BLM

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

ENVIRONMENTAL ASSESSMENT

DOI-BLM-MT-C040-2013-0010-EA

Project: Oil and Gas Lease Parcel Sale, July 16, 2013

Harding, Meade, and Fall River Counties, South Dakota

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South Dakota Field Office Oil and Gas Lease Sale EA
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1.0 PURPOSE AND NEED

1.1 Introduction

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

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

This environmental assessment (EA) has been prepared to disclose and analyze the potential environmental consequences from leasing all 7 nominated lease parcels located in the South Dakota Field Office (SDFO) decision space (Vicinity Map), to be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on July 16, 2013. The EA will use three alternatives to discuss different leasing scenarios that address resource concerns.

The analysis area includes the 3 nominated parcels: SDM 97300-H3, SDM 97300-H4, SDM 97300-H5 in Harding County (Map 1), 3 parcels: SDM 97300-JU, SDM 97300-JV, SDM 97300-JW, in Meade County (Map 2), and 1 parcel: SDM 97300-KU, in Fall River County (Map3).

There are certain characteristics which define and influence social and economic activity taking place in South Dakota. These characteristics may include local populations, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant land and water features, and amenities unique to the area. While the exploration and development of federal mineral estates may take place on well-defined parcels, the social and economic impacts of these activities may extend well beyond parcel boundaries. In order to

accurately portray the relationship of current BLM management, and examine the effects of leasing additional parcels for mineral development, the geographic scope of this analysis had to be extended. While there are only three South Dakota counties (Fall River, Harding, and Meade) which have parcels nominated for the July 2013 lease sale; Butte, Custer, and Pennington counties were identified as likely to be impacted by additional leasing. While the distribution of effects stemming from additional fluid minerals leasing will vary across the impact area, the distribution of economic effects stemming from the sale will be based on the number of acres leased, levels of production, and the business patterns of these counties.

1.2 Purpose and Need for the Proposed Action

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

This action is needed to help meet the energy needs of the people of the United States. By conducting lease sales, the BLM provides for the potential increase of energy reserves for the U.S., a steady source of income, and at the same time meets the requirement identified in the Energy Policy Act, Sec. 362(2), Federal Oil and Gas Leasing Reform Act of 1987, and the Mineral Leasing Act of 1920, Sec. 17.

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

Another purpose of this environmental assessment is to address more areas for which existing stipulations will be applied due to changing knowledge and new inventory data. Thus, this environmental assessment will maintain the Miles City District Oil and Gas RMP/EIS Amendment, which adopted these stipulations. Stipulations for which maintenance is being done, includes the following: (NSO 11-2) Surface occupancy and use is prohibited within riparian areas, 100-year floodplains of major rivers, and on water bodies and streams; (TL 13-1) Surface use is prohibited from December 1 to March 31 within crucial winter range for wildlife, (LN 14-11) Greater Sage Grouse Habitat Lease Notice - 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.; and (LN 14-15) Sprague's Pipit Lease Notice - The lease area may contain habitat for the federal candidate Sprague's pipit. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on Sprague's pipits, their habitat and overall population. Such measures would be developed during the application for permit to drill and environmental review processes, consistent with lease rights. If the U.S. Fish and Wildlife Service lists the Sprague's pipit as threatened or endangered under the Endangered Species Act, the BLM would enter into formal consultation on proposed permits that may affect the Sprague's pipit and its habitat. Restrictions, modifications, or denial of permits could result from the consultation process. .

1.3 Conformance with Land Use Plan(s)

This EA is tiered to and conforms to the information and analysis contained in the Land Use Plans: Final South Dakota Resource Management Plan, approved in April 1986, and the Miles City District Oil and Gas RMP/EIS Amendment (otherwise referred to as the MCDO document), approved on February 2, 1994.

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 stipulations are commonly added to lease parcels. Lease terms are added to all lease parcels.

Analysis of the 7 parcels is documented in this EA, and was conducted by South Dakota Field Office, Miles City Field Office, and Montana State Office resource specialists who relied on professional knowledge of the areas involved and review of current databases and file information to ensure that appropriate stipulations were recommended for a specific parcel. Analysis has also identified the need to defer entire or partial parcels from leasing pending further environmental review. A new resource management plan is being prepared by the South Dakota Field Office, which has identified new management actions needed to protect resources. In certain cases, parcels must be deferred to protect resources pending completion of the RMP. No parcels are being deferred in this case.

At the time of this review it is unknown whether a particular parcel will be sold and a lease issued. It is unknown when, where, or if future well sites, roads, and facilities might be proposed. Assessment of potential activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development (RFD) Scenario developed for the South Dakota Field Office. Detailed site-specific analysis and mitigation of activities associated with any particular lease would occur when a lease holder submits an application for permit to drill (APD). A more complete description of mitigation, BMPs, and conditions of approval related to oil and gas lease activities can be found in the Final South Dakota Resource Management Plan, approved in April 1986, and the Miles City District Oil and Gas RMP/EIS Amendment approved on February 2, 1994, the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development-The Gold Book, and online at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices. html.

Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

1.4 Public Scoping and Identification of Issues

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posted on the South Dakota Field Office website National Environmental Policy Act (NEPA) notification log. Scoping was initiated December

17, 2012; and the comment period was open through January 2, 2013. No scoping comments were received.

Internal scoping related to oil and gas leasing identified the following issues: protection of cultural and tribal areas; minimization of surface (soil) disturbance and protection measures for sensitive or limited soils and steep slopes; protection of jurisdictional waters of the U.S. from operations, identification of mitigation measures to minimize impacts from operations, and wildlife habitat concerns including sage grouse.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Alternative A - No Action

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

The No Action Alternative would exclude all 7 parcels within the South Dakota Field Office from the 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 Alternative would be to offer 7 parcels of federal minerals for oil and gas leasing, covering 939.58 acres of federal minerals administered by the South Dakota Field Office, in conformance with the existing land use planning decisions. The parcels are located in Harding, Meade, and Fall River Counties, South Dakota. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Maps 1 and 2 indicate the detailed location of each parcel.

Of the 939.58 acres of federal mineral estate considered in this EA, 1 parcel contains 40 acres of surface lands managed by the BLM. The remaining 6 parcels are all split estate (private surface with federal mineral estate).

2.3 Alternative C - BLM Preferred Alternative

Under the BLM Preferred Alternative, 7 lease parcels, containing 939.58 acres of federal minerals, would be offered with RMP lease stipulations and/or lease notices as necessary (Appendix A) for competitive oil and gas lease sale and lease issuance.

No lease parcels would be deferred.

2.4 Additional Considerations for Alternatives B and C

In the instance of the parcels which are split estate, the BLM provided courtesy notification to private landowners that their lands are considered in this NEPA analysis and would be considered for inclusion in an upcoming lease sale. If any activity were to occur 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, stipulations, conditions, and operating procedures would apply to these parcels.

Standard operating procedures, best management practices and required conditions of approval (COA) and the application of lease stipulations