Steganopus tricolor).* Vegetation cover for nest concealment from predators and for protection from other disturbances is important to these species during the breeding season.

**Mammals**

Many species of mammals that occur on these lease parcels are small terrestrial mammals such as rabbits, skunks, weasels, squirrels, gophers, mice, voles, and shrews, along with several species of bats which are not as visible but play an important ecological role in their associated habitats. The proposed lease parcels also provide habitat for many species of medium sized mammals, including coyote, red fox, bobcat, badger, and raccoon which are the main predators of the area. These species play an important ecological role in their associated habitats. The larger mammals that may occur on these lease unit and are much more visible are, mule deer, pronghorn antelope and white-tailed deer. These species concentrate within wintering habitat where increased stress from disturbance may affect the population.

## 3.7 Cultural Resources

Common prehistoric archaeological site types in Harding and Fall River Counties of western South Dakota are rock art, artifact scatters, burials, bison or antelope bone beds, eagle-trapping pits, tool stone procurement and tool manufacture. Also, these areas contain numerous rock cairns, rock shelters, stone alignments, stone circles, vision quest locales, and camp or occupation areas. Common historic archaeological sites are the remains of farmsteads, homesteads, depressions, artifact scatters, foundations, cabins, sheepherder camps, line camps, CCC camps, wells and historic inscriptions (Sundstrom 2009).

A literature search (Level I or Class I) of records at the South Dakota Archaeological Research Center was conducted for each of the 32 nominated lease parcels and a one mile search radius, to determine what types of numbers of known cultural resources are present within or adjacent to the lease parcels. Additional cultural resource information was reviewed for the general area in the 1986 South Dakota Resource Management Plan and the South Dakota Statewide Comprehensive Historic Preservation Plan (Sundstrom 2009). Requests were made to tribal historic preservation offices in South Dakota, North Dakota, Minnesota, and Montana for additional cultural information.

There are 29 lease parcels in Harding County and another 3 lease parcels in Fall River County that are being considered for this Environmental Analysis. Of these parcels, 10 of 32 parcels have received previous cultural resource surveys for Fiber optic Cable, Seismic Surveys, Cultural Resource Sample Surveys, Land Exchange, Roads and Railroads, and an Interstate Oil Pipeline. These surveys present 10 percent coverage in the lease parcels being considered. Eleven of the 32 parcels contain 11 cultural resource sites inside the lease parcels. There are 50 sites known in a one mile radius of 16 of the lease parcels. Table 3.7.1 displays the site types and how many are known for each lease parcel and in a one-mile radius.

Table 3.7.1: List of Cultural Resource Site Types and Numbers inside Parcels & 1-Mile Radius.

| **Cultural Resource Site Types** | **No. Sites Inside parcels** | **No. Sites 1-Mile Radius** |
|---|---|---|
| Well/Cistern | 2 | 1 |
| Prehistoric Isolated Find | 2 | 5 |
| Prehistoric Lithic Scatter | 5 | 9 |
| Historic Townsite | 1 | 1 |
| Prehistoric Occupation/Artifact Scatter | 1 | 1 |
| Artifact Scatter | | 6 |
| Stone Circles | | 3 |
| Rock Cairns | | 6 |
| Cairn/Depression | | 1 |
| Cairn/Possible Burial | | 1 |
| Grave | | 1 |
| Paleontological/Faunal | | 1 |

| | | |
|---|---|---|
| Rock Shelter | | 1 |
| Rock Art (Historic) | | 1 |
| Historic Industrial | | 1 |
| Historic Nonfarm Ruin | | 1 |
| Historic Farmstead | | 1 |
| Historic Road | | 2 |

Of the known sites inside the lease parcels one is considered eligible for consideration to the National Register of Historic Places (NRHP), three are unevaluated, and seven were previously evaluated as not eligible for consideration.

There are 50 known previously recorded cultural resource sites in the one mile radius of the lease parcels. Of these sites, one is considered eligible for consideration to the NRHP; 39 are unevaluated, and 10 were previously evaluated as not eligible. A large number of these radius sites are concentrated to two areas of lease review, near the Slim Buttes in southeastern Harding County, and along the Cheyenne River south of the Black Hills. This information was taken into consideration when doing the analysis and is the basis for recommendation of deferral for several of the leases.

One of the Fall River County lease parcels falls inside a cultural resource site that is considered a National Register of Historic Places eligible historic district and has potential for a National Landmark site. National Landmark and Historic District sites that qualify as NRHP eligible will need further consultation with the State Historic Preservation Office staff to ensure there are no adverse effects to the site and contributing elements.

Site 39FA3003: is the site of Igloo/Provo: the Eligible Historic District of the "Black Hills Army Depot". The Black Hills Ordnance Depot (BHOD) was a munitions storage and maintenance facility that was constructed in 1942 and operated by the United States Army near Edgemont, South Dakota. The BHOD was built to help meet the increased ordnance handling needs caused by World War II.Igloo, named from the igloo-like storage buildings at the BHOD was the residential community of federally owned housing where the civilian workforce of the Black Hills Ordnance Depot lived. Igloo was a thriving community that included the following facilities: public schools, a hospital, post office, church, shopping, and entertainment centers. The Black Hills Ordnance Depot, renamed "Black Hills Army Depot" in 1962, was closed in 1967. Igloo was abandoned but many of the Depot buildings remain on site.

Parcels SDM 97300-F, G, H, JK, JL, JM, JO, JP, JQ, JR, and JT, were determined to have cultural resource sites that are considered important enough to warrant more analysis or are in need of further consultation with the State Historic Preservation Office or interested Native American Tribes. Therefore; oil and gas parcels SDM 97300-F, G, H, JK, JL, JM, JO, JP, JQ, JR, and JT are recommended for deferral until completion of the revised Resource Management

Plan for the Field Office or until field inspection and additional consultation with the State Historic Preservation Office and interested Native American Indian Tribes can be completed.

Inventory data is not available for 22 lease parcels and portions of the remaining 10. A professional assessment of the lease parcels' potential for cultural resources eligible to the National Register of Historic Places (NHPA) was conducted to establish if an on-the-ground inventory is needed at this time. Based on topography in and surrounding the lease parcels and known cultural summary information it was determined that inventory considerations can be deferred until a specific development is proposed. In all cases the Standard Lease Notice and the following stipulation identified in IM-2005-003 should be attached to the lease:

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

### 3.8 Paleontology

The geologic formations present in the western part of South Dakota extend into several of the neighboring states and Canada, with only minor sedimentary or depositional differences. The formations encompass the last of the dinosaurs in the Cretaceous Period to the rapid development of early mammals in the Paleocene and Eocene Epochs of the Tertiary Period. These formations are found in eastern Montana, northeastern Wyoming, northwestern Nebraska, western South Dakota and North Dakota, and southernmost Saskatchewan and Manitoba.

The key geologic formations found in the South Dakota area containing significant paleontological resources falls into three main ages:

(1) The upper Jurassic Morrison Formation and the overlying lower Cretaceous Lakota Sandstone contain well-known dinosaur material. The Lakota Sandstone is also noted for the fossil plant material it contains. The Morrison Formation and Lakota Sandstone are found in the terrain surrounding the Black Hills, although exposures are mostly small in extent and somewhat difficult to explore.

(2) The second interval includes the late Cretaceous Hell Creek Formation and the overlying Ludlow Formation, which contain records of the last of the dinosaurs (Hell Creek Fm) and the beginning of the radiation of the mammals (Ludlow Fm). These formations occur throughout the northwestern corner of South Dakota, although exposures are not as extensive as in neighboring Montana and Wyoming.

(3) The third major time frame is represented by the Slim Buttes Formation and the various formations combined into the White River Group and the Arikaree Group, spanning the Eocene to Miocene Epochs. The Slim Buttes Formation is limited in exposure and also occurs in the northwest corner of the state. The White River and Arikaree Groups occur in many portions of western South Dakota and neighboring states. Outside of Badlands National Park, exposures tend to be found as ridgelines, sides of buttes, or other actively eroding surfaces, with large areas of alluvium or deep soils covering the bedrock in most areas.

The late Cretaceous/early Tertiary formations in the northern Great Plains region are world renowned for their dinosaur and early mammal fossils; most of the major museums in the United States have fossils from this region. Historically, most of the research and collecting occurred in Montana and Wyoming; however, recent finds have shown that similar fossils are preserved in equivalent formations in North and South Dakota. The Eocene/Oligocene/Miocene formations have also produced a huge number of significant mammal fossils over the last 130 years.

Areas in South Dakota were grouped together where the exposed or underlying bedrock had the potential to produce significant numbers of the material of interest. Values were assigned based on potential fossil yield of vertebrates or other scientifically significant fossils in bedrock formations known for South Dakota. These values are as follows:

(1) ***Very Low*** – Class 1: Igneous and metamorphic geologic units-not likely to contain recognizable fossils.
(2) ***Low*** – Class 2: Sedimentary geologic units- not likely to contain vertebrate fossils or scientifically significant non-vertebrate fossils.
(3) ***Moderate or Unknown*** –Class 3: Fossiliferous sedimentary geologic units – content varies in significance, abundance, and predictable occurrence. Some units of unknown potential.
(4) ***High*** –Class 4: are considered Class 5 fossils that do not have the potential for human or natural degradation.
(5) ***Very High*** –Class 5: Highly fossiliferous geologic units- regularly produce vertebrate fossils or scientifically significant vertebrate fossils. Situated to be subject to human or natural degradation.

Starting with the northern boundary of the state is the tertiary deposits. These contain few significant or rare fossils and were designated a Class 4 grading to the north as a *Class 3*. Included in this grouping are the following formations; Holocene, Pleistocene, Pliocene, Slim Buttes, Tongue River, Cannonball, and Ludlow.

South of these formations is the Hell Creek. This is a very significant formation with numerous vertebrate fossils of the upper Cretaceous. Among these fossils are dinosaurs, plants, small mammals, reptiles, and birds. This formation and the thin overlying material was rated a *Class 5*. Of primary concern would be the regions where the Hell Creek is exposed with no plant cover. Included in this group are the Hell Creek and Fox Hills.

South of the Hell Creek formation is the Pierre Shale and its related formations. These are marine shales, and do produce some invertebrates along with some marine vertebrates and fish. Included are the Pierre Shale, Niobrara, Carlile, Greenhorn, and Belle Fourche. This area was assigned a *Class 3* to *Class 4*.

Of the 32 nominated lease parcels, 26 parcels or portions of the parcels are in areas classified as high (Class 5), according to the Potential Fossil Yield Classification (PFYC) system map. Another 3 lease parcels in Harding County are in (Class 4) and the remaining 3 nominated parcels are located in an area considered moderate or unknown (Class 3).

Most paleontologic localities recorded with BLM offices resulted from researchers performing field work. A few localities have been found during BLM-required mitigation of surface-disturbing activities. Some localities are simply local knowledge. Investigating illegal collecting activities has revealed the locations of some fossil resources. There are presently no known localities or previous research areas for fossil or paleontological resources inside or adjacent to the nominated parcels.

### 3.9 Native American Religious Concerns

Cultural resource and Traditional Cultural Property (TCP) information was reviewed for the lease parcel areas in the 1986 South Dakota Resource Management Plan and the South Dakota Statewide Comprehensive Historic Preservation Plan (Sundstrom 2009). Requests were also made to tribal historic preservation offices in South Dakota, North Dakota, and Montana for additional cultural information or areas of concern. Presently, there are no TCP's or other culturally sensitive areas known for the proposed lease areas.

According to Bulletin #38 of the National Register, sites of traditional cultural significance refer to "beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices." Critical issues related to TCPs as cultural sites include continuity over time, community identity, and traditional use. A TCP can be defined generally as a place "that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community."

Summary reports that included the site and survey information as well as surrounding prominent topographic features for each lease parcel were sent to Tribal Historic Preservation Officers from the following tribes asking for additional information or concerns for culturally sensitive areas that may be affected by leasing the parcels (December 20, 2010; January 20, 2011).

Table 3.9.1: List of Native American Tribes Level I Reports Submitted for Review & Information.

| |
|---|
| Oglala Sioux Tribe |
| Standing Rock Sioux Tribe |
| Northern Cheyenne Tribe |
| Cheyenne River Sioux Tribe |
| Rosebud Sioux Tribe |
| Crow Creek Tribe |
| Eastern Shoshone Tribe |
| Flandreau Santee Sioux Tribe |
| Fort Peck Tribes |
| Lower Sioux Indian Community |
| Lower Brule Sioux Tribe |
| Sisseton-Wahpeton Oyate Tribes |
| Yankton Sioux Tribe |

No comments, identified TCP's, or additional information have been received so far, as a result of this request; however, cooperative meetings and information exchange from past project planning has resulted in a good record of topographic areas in South Dakota that are considered culturally sensitive to some Native American Tribes. Some of these areas are located in Harding County and in the Black Hills of western South Dakota. Based on this known information 10 of the 11 lease parcels recommended for deferral are based on a need for additional cultural information from interested Native American Tribes.

### 3.10 Visual Resources

No Visual Resource Management (VRM) classes have been established in the project area from a formal written decision document. While an existing Visual Resource Inventory (VRI) has been conducted nearby, the inventory did not extend into this area. Nevertheless, since the inventoried area was selected to be representative, it is reasonable to assume that the class identified would apply to adjacent areas. Butte and Harding counties are thereby assigned VRI class IV, allowing modification to the characteristic landscape. The South Dakota RMP revision will formally address VRM through a range of alternatives based on the VRI data, however in the interim, and as directed by BLM Manual 8400 (Visual Resource Management), the affected environment is described using the existing VRI classes.

VRI is only applied to federally managed surface acres, therefore the affected environment for visual resources only consists of approximately 1,723 acres of the 12,362 acres in the proposed action.

## 3.11 Livestock Grazing

There are 27 of the lease parcels located within 11 BLM grazing allotments. Table 3.11.1 identifies allotment specific information for each of the lease parcels. All 11 allotments are operated by ranches using the allotments for cow-calf or sheep operations. Most allotments have several range improvements such as fences, stock ponds, pipelines, springs, windmills, seedings, wells, and access roads for livestock management purposes.

**Table 3.11.1 – Lease parcels within grazing allotments**

| Allotment Number | Allotment Name | Parcel ID | Allotment Category* | Livestock Type | Season of Use | Number of Lessees | County | Surface Ownership |
|---|---|---|---|---|---|---|---|---|
| 7218 | Seal Draw | SDM97300-O; SDM97300-K; SDM97300-J4; SDM97300-JH; SDM97300-J3; SDM97300-JE; SDM97300-J2; SDM97300-JD; SDM97300-JG; SDM97300-JF | C | Cattle & Sheep | 03/01-02/28 | 1 | Harding | BLM and Private Surface |
| 2795 | Profile Butte | SDM97300-K; SDM97300- | C | Cattle | 03/01-02/28 | 1 | Harding | BLM and Private |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | L; SDM97300-M | | | | | | Surface |
| 2757 | Wagon Cr. North | SDM97300-L; SDM97300-M | C | Sheep | 03/01-02/28 | 1 | Harding | BLM and Private Surface |
| 1728 | Little Missouri | SDM97300-M | C | Cattle | 03/01-05/01 10/01-02/28 | 1 | Harding | Private surface with unfenced BLM in allotment. |
| 2741 | MNSD | SDM97300-J; SDM97300-JC; SDM97300-JB | C | Sheep | 03/01-03/31 11/01-02/28 | 1 | Harding | BLM and Private Surface |
| 1725 | Jones Creek | SDM97300-JI; SDM97300-JJ; SDM97300-JK; SDM97300-JT; SDM97300-JS | C | Cattle | 03/01-02/28 | 1 | Harding | BLM and Private Surface |
| 1723 | Clarks Fork | SDM97300-JK; SDM97300-JL; SDM97300-JM; SDM97300-JO; | C | Cattle | 03/01-02/28 | 1 | Harding | Private surface with unfenced BLM in allotment. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | SDM97300-JP; SDM97300-JQ; SDM97300-JT | | | | | | |
| 7214 | Beaver Creek | SDM97300-H | C | Cattle | 03/01-03/31 12/01-02/28 | 1 | Fall River | BLM |
| 2492 | Twentyone Divide | SDM97300-H | C | Cattle | 08/01-11/30 | 1 | Fall River | BLM and Private Surface |
| 7228 | Section 8 | SDM97300-H | C | Cattle | 03/01-02/28 | 1 | Fall River | BLM |
| 7259 | S. Cave Hills | SDM97300-G | C | Cattle | 03/01-02/28 | 1 | Harding | BLM and Private Surface |

* C category = Custodial

### 3.12 Recreation and Travel Management

Recreational opportunities and experiences managed for by the BLM are only available on BLM-administered surface. The affected environment consists of approximately 1,723 acres (or 7 percent of the total acreage proposed for lease) of BLM-administered public lands (surface). None of the 32 lease parcels fall within SRMAs or recreation areas.

Much of the 1,723 BLM-administered acres proposed for lease consist of small, isolated 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 parcels can be characterized as casual, dispersed recreational activities including hiking, and hunting.

### 3.13 Lands and Realty

The lands proposed for competitive leasing of the federal mineral estate are mainly (84%) scattered split estate mineral parcels (private surface overlying federal minerals) under the

jurisdiction of BLM. There are 9 parcels that contain 1,723 acres BLM surface and federal mineral estate under the jurisdiction of BLM. There are 21 parcels that contain 21.498 acres of split estate where the United States owns the minerals in the land and the surface is privately owned. For all parcels there is no existing legal access through the private land to the BLM administered surface estate.

Parcels SDM 93700-O, K, L, M, J, JA, JB, J1, JC, JD, JE, JF, JG, J2, J3, JH, and J4 are all grouped together 14-24 miles north of Camp Crook in northwestern Harding County. The North Camp Crook Road lies adjacent to or through Parcels SDM 93700 – M, J2, JG, JF, J, and JA. These parcels may have primitive roads crossing the parcels but legal access other than from the county road would need to be coordinated with the private landowner. The other parcels do not have legal public access to the parcels.

Parcel SDM 93700-G is adjacent to the USFS administered lands in north central Harding County. There are county roads that could be used to access the parcel

Parcels SDM 97300 – JI, JJ, JK, JL, JM, JO, JP, JQ, JR, JS, and JT are grouped together in north eastern Harding county either adjacent to the USFS administered lands or north and west of these USFS lands. These parcels may have primitive roads crossing the parcels but access would need to be coordinated with the private landowner. Parcel JS may have access to the Lincoln Road but the connection may not be enough to ensure legal access.

Parcel SDM 97300 - H is in northwestern Fall River County and does not have legal public access. This parcel may be crossed by a primitive road but access would need to be coordinated with the private landowner. Parcels SDM97300 – A and F are in western Fall River County and neither have legal public access. Primitive roads may cross these parcels but access would need to be coordinated with the private landowner.

New rights of ways associated with the development of the leases would need to be located outside of sage grouse priority protection areas and restricted in lek and brood rearing areas within the sage grouse general habitat area (see lease notice LN 14-11).

Currently, there are no biomass, geothermal, solar power, or wind projects proposed in the area of the aforementioned parcels

## 3.14 Minerals

**Fluid Minerals**

It is the policy of the BLM to make mineral resources available for disposal 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.

**Federal Oil and Gas Lease Information and Federal, State and Private Oil and Gas Development Activity within the External Boundaries of the Field Office**

Currently there are 168 oil and gas leases covering approximately 140,259 acres in the South Dakota Field Office. Existing production activity holds approximately 30 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 3.14.1. Numbers of townships, leases acres within those townships, and development activity for all jurisdictions are summarized in Table 3.14.2

If a lease parcel receives leasing interest and oil and gas lease sales lead to lease issuance there could be interest in exploration or development activity during the term of the lease. Exploration and development proposals in the future would require a separate environmental document to consider specific proposals and site specific resource concerns.

**Table 3.14.1 Existing Development Activity.**

| | FEDERAL WELLS | PRIVATE AND STATE WELLS |
|---|---|---|
| Drilling Well(s) | 2 | 31 |
| Producing Gas Well(s) | 28 | 49 |
| Producing Oil Well(s) | 42 | 241 |
| Water Injection Well(s) | 0 | 3 |
| Shut-in Well(s) | 10 | 15 |
| Temporarily Abandoned Well(s) | 2 | 38 |

**Table 3.14.2 Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels.**

| | Fall River County | Harding County |
|---|---|---|
| Number of Townships Containing Lease Parcels | 3 | 6 |
| Total Acres Within Applicable Township(s) | 68,676 | 132,035 |
| Acres of Federal Oil and Gas Minerals | 30,979 | 38,472 |
| Percent of Township(s) | 45.1 | 29.1 |
| Acres Leased Federal Oil and Gas Minerals | 3,158 | 2,866 |
| Percent of Township(s) | 4.6 | 2.2 |
| Leased Federal Oil and Gas Minerals | 0 | 0 |

| | Fall River County | Harding County |
|---|---|---|
| Suspended Percent of Township(s) | 0 | 0 |
| Federal Wells | | |
| Private and State Wells | | |

**Geology**

Lignite coals of the Ludlow formation have been mined in the past for their uranium content. There is potential of encountering this lignite bearing uranium in many places in Harding County. If the uranium bearing lignite is disrupted, the equilibrium state of the uranium can be affected, which could facilitate movement. Changes which could cause greater movement would be: increased permeability, uranium compounds becoming more oxidized, thus soluble, greater groundwater recharge, and exposure to the surface. This could result in a slightly greater risk to humans and the environment.

## 3.15 Social and Economic Conditions

**Economics**

Certain existing demographic and economic features influence and define the nature of local economic and social activity. Among these features are the local population, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant land and water features, and unique area amenities. The affected local economy is made up of two counties in South Dakota (Fall River and Harding) within the BLM SD Field Office boundaries and Bowman County, ND and Fallon County, MT. Although the parcels being considered in this environmental assessment are located in Fall River and Harding counties in South Dakota, the distribution of economic effects is based on acres leased and levels of production as well as business patterns especially where oil and gas drilling companies and oil and gas service and related companies are located. Much of the oil and gas drilling and service companies and their personnel who serve the oil and gas activities in Harding County are located in Bowman, ND (Bowman County) and Baker, MT (Fallon County).

The four-county local economy had an estimated 2009 population of 14,117 people. Total employment was estimated to be 9,014 jobs; there were an estimated 6,222 households; there were 139 NAICS industrial sectors represented in the local economy; average income per household was $80,363; and total personal income was $500.0 million (IMPLAN, 2009). Within this local economy, there were 1.57 people per job and 0.69 households per job.

Nature of the Oil and Gas Industry in South Dakota:

Only three counties in South Dakota, Harding, Custer, and Fall River counties, currently have oil and/or gas production. The vast majority of the production came from Harding County. In 2007, there were 163 producing oil wells and 64 producing gas wells. Average wellhead prices paid in 2007 were $62.78/bbl for oil and $7.22 /Mcf for natural gas. The average cost of drilling and equipping a well was $43,019,260 (oil), $423,072 (gas), and $414,247 (dry) (IPAA, 2010). Local economic effects of leasing federal minerals for oil and gas exploration, development, and production are influenced by the number of acres leased, the number of wells drilled, and the estimated levels of production. These activities influence local employment, income, and public revenues (indicators of economic impacts).

Leasing:

In January 2011, there were 97,199 acres of BLM-managed federal minerals leased for oil and gas in the South Dakota Field Office. Currently, annual lease rental is paid on 60,718 acres that are not held by production. Estimated minimum total annual average lease and rental revenue to the federal government was about $126,000. Lease rents were not paid on 36,481 acres that were 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 bid as well as annual rents. The minimum lease bid is $2.00 per acre; 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. Annual lease rentals continue until one or more wells are drilled that result in production and associated royalties. Within the South Dakota Field Office, about 38 percent of the leased acres are held by production.

Nearly all (99 percent) of the lease parcel acres being considered are public domain minerals. Forty-nine percent of federal leasing revenues from public domain minerals are distributed to the state. For revenues received from public domain lands, the state of South Dakota distributes the revenues to public schools or other public educational institutions within the counties in which the minerals were produced (SD statute 13-14-3.1). The federal government collects an estimated minimum annual average of about $126,000 in lease bids and rent; of which an estimated $62,000 are distributed to the state/local governments.

Production:

In 2010, production from federal minerals in the South Dakota Field Office equaled 108,595 barrels of oil and 328,100 MCF of natural gas (Office of Natural Resource Revenue, 2010). It is estimated that about 80 percent of this production comes from BLM-federal minerals. Federal oil and gas production in South Dakota is subject to production taxes or royalties. On public domain lands, these federal oil and gas royalties generally equal 12.5 percent of the value of production (43 CFR 3103.3.1). Forty-nine percent of these royalties are distributed to the state. In South Dakota, all of the royalty revenues that the state receives are redistributed to the counties of production to support public education. Estimated annual BLM-federal royalty

revenues were about $957,000; of which about $469,000 were distributed to the state and counties.

Local Economic Contribution:

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, rent, and production 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 570 total jobs and $41.7 million in total employee compensation and proprietor's income in the local economy (IMPLAN, 2009).

Total federal revenues from BLM-federal oil and gas leasing, rents, and royalty payments are an estimated $1.1 million annually. Federal revenues distributed to the state of South Dakota average an estimated $531,000 per year. The state redistributes all of this to the public school districts and other public educational institutions within the South Dakota counties with federal leases and production (South Dakota statute13-14-3.1).

The estimated annual local economic contribution associated with BLM-federal leases, rents, drilling, production, and royalty payments combined to support about 90 total local jobs and $4.3 million in local labor income, respectively (IMPLAN, 2009). This amounts to about 1.0 percent of the local employment and about 1.2 percent of local labor and proprietor's income. The NAICS aggregated sectors that experience the most influence from oil and gas related leasing, exploration, development, and production are mining and government. Table 3.15.1 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 local economy.

**Table 3.5.1 Current Contributions of Federal Oil and Gas Leasing, Exploration, Development, and Production to the Local Economy**

| | Employment (jobs) | | Labor Income (Thousands of 2009 dollars) | |
|---|---|---|---|---|
| Industry | Area Totals | BLM-Federal O&G -Related | Area Totals | BLM-Federal O&G-Related |
| Agriculture | 1,366 | 0 | $27,281 | $1 |
| Mining | 618 | 46 | $43,227 | $2,801 |
| Utilities | 25 | 0 | $2,135 | $16 |
| Construction | 504 | 1 | $22,786 | $44 |
| Manufacturing | 70 | 0 | $2,727 | $1 |

| | | | | |
|---|---|---|---|---|
| Wholesale Trade | 265 | 3 | $14,518 | $175 |
| Transportation & Warehousing | 560 | 2 | $41,553 | $132 |
| Retail Trade | 832 | 4 | $18,992 | $97 |
| Information | 107 | 1 | $3,932 | $23 |
| Finance & Insurance | 275 | 2 | $8,968 | $53 |
| Real Estate & Rental & Leasing | 70 | 1 | $972 | $9 |
| Prof, Scientific, & Tech Services | 203 | 3 | $8,188 | $156 |
| Mngt of Companies | 12 | 1 | $688 | $43 |
| Admin, Waste Mngt & Rem Serv | 121 | 1 | $1,985 | $11 |
| Educational Services | 66 | 0 | $1,374 | $4 |
| Health Care & Social Assistance | 818 | 3 | $26,327 | $98 |
| Arts, Entertainment, and Rec | 229 | 1 | $3,390 | $11 |
| Accommodation & Food Services | 563 | 2 | $7,943 | $30 |
| Other Services | 500 | 2 | $11,252 | $42 |
| Government | 1,808 | 13 | $94,715 | $513 |
| Total | 9,014 | 87 | 342,955 | 4,260 |
| Federal O&G as Percent of Total | --- | 0.97% | --- | 1.24% |

Source: IMPLAN, 2007

### 3.16 Social and Environmental Justice

This section focuses on two counties in western South Dakota where the lease acreage being examined is located. Harding County is located in the northwestern corner of the state and Fall River County is located in the southwestern corner. The 2009 population estimate for Harding County was 1,123, which was a decline of 17% from the 2000 figure. The 2009 population estimate for Fall River County was 7,241, which represented a decline of 3% from 2000. In comparison, the state population increased 8% between 2000 and 2009. The 2009 populations of Buffalo, the county seat of Harding County and Hot Springs, the county seat of Fall River County, were 313 and 4,093 respectively.

The 2009 population density (persons per square mile) for the area ranged from 0.4 in Harding County, to 4.2 in Fall River County, to 10.7 for South Dakota as a whole. The areas in the vicinity of the leases are home to small communities and farms and ranches. Oil and gas exploration and/or production is already occurring in the vicinity of these potential leases. Over 90% of the acreage being considered is split-estate where BLM does not manage the surface.

In 2009, the percent American Indian ranged from 1.9% in Harding County to 6.4% in Fall River County to 8.5 for the state as a whole. Tribes in South Dakota, North Dakota, Montana and elsewhere have an interest in lands in these counties. Ten of the potential leases contain areas that need additional cultural information from interested Tribes. The percent of the population living below the poverty level in 2008 ranged from 12.3% in Harding County to 15.0% in Fall River County. The state wide figure was 12.7%.

## 4.0 ENVIRONMENTAL IMPACTS

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 parcels are leased, it remains unknown whether development would actually occur, and if so, where specific facilities would be placed. This would not be determined until the BLM receives an APD in which more detailed information about proposed activities and facilities would be clarified for particular lease parcels. 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 best management practices (BMPs) documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development," also known as the "Gold Book" (USDI and USDA 2007). The BLM could also identify APD Conditions of Approval, 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.

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 of the proposed action are identified by resource below.

### 4.0.1 Reasonably Foreseeable Development Scenario Summary and Assumptions

The following assumptions are from the RFD developed for the South Dakota FO RMP Revision. The RFD forecasts the following level of development in the South Dakota planning area.

The South Dakota RFD scenario analyzes the potential for oil and gas development in the field office including both conventional oil and gas and CBNG. The potential is mapped in the RFD scenario. For this planning area average drilling densities per township over the life of the plan are as follows:

- High potential – 10 to 29 wells per township;
- Moderate potential – 2 to 10 wells per township;
- Low potential – 1 to 2 wells per township;
- Very low potential – less than 1 well per township;
- No potential – areas of the Black Hills where igneous rocks are at or near the surface.

Conventional activity would center on reserve growth (further development of existing fields). The projection of coal bed natural gas activity is unlikely; however it is part of the scenario of activity that could occur within the forecast period of twenty years. Disturbance projections from the RFD scenario follow (Tables 4.0.1 and 4.0.2).

**Table 4.0.1 Disturbance Associated with New Drilled Wells and Existing Active Wells in Planning Area (Short-Term Disturbance – Two Years).**

| Wells | | | Acres of Surface Disturbance | | | |
|---|---|---|---|---|---|---|
| Type | Total | BLM Managed | Access Roads and Flow Lines | Well Pad | Total | BLM Managed |
| New Exploratory and Development Wells CBNG (2010-2029) | 74 | 4 | 0.6 | 0.5 | 83 | 4 |
| New Exploratory and Development Gas Wells (2010-2029) | 112 | 23 | 0.6 | 0.5 | 123 | 25 |
| New Exploratory and Development Oil Wells (2010-2029) | 337 | 71 | 2.9 | 4 | 2,325 | 490 |
| Total New Exploratory and Development Wells (2010-2029) | 524 | 98 | | | 2,531 | 520 |
| Existing Active Gas Wells (as of August 2008) | 100 | 31 | 0.3 | 0.25 | 55 | 17 |
| Projected New Gas Wells (August 2008-December 2009) | 7 | 2 | 0.3 | 0.25 | 4 | 1 |
| Existing Active Oil Wells (as of August 2008) | 308 | 30 | 1.5 | 1.75 | 1,001 | 98 |
| Projected New Oil Wells (August 2008-December 2009) | 21 | 2 | 1.5 | 1.75 | 68 | 7 |
| Total Existing and Projected Wells (August 2008- | 436 | 65 | | | 1,128 | 122 |

| | | | | | | |
|---|---|---|---|---|---|---|
| December 2009) | | | | | | |
| Total Wells | 960 | 163 | | Total Short-Term Disturbance | 3,659 | 642 |

**Table 4.0.2. Disturbance Associated with New Drilled Wells and Existing Active Wells (Long-Term Disturbance).**

| Wells | | | Acres of Surface Disturbance | | | |
|---|---|---|---|---|---|---|
| Type | Total | BLM Managed | Access Roads and Flow Lines | Well Pad | Total | BLM Managed |
| New Producing CBNG Wells (2010-2029) | 68 | 4 | 0.3 | 0.25 | 37 | 2 |
| New Producing Gas Wells (2010-2029) | 67 | 14 | 0.3 | 0.25 | 37 | 8 |
| New Producing Oil Wells (2010-2029) | 202 | 43 | 1.5 | 1.75 | 657 | 140 |
| Total New Producing Wells (2010-2029) | 337 | 60 | | | 731 | 148 |
| Existing Active Gas Wells (as of August 2008) [1] | 25 | 9 | 0.3 | 0.25 | 14 | 5 |
| Projected Producing Gas Wells (August 2008-December 2009) | 4 | 1 | 0.3 | 0.25 | 2 | 1 |
| Existing Active Oil Wells (as of August 2008) [1] | 271 | 25 | 1.5 | 1.75 | 881 | 81 |
| Projected Producing Oil Wells (August 2008-December 2009) | 13 | 1 | 1.5 | 1.75 | 41 | 4 |
| Total Existing and Projected Wells (August 2008-December 2009) | 313 | 37 | | | 938 | 91 |
| Total Wells | 650 | 97 | | Total Long-Term Disturbance | 1,669 | 239 |

1 - minus abandonments during August 2008-December 2009 period

The context of alternatives considered in this EA relative to these assumptions is described below.

### 4.0.2 Alternative A (No Action Alternative)

Under the No Action Alternative, the proposed parcels would not be leased. There would be no new impacts from oil and gas production on the 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. The No Action Alternative would result in the continuation of the current land and resource uses on the parcels.

Unless specifically indicated by resource area, no further analysis of the No Action alternative is presented in the following sections.

### 4.0.3 Alternative B Assumptions

The act of leasing the parcels would, by itself, have no impact on any natural resources in the area administered by the South Dakota Field Office. Standard terms and conditions as well as special stipulations would apply to the lease parcels. All impacts would link to as yet undetermined future levels of lease development.

If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within 2 to 5 years) and long-term impacts are those that would substantially remain for more than 5 years.

Thirty two parcels are considered in this alternative. There are six townships affected in Harding County and three townships in Fall River County. In Harding County there is one parcel in one township that is classified as having high development potential for conventional oil and gas and no potential for CBNG. This classification forecasts that drilling of ten to twenty nine wells may occur in the township during the life of the RMP. Based on the location in Harding County the RFD assumes that any activity on the lease parcels would be exploration for oil. Short term disturbance (two years) for oil wells would be 2.9 acres for access roads and flow lines and four acres per well pad. Long term disturbance for a producing well would be 1.5 acres for access roads and flow lines and 1.75 acres per well pad. The parcel totals 440 acres, approximately one percent of the township area

In Harding County there are two parcels in one township that is classified as having moderate development potential for conventional oil and gas and no potential for CBNG. In Fall River County there is one parcel in one township that is classified as having moderate development potential for conventional oil and gas and no potential for CBNG. This classification forecasts that drilling of two to ten wells may occur in the township during the life of the RMP. Based on the location in Harding County and Fall River County the RFD assumes that any activity on the lease parcels would be exploration for oil. Short term disturbance (two years) for oil wells would be 2.9 acres for access roads and flow lines and four acres per well pad. Long term

disturbance for a producing well would be 1.5 acres for access roads and flow lines and 1.75 acres per well pad. The parcels total about 3,053 acres, approximately 7 percent of the two township area.

In Harding County there are four townships and in Fall River County there is one township that are classified as having low development potential for conventional oil and gas and no potential for CBNG. This classification forecasts that drilling of one to two wells may occur in the township during the life of the RMP. Based on the location in Harding County and Fall River County the RFD assumes that any activity on the lease parcels would be exploration for oil. Short term disturbance (two years) for oil wells would be 2.9 acres for access roads and flow lines and four acres per well pad. Long term disturbance for a producing well would be 1.5 acres for access roads and flow lines and 1.75 acres per well pad. The parcels total about 20,131 acres, approximately 17 percent of the five township area.

There is one parcel in Fall River County located in a township classified as having very low development potential. The South Dakota RFD assumes that very low development potential areas would see less than one well drilled per township for the life of the plan. This would indicate that very little activity would be likely on those parcels during the life of the plan. The parcels of 1,177.36 acres is approximately 5 percent of the township area

### 4.0.3 Alternative C Assumptions

The act of leasing the parcels would, by itself, have no impact on any natural resources in the area administered by the South Dakota Field Office. Standard terms and conditions as well as special stipulations would apply to the lease parcels. All impacts would link to as yet undetermined future levels of lease development.

If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within 2 to 5 years) and long-term impacts are those that would substantially remain for more than 5 years.

Under this alternative twenty parcels are would be leased. There would be four townships affected in Harding County and one township in Fall River County.

In Harding County there are two parcels in one township that is classified as having moderate development potential for conventional oil and gas and no potential for CBNG. In Fall River County there is one parcel in one township that is classified as having moderate development potential for conventional oil and gas and no potential for CBNG. This classification forecasts that drilling of two to ten wells may occur in the township during the life of the RMP. Based on the location in Harding County and Fall River County the RFD assumes that any activity on the lease parcels would be exploration for oil. Short term disturbance (two years) for oil wells would be 2.9 acres for access roads and flow lines and four acres per well pad. Long term disturbance for a producing well would be 1.5 acres for access roads and flow lines and 1.75

acres per well pad. The parcels total about 752 acres, approximately 2 percent of the two township area

In Harding County there are three townships that are classified as having low development potential for conventional oil and gas and no potential for CBNG. This classification forecasts that drilling of one to two wells may occur in the township during the life of the RMP. Based on the location in Harding County, the RFD assumes that any activity on the lease parcels would be exploration for oil. Short term disturbance (two years) for oil wells would be 2.9 acres for access roads and flow lines and four acres per well pad. Long term disturbance for a producing well would be 1.5 acres for access roads and flow lines and 1.75 acres per well pad. The parcels total about 10,827 acres, approximately 16 percent of the three township area.

## 4.1 Air Resources

### 4.1.1 Direct and Indirect Effects Air Quality

Leasing the subject parcels would have no direct impacts on air quality. Any potential effects on air quality from sale of lease parcels would occur at such time that the leases were developed. Current monitoring data show that the criteria pollutants fall well below applicable air quality standards indicating very good air quality. The potential level of development and mitigation (see below) is expected to maintain this level of air quality by limiting emissions. In addition to the limited level of development, 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.

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 volatile organic compounds 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.

### Greenhouse Gas (GHG) Emissions at the South Dakota FO and Project Scales

Sources of greenhouse gases associated with development of lease parcels may 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 for lease in this EA. Potential development activities would be analyzed in a separate NEPA analysis effort if the BLM receives an APD on any of the parcels considered here.

Anticipated GHG emission estimates presented in this section are taken from the Climate Change Supplementary Report for Montana, North Dakota, and South Dakota, Bureau of Land Management (Climate Change SIR, 2010). Data are derived from GHG emissions calculators developed by air resource specialists at the BLM National Operations Center in Denver, CO, based on methods described in the Climate Change SIR. Based on the RFD assumptions summarized above for the South Dakota FO, Table 4.1.1 discloses projected annual GHG source emissions, from BLM-permitted activities associated with the RFD (note: the source year selected to disclosed the estimated GHG emissions was the year with the highest expected combined construction and production emissions for oil and gas sources in the planning area).

**Table 4.1.1. BLM component of projected annual emissions of greenhouse gases associated with oil and gas exploration and development activity in the South Dakota Field Office.**

| Source | BLM Long-Term Greenhouse Gas Emissions in tons/year | | | | Emissions (metric tons/yr) |
|---|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $Co_2e$ | $CO_2e$ |
| Conventional Natural Gas | 455.9 | 99.3 | 0.01 | 2,542.3 | 2,306.9 |
| Coal Bed Natural Gas | 283.9 | 17.3 | 0.0 | 647.8 | 587.9 |
| Oil | 704,439.6 | 803.8 | 12.5 | 725,203.1 | 658,079 |
| **Total** | **705,179.4** | **920.4** | **12.51** | **728,393.2** | **660,973.8** |

Under Alternative A, there would be no greenhouse gas emissions resultant from this project because under this alternative, no additional parcels would be leased.

To estimate potential GHG emissions associated with each action alternative for this project, the following approach was used:

1. The proportion of each project level action alternative relative to the total RFD was calculated based on total acreage of parcels under consideration for leasing (and/or lifting of lease suspensions) 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 highest year emission output used) to estimate GHG emissions for that particular alternative.

Under Alternative B, approximately 23,221 acres of lease parcels with federal minerals would be leased. These acres constitute 1.6 percent of the total federal mineral estate of 1,471,000 acres identified for the South Dakota RFD. Therefore, based on the approach described above to estimate GHG emissions, 1.6 percent of the total estimated BLM emissions of 660,973.8 metric tons/year would be approximately 10,575 metric tons/year of $CO_2e$ if the parcels within Alternative B were to be developed.

Under Alternative C, approximately 10,565 acres (or 45 percent of the lease parcel areas) would not be recommend for oil and gas leasing at this time. These acres constitute 0.72 percent of the total federal mineral estate of 1,471,000 acres identified for the South Dakota RFD. Therefore, based on the approach described above to estimate GHG emissions, 0.72 percent of the total estimated BLM emissions of 660,973.8 metric tons/year would be approximately 4,747.2 metric tons/year of $CO_2e$ if the parcels within Alternative B were to be developed.

**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 on climate from developing lease parcels. 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 from potential GHG emissions, discussed above, in the event lease parcels would be developed, the act of leasing does not produce any GHG emissions in and of itself. Releases of GHGs would occur at the exploration/development stage.

### 4.1.2 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 conditions of approval 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:

- flare or incinerate hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- install emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- install 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 volatile organic compounds (VOCs));
- gas or electric turbines rather than internal combustions engines for compressors;
- nitrogen oxides (NOx) 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 revegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads;
- co-locate 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;
- install 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 NOx and ozone (O3).

More specific to reducing greenhouse gas 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 are summarized below in the Table below (reproduced from Table 6-2 in the Climate Change SIR, 2010). The table displays common methane emission technologies reported under the USEPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

**Table – 4.1.1a 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 USEPA Natural Gas STAR Program documents. Individual documents are referenced in the 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.

In an effort to disclose potential future GHG emissions reductions that might be feasible in individual field offices, the BLM estimated GHG emissions reductions based on the RFD for the Miles City FO. For analysis purposes, the Miles City Field Office RFD was selected based on the high potential development scenario. Similar emissions reductions may be possible in other Montana, North Dakota and South Dakota Field Offices.

For emissions sources subject to BLM (federal) jurisdiction, the estimated emissions reduction represent approximately 51 percent reduction in total GHG emissions compared to the estimated Miles City FO federal GHG emissions inventory (Climate Change SIR, as updated October 2010, Section 6.5 and Table 6-3). The emissions reductions technologies and practices are identified as mitigation measures that could be imposed during development. (Note: except for the light-duty vehicle GHG emission standards, no federal or state regulations mandate these GHG emissions reductions).

## 4.2 Soil Resources

Parcels with the Controlled Surface Use 12-1 stipulation added to them, due to slopes over thirty percent, includes at least a portion of parcels JM, JO, JP, JR, and JS.

### 4.2.1 Direct and Indirect Effects

While the act of leasing a tract would produce no impacts, the development of the leases would result in reasonably foreseeable disturbances to soils. Construction and operation of well pads, access roads, pipelines, power lines, reserve pits, and other facilities would result in the exposure of mineral soil, some mixing of soil horizons, soil compaction, loss of soil productivity, and increased susceptibility to wind and water erosion. The likelihood and magnitude of these occurrences is dependent upon local site characteristics, climatic events, and the specific mitigation applied.

Mixing of soil horizons may result in physical and chemical disruption and significantly negative changes in the way reclaimed soils are able to accept and use water. Potential impacts would be addressed in more detail at the APD stage.

### 4.2.2 Mitigation

In the event of exploration/development, a number of measures would be taken to prevent, minimize, or mitigate impacts to soil resources. The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation. Remediating physically and chemically disrupted soils can involve the application of large quantities of soil amendments to compensate. Once this top-soil is applied, any topsoil disruption mitigated, and vegetation is re-established the impacts would be remediated.

Reserve pits would be dewatered, filled in with spoil material, re-contoured, topsoil added, and reseeded as described in the Conditions of Approval section of the authorized Application for Permit to Drill. Upon abandonment of wells and/or when access roads are no longer in service

the Authorized Officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas as described in the Conditions of Approval.

Road construction requirements and regular maintenance would alleviate potential impacts to access roads from water erosion damage.

Additional mitigation measures and/or best management practices would be assigned once a site specific plan of development is proposed.

### 4.3 Water Resources

Parcels with enough floodplains to have the NSO 11-2 floodplain stipulation applied to at least a portion are: K, M, JD, J3, JK, JQ, JT, H, and A.

#### 4.3.1 Direct and Indirect Effects

The action of leasing the parcel itself would not have any impact on water resources. The subsequent development of the leases could result in reasonably foreseeable disturbances to hydrologic resources. Stipulations regarding steep slopes, erosive soils, and activities on floodplains and in wetlands would minimize potential impacts and are applied (refer to Appendix A). The streams on the parcels have floodplains of varying widths. Most of the floodplains can be avoided using the 200 meter rule established in onshore order #1 to move a proposed well location out of a problematic place. Some of the floodplains are too large to avoid via the 200 meter rule.

The development of the lease (construction and operation of well pads, access roads, pipelines, powerlines, reserve pits, and other facilities) would create surface disturbances that can subsequently lead to surface and ground water degradation through non-point source pollution. The likelihood and magnitude of these occurrences is dependent upon local site characteristics, climatic events, and the success of specific mitigation measures applied. Potential impacts would be addressed in more detail at the APD stage.

#### 4.3.2 Mitigation

In the event of exploration/development, a number of measures would be taken to prevent, minimize, or mitigate impacts to water resources. The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation. Once this topsoil is applied and vegetation is re-established the impacts would be remediated.

The use of plastic-lined reserve pits would reduce or eliminate the risk of drilling fluid seeping into the soil and eventually reaching groundwater. Spills or produced fluids (e.g., saltwater, oil, and/or condensate in the event of a breech, overflow, or spill from storage tanks) could result in contamination of the soils onsite, or offsite, and may potentially impact surface and groundwater resources in the long term. The casing and cementing requirements imposed on proposed wells

would reduce or eliminate the potential for groundwater contamination from drilling muds and other surface sources.

Reserve pits would be re-contoured and reseeded as described in the Conditions of Approval. Upon abandonment of wells and/or when access roads are no longer in service the Authorized Officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas as described in Conditions of Approval.

Road construction requirements and regular maintenance would alleviate potential impacts to access roads from water erosion damage.

Additional mitigation measures and/or best management practices would be assigned once a site specific plan of development is proposed.

## 4.4 Vegetation Resources

At this stage (lease sale) there are no impacts. Impacts (both direct and indirect) would occur when the lease is developed in the future. The potential impacts would be analyzed on a site specific basis prior to oil and gas development and during the APD stage of development.

### 4.4.1 Direct and Indirect Effects:

Impacts to native vegetation would depend on the native vegetation type and the topography of the lease parcels. The lease parcels contain mainly grassland vegetation communities with some sagebrush present within the grassland communities. Habitat disturbance in grasslands generally can be mitigated with seeding to ensure re-establishment of perennial vegetation occurs to limit soil erosion. Erosion potential of the soils can be a limiting factor for vegetation re-establishment. The impacts associated with well pads and roads, however, would be very site-specific and are not expected to significantly affect these habitats at the community scale. The footprint of the disturbance is also expected to be a small proportion of the habitat area.

Topography can play a role in the amount of surface disturbance that results from well and road construction. Flat areas would require little or no cut and fill, and road routes are not constrained by topography. In hilly areas, cut and fill may be required which disturbs additional land. Road routes may have to travel longer distances to meet engineering requirements and may also require cut and fill. Areas lacking roads near potential drilling sites would have more disturbance, as the entire access route would need to be constructed rather than just a short spur route from an existing road.

Potential impacts to plants include direct mortality from earth excavation or crushing by vehicles. Adverse impacts could also result from soil erosion resulting 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 adversely affected. Weeds which are introduced and/or promoted by soil disturbing activities compete against and displace native vegetation.

Rare plants are not known to be present within the affected area. Dust generated by construction activities and travel along dirt roads can affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil 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 impacts could be expected.

### 4.4.2 Mitigation

Reclaimed land would be seeded to native vegetation. Nurse crops may be used to control erosion and weed invasion. Grassland habitats may resemble their pre-project conditions in 2 to 5 years.

Mitigation would be addressed at the site specific APD stage of development. Needed stipulations and Conditions of Approval would be identified and addressed during planning at the APD stage.

## 4.5 Special Status Species

At this stage (lease sale) there are no impacts. Impacts (both direct and indirect) would occur when the lease is developed in the future. The potential impacts would be analyzed on a site specific basis prior to oil and gas development and during the APD stage of development. The following discussion relates to all three alternatives.

### Threatened and Endangered Species

### Birds

Greater sage grouse habitat, within the boundaries of the General Habitat Areas (GHA), occurs within all of the lease parcels in Harding County.

Recent research has shown that there is interaction between the sage grouse populations in Wyoming, Montana, North Dakota and South Dakota. Recent investigations conducted on the effects of oil and gas activities on greater sage grouse found breeding populations were negatively affected by well densities. Also, found effects were often not noted until 3-4 years after development and Harju (2009) found effects in some areas were only apparent 9-10 years after development, suggesting that the full impact of development may not have yet occurred from recent oil and gas activities.

Impacts from surface-disturbing activities, disruptive activities, and management actions are anticipated for greater sage grouse across all activities. Estimated short- and long-term surface

disturbance from BLM actions in the lease units are anticipated to result in loss, degradation, and fragmentation of sagebrush habitat. Oil and gas development is a major source of surface disturbance in the lease units, and oil and gas development has been identified as a cause of declining greater sage-grouse populations (Doherty, et al. 2008, Walker, et al. 2007, Naugle, et al 2009, Harju 2009). Surface disturbance is anticipated to have adverse impacts to sagebrush habitats including temporary and permanent loss of habitats in lease units. Fragmentation and degradation of habitat for greater sage grouse also is anticipated from surface-disturbing activities and associated development of these leases. Findings suggest that impacts to sage grouse populations are determined by the level of disturbances in nesting habitat regardless of the distance of disturbances to leks. Impacts can be assessed by well density in sagebrush habitats even though those impacts are measured by the number of males at nearby leks and are often described in relation to distance to leks.

The difference between alternatives is that Alternative A would have no additional habitat disturbance due to oil or gas activity. Alternative B would allow leasing to occur on all nominated parcels with the current stipulations. There would be more anticipated adverse impacts to greater sage grouse and their habitats under Alternative B than Alternative C. Alternative C would defer some nominated parcels that are within areas where additional restrictions concerning greater sage grouse habitat are proposed in the upcoming RMP. Alternative C would allow leasing where current stipulations are sufficient to protect the resource.

**Mammals**

The potential occurrence of the black-footed ferret or the gray wolf is very low, so the habitat disturbance impacts that may result from leasing these parcels would be negligible.

**Fish**

The potential for occurrence of the pallid sturgeon and the topeka shiner is extremely low, so the habitat disturbance impacts that may result from leasing these parcels would be negligible.

**Insects**

The potential for occurrence of the American Burying Beetle, or the Dakota Skipper Butterfly is low, so habitat disturbance that may result from leasing these parcels would be negligible.

**Sensitive Species**

There are 33 bird species considered sensitive by BLM in the South Dakota planning area.

**Grassland birds**.

Degree of impacts to these grassland birds will depend on the time of year it occurs and amount of disturbance permitted in the lease units. The potential impacts include loss of habitat both temporary and permanent, disturbance during the breeding, nesting and young raising stages, and

collision with vehicles. The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in negligible to minor impacts to grassland birds at the site-specific scale and negligible at the population and landscape scales. For some wildlife species disturbances are related to timing of the impacts. Raptors are more vulnerable to disturbances during the early stages of nesting.

**Mammals**

The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in negligible to minor impacts to mammals at the site-specific scale and negligible at the population and landscape scales.

**Reptiles and Amphibians**

The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in negligible to minor impacts to reptiles and amphibians at the site-specific scale and negligible at the population and landscape scales.

**Fish**

The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in negligible impacts to fish at the site-specific scale and at the population and landscape scales.

### 4.5.2 Mitigation

There are timing buffers developed for nesting areas of the interior least tern, greater sage grouse and piping plovers.

Parcels M, JK, JL, and JT and portions of Parcels L, O, and JJ are outside the current timing stipulation boundary of 2 miles around a lek but are within the outer limits proposed by scientific research (Naugle et. al. 2009). In the development of the new Resource Management Plan (RMP) these areas are being considered for timing restrictions. Therefore these 4 parcels and portions of 3 parcels are being deferred in Alternative C to provide the necessary timing restriction on activity within nesting and brooding habitat for greater sage grouse.

There are 2 parcels (JO and JP) that have raptor (prairie falcon and golden eagle) nesting stipulation in Alternative B. The area around the nest does not provide the recommended buffer to ensure the nest success. These parcels are deferred pending completion of RMP because of levels of restrictions for raptors nesting that are being considered in RMP.

The occurrence of Sprague's pipit (*Anthus spragueii* ) on BLM administered surface or minerals is unknown. Lease parcels will have a lease notice to develop specific measures during the APD stage to reduce impacts to this bird.

## 4.6 Fish and Wildlife Resources

### 4.6.1 Direct and Indirect Effects

Potential impacts to animals, including listed species, include direct mortality or injury, loss of dens or burrows, displacement, and human disturbance. Direct mortality or injury could result from vehicle strikes. Animals could be displaced during project activities. Such displacement of animals into unfamiliar areas could increase the risk of predation and increase the difficulty of finding required resources such as food and shelter. Human disturbance could result in displacement of animals. Human disturbance also might alter the behavior of animals (e.g., activity periods, space use) resulting in increased predation risk, reduced access to resources, and reduced breeding success. Project activities during the spring breeding season could increase the potential for adverse impacts. Animals could also become entrapped in oil spills, leaks, sumps or improperly maintained well cellars or other facilities.

Roads and large areas of disturbance can be a barrier to movement for some animal species. Animals in the Northern Great Plains, however, generally do not have difficulty crossing roads or disturbed areas. It is not unusual to observe mammals, birds, reptiles or amphibians using and crossing roads. This tendency does expose these animals to vehicle strikes and predation.

Structures such as utility poles, buildings, and pumping units may provide perches for raptors. Addition of utility poles may increase electrocution rates for raptors and may increase predation rates on small mammals and other prey species. The types of structures typically found in oilfields, however, do not tend to provide nesting structures for raptors.

The impacts to sage grouse, mule deer and antelope on winter range include disturbances from humans, machinery and vehicles. They can be displaced or disturbed by these activities during stressful periods of snow, wind, and cold temperatures.

### 4.6.2 Mitigation

There are timing stipulations that will restrict exploration and development activities from December 1 to March 30 for big game and sage grouse winter range. All of Parcels JB, and JF and portions of Parcels J, G, K, O, J2, J3, JA, JD, JH, JI, JK, JL, JT and JZ are within a proposed winter range for the sage grouse, mule deer and antelope.

To lower disturbance and disruption levels for raptors and big game there would be timing buffers around raptor nest locations during the nesting and chick-raising periods.

Surface disturbances from pads and roads should be kept a minimum. Any utility poles should be equipped with anti-perch devices for lower electrocution and predation rates.

## 4.7 Cultural Resources

### 4.7.1 Direct and Indirect Effects

Leasing a nominated parcel gives a basic right to the operator to develop the lease. Leasing would not, however, result in effects to cultural resources. It is only when the lease is developed that there is a potential for cultural resources to be affected by the proposed action. That is when the drilling location is known and cultural resource investigations can be centered on that location and other related developments such as roads, transmission lines, and pipelines.

Direct and Indirect impacts are not anticipated from leasing nominated parcels. It is at the APD stage of development that specific impacts can be correctly assessed. Potential impacts to cultural resources at the APD stage include damage to archaeological sites through construction activities and the possible of removal of, or damage to, archaeological materials due to increased human activity in the area. Conversely, cultural resource investigations associated with development potentially adds to our understanding of the prehistory and history of the area under investigation.

A preliminary records review at the South Dakota State Archaeological Research Center conducted for the sections containing the nominated lease locations and a one mile radius determined there has been only 10 percent cultural resource survey coverage previously in the proposed lease areas. Eleven sites have been previously recorded in the areas proposed for lease. They include two historic spring developments; one historic townsite; one prehistoric occupation site; five prehistoric lithic scatters and two isolated finds containing lithic flakes. One site is NRHP eligible and three are unevaluated. No direct or indirect effects will happen if these lease parcels are considered for deferral until further field inspection and consultation can be completed. The remaining seven sites inside the lease parcels have been evaluated and are considered not eligible for the NRHP. No further work should be necessary for these locations and there will be no effects from leasing and development at these site locations.

### 4.7.2 Mitigation

Specific mitigation measures, including, but not limited to possible site avoidance or excavation and data recovery would have to be determined when site specific development proposals are received.

Based on existing information there are four cultural resource sites located in the nominated parcels and if developed these properties could be potentially impacted by a site specific proposal. Since these sites have been determined significant or the sites have not been evaluated for consideration to the National Register of Historic Places; specific mitigation measures, including, but not limited to, possible site avoidance or excavation, and data recovery would be determined when site specific development proposals are received.

The remaining 50 known cultural resource sites located in the mile radius of the proposed leases are outside the lease nomination areas and should not be affected by future actions related to leasing.

Each nominated lease parcel should have the standard lease notice attached and the special cultural resource stipulation as written in IM 2005-003. Refer to Appendix A of this document for pertinent parcel-specific lease stipulations as needed.

## 4.8 Paleontology

### 4.8.1 Direct and Indirect Effects

The act of leasing a nominated parcel would not impact paleontological resources; however, subsequent development could have impacts on those resources. For areas known to contain or have the potential to contain paleontological resources a survey should be conducted when a specific development may impact those resources.

Western South Dakota has many different formations; however for the purpose of management many of these formations can be grouped and treated as a single unit. One of the determining factors is the location of highly fossiliferous beds underlying the younger formations.

Significant paleontological resources occur regularly on land underlain by the Hell Creek and Ludlow formations and mitigation will be a consideration with all surface disturbing activities or land exchanges. The Niobrara formation, Pierre Shale, Fox Hills formation, Bullion Creek formation, the White River Group, and the Arikaree formation are all known for significant fossil finds.

As a section of the Omnibus Public Lands Act (March 30, 2009), the Paleontological Resources section of the Act (Title VI, Subtitle D) for the first time specifically addressed management of paleontological resources on public lands. As a result of this act, a map of the planning area which shows the area according to its "Potential Fossil Yield Classification" (or PFYC) was designed to provide a tool for predicting the potential management areas have for fossil locales. The BLM Standard IM 2008-2009 introduced this classification system, which outlines BLM's approach to assessment and mitigation of paleontological resources. The PFYC system uses five classes for geologic units: Class 1: Very Low; Class 2, Low; Class 3, Moderate (3a), or Unknown (3b); Class 4, High; and Class 5, Very High. This classification approach is meant to reflect the probability of impacting significant fossils. And the intent of the classification system is to eliminate or reduce adverse impacts to paleontological resources from authorized actions.

Of the 32 nominated lease parcels, 29 parcels are in areas classified as high according to the Potential Fossil Yield Classification (PFYC) system map. The remaining 3 nominated parcels are located in areas considered moderate or unknown. Presently, there are no known localities or previous research areas for fossil or paleontological resources inside or adjacent to the nominated parcels; therefore, there are no known direct or indirect affects to paleontological resources.

### 4.8.2 Mitigation

The act of leasing a nominated parcel would not impact paleontological resources; however, subsequent development could have impacts on those resources. For areas known to contain or

have the potential to contain paleontological resources a survey should be conducted when a specific development may impact those resources.

Each nominated lease parcel should have the standard lease notice attached and the special paleontological resource stipulation as written in IM 2008-009, 10/15/2007 and IM 2009-011, 10/10/2008. Where known resources are of such high value Field Offices should consider deferring the parcel from sale or applying a stipulation; i.e., Controlled Surface Use (CSU) or a No Surface Occupancy (NSO). Refer to Appendix A of this document for pertinent parcel-specific lease stipulations as needed.

**LEASE NOTICE 14-12**

PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT

Surface occupancy or use is subject to the following special operating constraints: The lessee/operator is given notice that 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 identified meet the conditions 1 and/or 2 as set forth in the Potential Fossil Yield Classification System, 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 IM 2008-009, 10/15/2007 and IM 2009-011, 10/10/2008. The project proponent may be required to conduct a paleontological inventory prior to any surface disturbance. If inventory is required, the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory. An acceptable inventory report is to be submitted to the BLM for review and approval at the time a surface-disturbing plan of operations is submitted. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or project proponent shall contact the B LM to determine if a paleontological resource inventory is required. If an inventory is required then;

1). The lessee or project proponent will complete the required inventory. The lessee or project proponent may engage the services of a paleontological resource consultant acceptable to the BLM to conduct a paleontological resource inventory of the area of proposed surface disturbance. 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.

2). Paleontological inventory may identify resources that may require mitigation to the satisfaction of the BLM as directed by IM 2009-011, 10/10/2008.

## 4.9 Native American Religious Concerns

### 4.9.1 Direct and Indirect Effects

Leasing of nominated parcels would not have an impact on TCPs and/or areas of religious or cultural importance to tribes. A lease sale would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007. It would not prevent tribes from visiting sacred sites or prevent possession of sacred objects. A specific development authorized through the APD process may, however, have an impact to Native American religious practices and TCPs.

There are known or identified TCPs and/or properties of religious and cultural importance to tribes adjacent to some of the proposed lease parcels. To ensure there will be no direct, indirect,

or cumulative effects; ten parcels are recommended deferred until more information on the TCP can be acquired during cooperative meetings with interested Native American Tribes.

### 4.9.2 Mitigation

The stipulation contained in IM-2005-003; should be attached to all other nominated lease parcels that are recommended during this analysis. Consultation with tribes is necessary to determine whether nominated parcels can be recommended for sale. Ten parcels are deferred until consultation with Tribes has been completed. Additional consultation may also be necessary at the APD stage. Refer to Appendix A of this document for pertinent parcel-specific lease stipulations as needed.

## 4.10 Visual Resources

### 4.10.1 Direct and Indirect Effects

The parcels proposed for lease fall into VRI class IV. While the act of leasing Federal minerals produces no visual impacts, subsequent development of a lease could result in some new development and modifications to the existing landscape. Through the use of best management practices and mitigation guidelines for visual resources, impacts to visual resources would be minimal as the potential new development/modifications are expected to favorably blend with the form, line, color and texture of the existing landscape.

### 4.10.2 Mitigation

All new development would implement, as appropriate for the site, BLM Best Management Practices for VRM in Oil and Gas Development. This includes (but would not be limited to) proper site selection, minimizing disturbance, selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Wherever practical, no new development would be allowed on ridges or mountain tops. Overall, the goal is to not reduce the visual qualities that currently exist

## 4.11 Livestock Grazing

### 4.11.1 Direct and Indirect Effects

At this stage (lease sale) there would be no impacts to livestock grazing. Impacts (both direct and indirect) would occur if a lease is developed in the future. The potential impacts would be analyzed on a site specific basis prior to oil and gas development and during the APD stage of development.

Impacts possible at the APD stage of development would include a loss of forage as a result of drill-site development which includes pad, reserve pit, earthen pit, roads, surface facilities, pipelines, powerlines, and herbicide use. In some cases there may be a temporary loss of AUMs.

Short term shifts in grazing intensities, cattle distribution, and utilization levels could occur as a worst case scenario. The cumulative number of AUMs removed from a grazing allotment would have to be considered at the APD stage of development. Short-term and long-term impacts associated with AUM losses would be apparent in rangeland monitoring efforts.

### 4.11.2 Mitigation

Mitigation would be deferred to the site specific APD stage of development. BMPs would be incorporated into COAs.

Fencing of facilities would be considered as needed to minimize conflicts between oil and gas exploration/development and livestock grazing. The carrying capacity, stocking rates, and utilization objectives for an allotment would have to be analyzed with the removal of acreage from the allotment. Well locations should not be placed in a location that will impair range improvement usefulness and maintenance. Any linear features (i.e. roads and pipelines) that disturb range improvements should mitigate such disturbance by repairing the range improvement to the prior condition or better.

## 4.12 Recreation and Travel Management

### 4.12.1 Direct and Indirect Effects

While the act of leasing Federal minerals itself produces no impacts to recreation, subsequent development of a lease could cause general impacts to recreation activities

For these lease parcels containing isolated tracts of BLM public lands that generally do not have existing public access, recreation opportunities that occur in these areas are limited to non-existent, therefore, oil and gas activities would have little or no impact on recreational experiences in this area.

## 4.13 Lands and Realty

### 4.13.1 Direct and Indirect Effects

Leasing BLM lands for oil and gas exploration and production in areas that have low or very low potential does not typically impact land uses because the potential of a successful new find is low.

Leasing can sometimes cause conflicts with other surface uses that may be taking place on the lands. This is especially possible if the leased lands are split estate, where the surface estate is privately owned and the mineral estate is federally owned and under the jurisdiction of BLM. Surface owners are often not aware of the Federal ownership of the mineral estate, or are not aware of the implications of the Federal ownership.

The surface landowners have been notified that the Federal mineral estate underneath their surface is proposed for oil and gas competitive leasing.

Along with the ownership of the minerals the Federal government retains the right to use any part of the surface for exploration or development. These "surface entry rights" can cause distress for private surface owners who do not wish to see new roads and well pads on their land. Adjacent private lands can also be impacted due to leasing, in that new road access to the leased areas is sometimes necessary. Although the responsibility for obtaining access to leased areas is the lessee's and not BLM's, leasing can sometimes cause an indirect impact to adjacent lands due to the need for road access.

Any surface disturbing activity requires BLM approval. For those parcels that are split estate (private surface overlying Federal minerals), the BLM requires the lessee/operator to make a good faith effort to obtain an agreement with the private surface owner prior to access on the leased land issued through competitive bid.

## 4.14 Fluid Minerals

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use would have the greatest effects on oil and gas exploration and development. Leases issued with major constraints (No Surface Occupancy stipulations) may decrease some lease values, increase operating costs, and to a lesser extent require relocation of well sites and modification of field development. Leases issued with moderate constraints (Timing Limitation and Controlled Surface Use stipulations) may result in similar but reduced impacts, and delays in operations and uncertainty on the part of operators regarding restrictions.

If areas are deferred some development plans could be delayed, relocated or completely dropped because of the need to include federal acreage as part of an exploration or development plan.

### 4.14.1 Direct and Indirect Effects

Under Alternative B approximately 2,074 acres or 9 percent of the areas would be offered for lease subject to major constraints (no surface occupancy). Approximately 2,439 acres or 10 percent would be offered for lease subject to moderate constraints. Approximately 8,545 acres or 37 percent would be offered for lease subject to timing stipulations Approximately 11,082 acres or 48 percent would be offered for lease subject to standard terms and conditions and lease notices. There are some acres that have NSO or CSU constraints that also have timing stipulations so the total does not add up to the acres to be leased.

Under Alternative C approximately 10,565 acres or 45 percent of the lease parcel areas would not be recommend for oil and gas leasing at this time. Approximately 479 acres or 2 percent of the areas would be offered for lease subject to major constraints (no surface occupancy). Approximately 200 acres or less than 1 percent would be offered for lease subject to moderate

constraints. Approximately 6,236 acres or 27 percent would be offered for lease subject to timing stipulations. Approximately 4,911 acres or 21 percent would be offered for lease subject to standard terms and conditions and lease notices.

These stipulations may slow down development of a lease or decrease the interest of obtaining the lease

## 4.15 Social and Economic Conditions

### Economics

### Alternative A:

Economic impacts associated with Alternative A would be similar to those described in the economic section of the Affected Environment. These effects are summarized in Table 4.15.1 and Table 4.15.2.

**Table 4.15.1 Summary of Estimated Annual Economic Impacts by Alternative**

| Activity | Alternative | | |
|---|---|---|---|
| | A | B | C |
| Existing Acres leased* | 121,285 | 121,285 | 121,285 |
| Existing Acres leased (BLM) | 97,199 | 97,199 | 97,199 |
| Acres that would be leased based on this EA | 0 | 23,221 | 11,579 |
| Total BLM acres leased | 97,199 | 120,420 | 108,778 |
| BLM acres held by production* | 36,481 | 36,481 | 36,481 |
| Total BLM acres leased for which lease rents would be paid | 60,718 | 83,939 | 72,297 |
| | | | |
| Lease rental first 5 years ($1.50/acre) | 45,539 | 62,954 | 54,223 |
| Lease rental second 5 years ($2.00/acre) | 60,718 | 83,939 | 72,297 |
| Minimum lease bid ($2.00/ac.) | 19,440 | 24,084 | 21,756 |

| | | | |
|---|---|---|---|
| Total annual federal lease and rental revenue | 125,696 | 170,976 | 148,275 |
| Distribution to State/local government | 61,591 | 83,778 | 72,655 |
| | | | |
| BLM-federal annual oil production (bbl)** | 87,029 | 107,820 | 97,397 |
| BLM-federal annual gas production (MCF)** | 262,943 | 325,759 | 294,266 |
| Federal oil royalty (bblx$65.28x0.125) | 710,158 | 879,812 | 794,756 |
| Federal gas royalty (MCFx$7.51x0.125) | 246,837 | 305,806 | 276,242 |
| Total annual Federal O&G royalties | 956,995 | 1,185,618 | 1,070,999 |
| Distribution to State/local government | 468,927 | 580,953 | 524,789 |
| | | | |
| Total annual Federal revenues | 1,082,691 | 1,356,595 | 1,219,274 |
| Total annual State/local revenues | 530,519 | 664,731 | 597,444 |
| Total annual revenue distributed to counties | 530,519 | 664,731 | 597,444 |
| *LR2000, BLM, January 2011<br>**Estimated 2010 federal production level | | | |

**Table 4.15.2 Summary Comparison of Estimated Average Annual Economic Impacts**

| Alternative | Acres Available for Lease | Change in Revenue to Local Counties | Change in Total Employment (full and part-time jobs) | Change in Total Local Wage and Proprietor's Income ($1000) | Change in Local Population | Change in Number of Households |
|---|---|---|---|---|---|---|
| Alt. A | 0 | $0 | 0 | $0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Alt. B | 23,221 | $134,213 | 21 | $1,034 | 33 | 14 |
| Alt. C | 11,579 | $66,926 | 11 | $515 | 17 | 8 |

**Alternative B:**

Public Revenues related to leasing, rent, and production:

Leasing an additional 23,221 acres of federal minerals (Alternative B) would increase estimated average annual oil and gas leasing and rent revenues to the federal government by a minimum of $45,000 (Table 4.15.1). Estimated average annual leasing and rent revenues that would be distributed to state/local governments would increase by a minimum of about $22,000. Average annual federal oil and gas royalties would increase by an estimated $229,000 with Alternative B. Average annual royalties distributed to the state/counties would increase by an estimated $112,000.

Total average annual BLM federal revenues related to leasing 120,420 acres of federal minerals and associated annual rent and royalty revenues related to average annual production of BLM federal minerals would amount to an estimated $1.36 million. This would be an estimated average annual increase of about $274,000 compared to current management and Alternative A. Total annual revenues distributed to the state and counties would be an estimated $665,000, an estimated $134,000 more than with Alternative A.

Local Economic Contribution:

The estimated combined total annual employment and income supported by federal oil and gas leasing, distributions of royalties to local governments, drilling wells, and production would amount to about 110 total jobs and $5.3 million within the local economy (IMPLAN, 2009). Table 4.15.3 shows that this would be an annual increase of about 20 total jobs and $1.0 million in labor income over levels anticipated with Alternative A. There would also be a corresponding increase in local population of about 30 people and the number of households would increase by about 10. The distribution of employment and income effects among the local economic sectors is displayed in Table Econ. 4.

Conclusion:

Total federal contribution of Alternative B (leasing an additional 23,221 acres of BLM federal minerals and anticipated related exploration, development, and production of oil and gas) would have a small effect on local population, total local employment, number of households, average income per household, and total personal income, e.g. the effects would be less than half of one percent of current levels. The economic effects would continue to be spread unevenly among the

counties. Leasing the additional 23,221 acres and anticipated exploration, development, and production under alternative B would provide a minimum of about $134,000 per year of additional funds for education in Harding and, to a lesser extent, Fall River counties. Leasing the additional 23,221acres 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), or economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates).

**Table 4.15.3 Employment and Income by Major Industry by Alternative**

| Industry | Total Jobs Contributed | | | Total Income Contributed ($1000) | | |
|---|---|---|---|---|---|---|
| | Alt. A | Alt. B | Alt. C | Alt. A | Alt. B | Alt. C |
| Agriculture | 0 | 0 | 0 | $1 | $1 | $1 |
| Mining | 46 | 58 | 52 | $2,801 | $2,801 | $3,477 |
| Utilities | 0 | 0 | 0 | $16 | $16 | $20 |
| Construction | 1 | 1 | 1 | $44 | $44 | $54 |
| Manufacturing | 0 | 0 | 0 | $1 | $1 | $1 |
| Wholesale Trade | 3 | 4 | 4 | $175 | $175 | $217 |
| Transportation & Warehousing | 2 | 3 | 3 | $132 | $132 | $164 |
| Retail Trade | 4 | 5 | 5 | $97 | $97 | $121 |
| Information | 1 | 1 | 1 | $23 | $23 | $29 |
| Finance & Insurance | 2 | 2 | 2 | $53 | $53 | $65 |
| Real Estate & Rental & Leasing | 1 | 1 | 1 | $9 | $9 | $11 |
| Prof, Scientific, & Tech Services | 3 | 4 | 4 | $156 | $156 | $193 |
| Mngt of Companies | 1 | 1 | 1 | $43 | $43 | $53 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Admin, Waste Mngt & Rem Serv | 1 | 1 | 1 | $11 | $11 | $14 |
| Educational Services | 0 | 0 | 0 | $4 | $4 | $5 |
| Health Care & Social Assistance | 3 | 4 | 3 | $98 | $98 | $122 |
| Arts, Entertainment, and Rec | 1 | 1 | 1 | $11 | $11 | $13 |
| Accommodation & Food Services | 2 | 3 | 3 | $30 | $30 | $38 |
| Other Services | 2 | 3 | 3 | $42 | $42 | $53 |
| Government | 13 | 17 | 15 | $513 | $513 | $643 |
| Total Federal Contribution | 87 | 108 | 98 | $4,260 | $4,260 | $5,294 |
| Percent Change from Current | 0.0% | 24.3% | 12.1% | --- | 0.0% | 24.3% |

**Alternative C:**

Public Revenues related to leasing, rent, and production:

Leasing an additional 11,579 acres of federal minerals (Alternative C) would increase estimated average annual oil and gas leasing and rent revenues to the federal government by a minimum of almost $23,000 (Table Econ.4.15.1). Estimated average annual leasing and rent revenues that would be distributed to state/local governments would increase by a minimum of about $11,000. Average annual federal oil and gas royalties would increase by an estimated $114,000 with Alternative C compared to current levels. Average annual royalties distributed to the state/counties would increase by an estimated $56,000.

Total average annual BLM federal revenues related to leasing 108,778 acres of federal minerals and associated annual rent and royalty revenues related to average annual production of BLM federal minerals would amount to an estimated $1.22 million. This would be an estimated average annual increase of about $137,000 compared to current management and Alternative A.

Total annual revenues distributed to the state and counties would be an estimated $597,000, an estimated $67,000 more than with Alternative A.

Local Economic Contribution:

The estimated combined total annual employment and labor and proprietor's income supported by federal oil and gas leasing, distributions of royalties to local governments, drilling wells, and production would amount to about 100 total jobs and $4.8 million within the local economy (IMPLAN, 2009). Table Econ.4.15.2 shows that this would be an annual increase of about 10 total jobs and $0.5 million in labor income over levels anticipated with Alternative A. There would also be a corresponding increase in local population of almost 20 people and the number of households would increase by less than 10.

Conclusion:

Total federal contribution of Alternative C (leasing an additional 11,579 acres of BLM federal minerals and anticipated related exploration, development, and production of oil and gas) would have an even smaller effect on local population, total local employment, number of households, average income per household, and total personal income than Alternative B. The economic effects would continue to be spread unevenly among the counties. Leasing the additional 11,579 acres and anticipated exploration, development, and production under alternative C would provide a minimum of about $67,000 per year of additional funds for education in Harding and, to a lesser extent, Fall River counties. Leasing the additional 11,579acres 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), or economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates).

## 4.16 Social and Environmental Justice

### Impacts Common to All Alternatives.

No alternative would affect the demographics, social trends, or social organization in the area.

### 4.16.1 Direct and Indirect Effects

### Alternative A

The No Action alternative would result in the continuation of the current land and resource uses and would cause no social or environmental justice impacts.

**Alternative B**

While the act of leasing federal minerals itself would result in no social impacts, subsequent development of a lease may generate impacts to people living near or using the area in the vicinity of the lease. Oil and gas exploration, drilling, or production could create an inconvenience to these people due to increased traffic and traffic delays, noise and visual impacts. This could be especially noticeable in rural areas where oil and gas development has been minimal. The amount of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, length of time, and season these activities occurred, etc. Creation of new access roads into an area could allow increased public access and exposure of private property to vandalism. For leases where the surface is privately owned and the subsurface is federally owned, surface owner agreements, standard lease stipulations, and BMPS could address many of the concerns of private surface owners.

New revenues, employment and population may benefit the smaller communities in the area. See "Direct and Indirect Effect to Economic Conditions".

There would be no disproportionate effects to low income or American Indian populations from leasing**.** However, concerns about the lease development process were received from interested Tribes. There are low income people in the counties, but they do not appear to be associated with any specific BLM resources or activities.

**Alternative C**

The social effects would be the same as for Alternative B but leasing would be not occur until further information is available on the tracts of concern to American Indians. In addition, new revenues, employment and population may benefit the smaller communities in the area, but not as much as for Alternative B. See "Direct and Indirect Effect to Economic Conditions".

## 4.17 Cumulative Impacts

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. 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.

Cumulative effects associated with all BLM programs in the South Dakota Field Office, including implementation of the Reasonable Foreseeable Development Scenario described above, are described in the Miles City District Oil and Gas RMP/EIS Amendment ( 1994) on pages 55-60 and 75-77.Anticipated exploration and development activity 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 all resources and programs other than Air Resources. This previous analysis is hereby incorporated by reference for resources and programs other than Air Resources.

### 4.17.1 Past, Present and Reasonably Foreseeable Future Actions:

There are no known new actions that are proposed for the project area. Livestock grazing and wildlife habitat are the main uses of the land that have occurred in the past, are happening now and are projected to continue. No other proposals or actions are currently planned.

### 4.17.2 Cumulative Impacts by Resource

#### 4.17.2.1 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change

The cumulative effects analysis area is the South Dakota Field Office, with additional discussion at state-wide, national, and global scales for greenhouse gas 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 South Dakota FO RFD are compared below with recent available inventory data at the state, national, and global scales. Greenhouse gas 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 to provide a context for the potential contributions of GHGs associated with this project.

As discussed in the Air Quality section of Chapter 4, total long-term projected BLM GHG emissions from the RFD are 660,973.8 metric tons/year $CO_2$e. Potential emissions under Alternative B would be approximately 1.6 percent of this total. **Table 4.17.1** displays projected GHG emissions from non-BLM activities included in the South Dakota FO RFD. Total projected emissions of non-BLM activities in the RFD are 194,111.4 metric tons/year of $CO_2$e. When combined with projected annual BLM emissions, this totals 855,085.2 metric tons/year $CO_2$e. Potential GHG emissions under Alternative B would be 0.65 percent of the estimated emissions for the entire RFD. Potential incremental emissions of GHGs from exploration and

development of fluid minerals under Alternative B would be minor in the context of projected GHG contributions from the entire RFD for the South Dakota Field Office.

**Table 4.17.1. Projected non-BLM GHG emissions associated with the South Dakota FO Reasonable Foreseeable Development Scenario for fluid mineral exploration and development.**

| Source | Non-BLM Long-Term Greenhouse Gas Emissions in tons/year | | | | Emissions (metric tons/yr) |
|---|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $Co_2e$ | $CO_2e$ |
| Conventional Natural Gas | 1,796.4 | 384.04 | 0.03 | 9,869.7 | 8,956.2 |
| Coal Bed Natural Gas | 1,385.8 | 306.4 | 0.02 | 7,826.1 | 7,101.7 |
| Oil | 190,613.6 | 214.6 | 3.5 | 196,214.9 | 178,053.5 |
| **Total** | **193,795.8** | **905.04** | **3.55** | **213,910.7** | **194,111.4** |

**South Dakota's Contribution to U.S. and Global Greenhouse Gases (GHGs)**

South Dakota's GHG inventory (http://www.climatestrategies.us/ewebeditpro/items/O25F18227.pdf) shows that activities within the state contribute 0.5 percent of U.S. and 0.1 percent of global GHG emissions. The principal sources of South Dakota's emissions are agriculture (46 percent) and the use of electricity and transportation (19 percent each). The fossil fuel industry is responsible for approximately 1 percent of total emissions. This means that all of the fossil fuel produced, processed, and transported in South Dakota would be responsible for 0.001 percent of global emissions.

GHG emissions from all major sectors in South Dakota in 2005 totaled approximately 36.5 million metric tons of $CO_2e$ (Climate Change SIR, 2010). Potential emissions from development of lease parcels in Alternative B represent approximately 0.02 percent of the state-wide total of GHG emissions based on the 2005 state-wide inventory.

The EPA (Climate Change SIR, 2010) published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,957 million metric tons, and net emissions of 6,016 million metric tons (when $CO_2$ sinks were considered) of $CO_2e$ in 2008. Potential annual emissions under Alternative B would amount to approximately 0.0001 percent of gross U.S. total emissions. Global GHG emissions for 2004 (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 0.00001 percent of this global total.
As indicated in the Air Quality section of Chapter 4 above, although the effects of greenhouse gas emissions in the global aggregate are well-documented, it is currently not credibly possible to determine what specific effect greenhouse gas 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 would incrementally contribute to the total volume of GHGs emitted to the atmosphere, and ultimately to climate change.

Mitigation measures identified in the Air Quality section of Chapter 4 above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development as a result of this project. 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).

#### 4.17.2.3 Cumulative Impacts of Climate Change

As previously discussed in the Chapter 4 Air Quality section, it is difficult to impossible to identify specific impacts of climate change on specific resources within the project area. 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. Effects of climate change on resources are described in Chapter 3 of this EA and in the Climate Change SIR.

#### 4.17.2.4 Cumulative Impacts on Other Resources

**Soil Resources**

Contamination of soil from drilling and production wastes and/or spills could cause a long-term reduction in site productivity. Some of these impacts can be reduced or avoided through proper design, construction and maintenance and implementation of best management practices.

Given the need for site specific locations, development techniques, and mitigation a specific description of effects is not possible at this time.

**Water Resources**

Where facilities cross or are close to waterways, the likelihood of project impacts would increase. These impacts could include increased sedimentation; increased salt loading; contamination by petroleum products, chemicals, or produced waters; and flow alterations. Similarly, possible leaks from reserve and evaporation pits could degrade surface and ground water quality. Some of these impacts can be reduced or avoided through proper project design, construction and maintenance activities and implementation of best management practices.

Authorization of the proposed projects would require full compliance with BLM directives and stipulations that relate to surface and groundwater protection. Given the need for site specific locations, development techniques, and mitigation a specific description of effects is not possible at this time.

**Sensitive and Fish and Wildlife Resources**

The cumulative effects in Alternative B are the lease sale of some of the parcels that fall within greater sage grouse habitat would decrease the amount of habitat on public land and the development on the private minerals would continue to grow within the sage brush areas. This

would lead to a decrease in available sage brush habitat which could decrease the populations of species that depend on sage brush. This would include both sensitive and general wildlife species including sage grouse, mule deer, antelope and other sagebrush and grassland species.

The cumulative effects with alternative C are the parcels that have important sagebrush habitat or nesting habitat will be protected for those species that require those specialized environments. The private minerals within these habitats would continue to be developed and the species would rely more heavily on the public lands (including federal minerals) for their habitat,

**Economics**

Cumulative Effects Alternative B: The cumulative effects of federal mineral leasing within the local economy as well as the specific effects of leasing an additional 23,221 acres under Alternative B are presented in the previous analysis. These effects are summarized in Table Econ.4.15.1 and 4.15.2. The oil and gas industry would continue to be an influence on the local economy; however the total demographic and economic characteristics of the local economy would change little with the economic activity associated with leasing an additional 23,221 acres of federal minerals.

Cumulative Effects Alternative C: The cumulative effects of federal mineral leasing within the local economy as well as the specific effects of leasing an additional 11,579 acres under Alternative C are presented in the previous analysis. These effects are summarized in Table 4.15.1 and 4.15.2. The oil and gas industry would continue to be an influence on the local economy; however the total demographic and economic characteristics of the local economy would change little with the economic activity associated with leasing an additional 11,579 acres of federal minerals.

## 5.0 CONSULTATION AND COORDINATION:

### 5.1 Persons, Agencies, and Organizations Consulted

Table 5-1 lists persons, agencies, and organizations were consulted during development of this EA along with the findings and conclusions associated with consultations.

### Table 5-1:

### List of all Persons, Agencies and Organizations Consulted for Purposes of this EA

| Name | Purpose & Authorities for Consultation or Coordination | Findings & Conclusions |
|---|---|---|
| Waste' Win Young | Tribal Historic Preservation Officer – Standing Rock Sioux Tribe | |
| Wilmer Mesteth | Tribal Historic Preservation Officer – Oglala Sioux Tribe | |
| Joe Fox | Acting Tribal Historic Preservation Officer Northern Cheyenne Tribe | |
| Steve Vance | Tribal Historic Preservation Officer – Cheyenne River Sioux Tribe | |
| Elgin Crows Breast | Tribal Historic Preservation Officer – Fort Berthold | |
| Russell Eagle Bear | Tribal Historic Preservation Officer – Rosebud Sioux Tribe | |
| Wanda Wells | Tribal Historic Preservation Officer – Crow Creek Sioux Tribe | |
| Richard Ferris | Tribal Historic Preservation Officier – Eastern Shoshone Tribe | |
| Joshua Weston | President – Flandreau Santee Sioux Tribe | |
| Curley Youpee | Director of Cultural Resources Ft. Peck Tribes | |

| | | |
|---|---|---|
| Pamela Halverson | Tribal Historic Preservation Officier – Lower Sioux Indian Community | |
| Clair Green | Cultural Resources/Public Affairs – Lower Brule Sioux Tribe | |
| Dianne Desrosiers | Tribal Historical Preservation Officer-Sisseton-Wahpeton Oyate Tribes | |
| Lana Gravatt | Tribal Historical Preservation Officer – Yankton Sioux Tribe | |

## 5.2 Summary of Public Participation

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 December 17, 2011. Surface owner notification letters were also distributed briefly explaining the oil and gas leasing process and planning process. The surface owner notification letter requested written comments regarding any issues or concerns that should be addressed in the environmental analysis. A total of 25 surface owner notification letters were distributed for the oil and gas leasing analysis process in South Dakota

## 5.3 List of Preparers:

| Name | Title | Responsible for the Following Section(s) of this Document |
|---|---|---|
| Marian Atkins | Field Manager | Preparer |
| Brenda Shierts | Archeologist | Cultural Resources |
| Russ Pigors | Physical Scientist | Minerals, Soils, Water Resources |
| Wayne Berrett | Rangeland Management Specialist | Vegetation, Grazing |
| Chuck Berdan | Realty Specialist | Lands and Realty, Wildlife, Sensitive Species |
| Gerald Moller | Range Technician | Invasive Species |
| Mike Philbin | | Air Quality, Climate |
| Joan Trent | Social Scientist | Social |
| John Thompson | Planning | Economics |
| Kim Prill | Planning and Environmental Coordinator | Facilitation and organization |

## 6.0 REFERENCES

References: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Harju, Seth M.[a,1], Matthew R. Dzialak[a], Renee C. Taylor[b], Larry D. Hayden-Wing[a], and Jeffrey B. Winstead; *Thresholds and Time Lags in Effects of Energy Development on Greater Sage-Grouse Populations*. Journal of Wildlife Management 74(3):437-448. 2010 10.2193/2008-289

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Walker, Brett L., David E. Naugle, Kevin E. Doherty (*2007*) *Greater Sage-Grouse Population Response to Energy Development and Habitat Loss*. Journal of Wildlife Management: Vol. 71, No. 8, pp. 2644-2654.

## 7.0 DEFINITIONS/ACRONYMS:

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 South 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 2007 data set was used in this analysis.

**APPENDICES:**

**APPENDIX A:**

**Lease Parcel Summary Table**

| APPENDIX A - SD FIELD OFFICE | | | | |
|---|---|---|---|---|
| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-O | T. 21 N, R. 1 E, BHM, SD<br>SEC. 4 LOTS 1,2;<br>SEC. 4 SENE,SE;<br>SEC. 9 ALL;<br>SEC. 10 N2S2,SESW;<br>HARDING COUNTY<br>1120.32 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1 (ALL LANDS); | T. 21 N, R. 1 E, BHM, SD<br>SEC. 4 LOTS 1,2;<br>SEC. 4 SENE,SE;<br>SEC. 9 N2,SW;<br>HARDING COUNTY<br>280.32 AC<br>PD<br><br>CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1 (ALL LANDS); | T. 21 N, R. 1 E, BHM, SD<br>SEC. 9 SE;<br>SEC. 10 N2S2,SESW;<br>HARDING COUNTY<br>840 AC<br>PD<br><br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA |
| SDM 97300-K | T. 21 N, R. 1 E, BHM, SD<br>SEC. 5 LOTS 1,2,3,4;<br>SEC. 5 S2N2,W2SW,E2SE;<br>SEC. 6 LOTS 1,2,3,4;<br>SEC. 7 LOTS 1,2,3,4;<br>SEC. 8 W2;<br>SEC. 17 W2NE,E2NW;<br>HARDING COUNTY<br>1302.22 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 17 E2NW;<br>TL 13-1 (ALL LANDS); | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 17 E2NW;<br>TL 13-1 (ALL LANDS); | |

| APPENDIX A - SD FIELD OFFICE | | | | |
|---|---|---|---|---|
| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-L | T. 21 N, R. 1 E, BHM, SD<br>SEC. 19 LOTS 1,2,3,4;<br>SEC. 20 NWSW,S2SW;<br>SEC. 30 LOTS 1,2;<br>HARDING COUNTY<br>353.08 AC<br>PD | T. 21 N, R. 1 E, BHM, SD<br>SEC. 19 LOTS 1,2,3,4;<br>SEC. 20 NWSW,S2SW;<br>HARDING COUNTY<br>276.32 AC<br>PD<br><br>CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | T. 21 N, R. 1 E, BHM, SD<br>SEC. 19 LOTS 1,2,3,4;<br>SEC. 20 NWSW,S2SW;<br>HARDING COUNTY<br>276.32 AC<br>PD<br><br>CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | T. 21 N, R. 1 E, BHM, SD<br>SEC. 30 LOTS 1,2;<br>HARDING COUNTY<br>76.76 AC<br>PD<br><br>LANDS CURRENTLY IN LEASE SDM 101090 |
| SDM 97300-M | T. 21 N, R. 1 E, BHM, SD<br>SEC. 21 SENE,SESW,NESE, S2SE;<br>SEC. 22 N2N2,S2NW,N2SW, SWSW;<br>SEC. 23 NENE,SWNE,W2NW, SENW,E2SW,NWSE, S2SE;<br>SEC. 24 NWSW;<br>SEC. 26 N2NE,S2NW;<br>SEC. 27 NWNW;<br>SEC. 28 N2NE;<br>HARDING COUNTY<br>1280.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 21 SENE; NESE; | DEFER ALL LANDS PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA | DEFER ALL LANDS PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA |

| APPENDIX A - SD FIELD OFFICE | | | | |
|---|---|---|---|---|
| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-J | T. 22 N, R. 1 E, BHM, SD<br>SEC. 1 SW;<br>SEC. 12 N2S2;<br>SEC. 13 NE,SW;<br>SEC. 14 W2SW,S2SE;<br>HARDING COUNTY<br>800.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 13 SW;<br>SEC. 14 W2SW,S2SE; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 13 SW;<br>SEC. 14 W2SW,S2SE; | |
| SDM 97300-JA | T. 22 N, R. 1 E, BHM, SD<br>SEC. 2 LOTS 3,4;<br>SEC. 2 S2N2,SW;<br>HARDING COUNTY<br>399.47 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 2 LOTS 3,4;<br>SEC. 2 S2N2; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 2 LOTS 3,4;<br>SEC. 2 S2N2; | |
| SDM 97300-JB | T. 22 N, R. 1 E, BHM, SD<br>SEC. 4 LOTS 1,2;<br>SEC. 4 S2NE,SE;<br>SEC. 9 ALL;<br>HARDING COUNTY<br>958.97 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1 (ALL LANDS); | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1 (ALL LANDS); | |

| APPENDIX A - SD FIELD OFFICE | | | | |
|---|---|---|---|---|
| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-J1 | T. 22 N, R. 1 E, BHM, SD<br>SEC. 8 NWNW,SESW,NESE, S2SE;<br>SEC. 17 NE,NENW,S2NW, NESW,N2SE;<br>HARDING COUNTY<br>600.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 8 E2SE;<br>SEC. 17 NE,NENW,S2NW, NESW,N2SE; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 8 E2SE;<br>SEC. 17 NE,NENW,S2NW, NESW,N2SE; | |
| SDM 97300-JC | T. 22 N, R. 1 E, BHM, SD<br>SEC. 10 S2NE,SW,N2SE;<br>HARDING COUNTY<br>320.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL-13-1;<br>SEC. 10 S2NE,N2SE; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL-13-1;<br>SEC. 10 S2NE,N2SE; | |
| SDM 97300-JD | T. 22 N, R. 1 E, BHM, SD<br>SEC. 19 LOTS 1,2,3,4;<br>SEC. 20 ALL;<br>SEC. 28 N2NE,W2,S2SE;<br>HARDING COUNTY<br>1308.16 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 19 LOT 2;<br>SEC. 20 SWNW; E2SW; NWSW;<br>TL 13-1;<br>SEC. 19 LOTS 1,2;<br>SEC. 20 N2,SE;<br>SEC. 28 N2NE;NW;N2SW; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 19 LOT 2;<br>SEC. 20 SWNW;E2SW; NWSW;<br>TL 13-1;<br>SEC. 19 LOTS 1,2;<br>SEC. 20 N2,SE;<br>SEC. 28 N2NE;NW;N2SW; | |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-JE | T. 22 N, R. 1 E, BHM, SD<br>SEC. 21 N2;<br>SEC. 22 ALL;<br>HARDING COUNTY<br>960.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 21 N2;<br>SEC. 22 NW; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 21 N2;<br>SEC. 22 NW; | |
| SDM 97300-JF | T. 22 N, R. 1 E, BHM, SD<br>SEC. 23 ALL;<br>HARDING COUNTY<br>640.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1 (ALL LANDS); | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1 (ALL LANDS); | |
| SDM 97300-JG | T. 22 N, R. 1 E, BHM, SD<br>SEC. 24 SW,NWSE,S2SE;<br>SEC. 25 N2;<br>HARDING COUNTY<br>600.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | |
| SDM 97300-J2 | T. 22 N, R. 1 E, BHM, SD<br>SEC. 26 N2,N2SW;<br>SEC. 27 NW,SE;<br>HARDING COUNTY<br>720.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-J3 | T. 22 N, R. 1 E, BHM, SD<br>SEC. 29 N2,SW;<br>HARDING COUNTY<br>480.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 29 NWNE; SENE;<br>TL 13-1 (ALL LANDS); | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 29 NWNE; SENE;<br>TL 13-1 (ALL LANDS); | |
| SDM 97300-JH | T. 22 N, R. 1 E, BHM, SD<br>SEC. 30 LOTS 1,2,3,4;<br>SEC. 32 W2;<br>HARDING COUNTY<br>501.20 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC 32 W2; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC 32 W2; | |
| SDM 97300-J4 | T. 22 N, R. 1 E, BHM, SD<br>SEC. 33 N2NE,NENW,SESE;<br>HARDING COUNTY<br>160.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | |
| SDM 97300-G | T. 21 N, R. 4 E, BHM, SD<br>SEC. 13 N2N2;<br>SEC. 14 NESE,S2SE;<br>SEC. 23 NENE,S2NE,SENW;<br>HARDING COUNTY<br>440.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC 13 N2N2<br>SEC. 14 NESE,S2SE;<br>SEC. 23 E2NE; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-JI | T. 20 N, R. 6 E, BHM, SD<br>SEC. 22 N2,W2SE;<br>HARDING COUNTY<br>400.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 22 NE; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 22 NE; | |
| SDM 97300-JJ | T. 20 N, R. 6 E, BHM, SD<br>SEC. 26 W2NE,NW,S2;<br>SEC. 27 S2;<br>HARDING COUNTY<br>880.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | T. 20 N, R. 6 E, BHM, SD<br>SEC. 27 SW;<br>HARDING COUNTY<br>160 AC<br>PD<br><br>CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS); | T. 20 N, R. 6 E, BHM, SD<br>SEC. 26 W2NE,NW,S2;<br>SEC. 27 SE;<br>HARDING COUNTY<br>720 AC<br>PD<br><br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-JK | T. 19 N, R. 7 E, BHM, SD<br>SEC. 6 LOTS 3,4,5;<br>SEC. 6 SENW,E2SW,W2SE;<br>SEC. 7 LOTS 1,2,3,4;<br>SEC. 7 E2W2;<br>HARDING COUNTY<br>610.13 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 6 LOTS 3,4,5;<br>SEC. 6 SENW;E2SW;<br>SEC. 7 LOTS 1,2,3,4;<br>SEC. 7 E2W2;<br>TL 13-1;<br>SEC. 6 LOTS 3,4,5;<br>SEC. 6 SENW; E2SW; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION;<br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION;<br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA |
| SDM 97300-JL | T. 19 N, R. 7 E, BHM, SD<br>SEC. 8 N2,SE;<br>SEC. 9 W2NW,SW,W2SE;<br>SEC. 17 E2,SENW,E2SW;<br>HARDING COUNTY<br>1240.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-1;<br>SEC. 17 E2; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION;<br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION;<br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA |
| SDM 97300-JM | T. 19 N, R. 7 E, BHM, SD<br>SEC. 12 NWNE,S2NE,SE;<br>SEC. 13 E2E2,NWNE,SWSE;<br>HARDING COUNTY<br>520.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>CSU 12-1;<br>SEC. 12 SE;<br>SEC.13 E2E2; NWNE; SWSE; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-JO | T. 19 N, R. 7 E, BHM, SD<br>SEC. 23 S2NW,SW;<br>SEC. 26 N2NW;<br>HARDING COUNTY<br>320.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL-13-4 (ALL LANDS);<br>CSU 12-1 (ALL LANDS); | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION<br>DEFERRED PENDING RMP COMPLETION;<br>GOLDEN EAGLE NESTING AREA | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION |
| SDM 97300-JP | T. 19 N, R. 7 E, BHM, SD<br>SEC. 26 S2SW;<br>SEC. 27 W2,NWSE,S2SE;<br>SEC. 34 E2;<br>SEC. 35 SENE,N2NW,S2;<br>HARDING COUNTY<br>1280.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>TL 13-4;<br>SEC. 26 S2SW;<br>SEC. 35 SENE,N2NW;<br>CSU 12-1;<br>SEC. 26 S2SW;<br>SEC. 27 NWSE; S2SE;<br>SEC.34 E2;<br>SEC. 35 SENE; N2NW; S2; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION;<br>DEFERRED PENDING RMP COMPLETION;<br>GOLDEN EAGLE NESTING AREA | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION |
| SDM 97300-JQ | T. 19 N, R. 7 E, BHM, SD<br>SEC. 30 LOTS 1,2;<br>SEC. 30 SWNE,E2W2,SE;<br>HARDING COUNTY<br>430.90 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 30 LOTS 1,2;<br>SEC. 30 SENW,W2SE,SESE; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-JR | T. 20 N, R. 7 E, BHM, SD<br>SEC. 3 LOTS 3,4;<br>SEC. 3 S2NW,SW;<br>SEC. 4 LOTS 1,2,3,4;<br>SEC 4 S2N2,S2;<br>SEC. 9 N2NE,NW,NWSW;<br>SEC. 10 NW;<br>HARDING COUNTY<br>1394.05 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>CSU 12-1;<br>SEC. 3 S2NW; N2SW;<br>SEC. 4 LOT 3;<br>SEC. 4 SENW; S2NE; S2SW; NESE;<br>SEC. 9 NWNW;<br>SEC. 10 E2NW; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION |
| SDM 97300-JS | T. 20 N, R. 7 E, BHM, SD<br>SEC. 10 SWSE;<br>SEC. 14 W2NW,E2SW,W2SE;<br>SEC. 15 NE,N2NW;<br>HARDING COUNTY<br>520.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>CSU 12-1;<br>SEC. 10 SWSE;<br>SEC. 14 SESW; SWSE;<br>SEC. 15 NENE; SWNE; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>CSU 12-1;<br>SEC. 10 SWSE;<br>SEC. 14 SESW; SWSE;<br>SEC. 15 NENE; SWNE; | |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300-JT | T. 20 N, R. 7 E, BHM, SD<br>SEC. 15 SWSW;<br>SEC. 21 NW,S2;<br>SEC. 22 SWNE,W2NW,SW,<br>NWSE;<br>SEC. 27 NWNW,S2NW,N2S2;<br>SEC. 28 NE;<br>HARDING COUNTY<br>1280.00 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-11 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>LN 14-15 (ALL LANDS);<br>NSO 11-2;<br>SEC. 15 SWSW;<br>SEC. 22 E2SW; NWSE; NWNW;<br>SEC. 27 S2NW; N2S2;<br>SEC. 28 S2NE;<br>TL 13-1;<br>SEC. 27 NWNW; S2NW;N2S2;<br>SEC. 28 S2NE; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION;<br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION;<br>DEFERRED PENDING RMP COMPLETION;<br>SAGE GROUSE GENERAL HABITAT AREA |
| SDM 97300-H | T. 7 S, R. 1 E, BHM, SD<br>SEC. 7 LOTS 1,2;<br>SEC. 7 NE,E2NW;<br>SEC. 8 N2SW;<br>SEC. 17 NESW,N2SE;<br>SEC. 18 LOTS 2,3;<br>SEC. 18 NE,SENW,NESW,<br>N2SE;<br>SEC. 19 LOTS 1,2,3;<br>SEC. 19 NWNE,E2NW,NESW;<br>FALL RIVER COUNTY<br>1177.36 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>NSO 11-2;<br>SEC. 19 LOTS 1,2;<br>SEC. 19 NWNE; E2NW; NESW; | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION | DEFER ALL LANDS;<br>CULTURAL RESOURCES AND TRIBAL CONSULTATION |

| APPENDIX A - SD FIELD OFFICE | | | | |
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| **PARCEL NUMBER** | **PARCEL DESCRIPTION** | **PROPOSED FOR LEASING ALTERNATIVE B** | **PROPOSED FOR LEASING ALTERNATIVE C** | **PROPOSED FOR DEFERRAL/NO LEASING ALTERNATIVE C** |
| SDM 97300 A | T. 9 S, R. 2 E, BHM, SD<br>SEC. 30 LOT 3;<br>SEC. 30 NESW;<br>SEC. 31 NWNE,SESW;<br>SEC. 32 NWSW;<br>FALL RIVER COUNTY<br>192.14 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>NSO 11-2;<br>SEC. 30 LOT 3;<br>SEC. 30 NESW;<br>SEC. 31 NWNE; | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-12 (ALL LANDS);<br>NSO 11-2;<br>SEC. 30 LOT 3;<br>SEC. 30 NESW;<br>SEC. 31 NWNE; | |
| SDM 97300 F | T. 10 S, R. 2 E, BHM, SD<br>SEC. 7 LOT 1;<br>FALL RIVER COUNTY<br>32.66 AC<br>PD | CR 16-1 (ALL LANDS);<br>TES 16-2 (ALL LANDS);<br>LN 14-12 (ALL LANDS); | DEFER ALL LANDS PENDING RMP COMPLETION;<br>CULTURAL RESOURCES | DEFER ALL LANDS PENDING RMP COMPLETION;<br>CULTURAL RESOURCES |

| Stipulation Number | Stipulation Name/Brief Description |
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| **CR 16-1** | **CULTURAL RESOURCES LEASE STIPULATION**<br><br>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. |
| **TES 16-2** | **ENDANGERED SPECIES ACT SECTION 7 CONSULTATION STIPULATION**<br><br>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. |
| **LN 14-11** | **LEASE NOTICE GREATER SAGE-GROUSE HABITAT**<br><br>The lease may in part, or in total contain important Greater Sage-Grouse habitats as identified by the BLM, either currently or prospectively. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on the Greater Sage-Grouse populations and habitat quality. Such measures shall be developed during the application for permit to drill on-site and environmental review process and will be consistent with the lease rights granted. |
| **LN 14-12** | **PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT LEASE NOTICE**<br>Surface occupancy or use is subject to the following special operating constraints: The lessee/operator is given notice that 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 project proponent may be required to conduct a paleontological inventory prior to any surface disturbance. If inventory is required, the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory. |

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| **LN 14-15** | **SPRAGUE'S PIPIT LEASE NOTICE**<br><br>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.<br><br>If the USFWS lists the Sprague's pipit as threatened or endangered under ESA, 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**<br><br>Surface occupancy and use is prohibited within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams. |
| **CSU 12-1** | **CONTROLLED SURFACE USE STIPULATION**<br><br>Surface occupancy or use is subject to the following special operating constraints. Prior to surface disturbance on slopes over 30 percent, an engineering/reclamation plan must be approved by the authorized officer.<br><br>Such plan must demonstrate how the following will be accomplished: (a) Site productivity will be restored, (b) Surface runoff will be adequately controlled, (c) Off-site areas will be protected from accelerated erosion, such as rilling, gullying, piping, and mass wasting, (d) Water quality and quantity will be in conformance with state and federal water quality laws (e) Surface-disturbing activities will not be conducted during extended wet periods and (f) Construction will not be allowed when soils are frozen. |
| **TL 13-1** | **TIMING LIMITATION STIPULATION**<br><br>Surface use is prohibited from December 1 to March 31 within crucial winter range for wildlife. This stipulation does not apply to the operation and maintenance of production facilities. |
| **TL 13-4** | **TIMING LIMITATION STIPULATION** |

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| | Surface use is prohibited from March 1 to August 1 within one-half mile of Raptor nest sites which have been active within the past 2 years. This stipulation does not apply to the operation and maintenance of production facilities. |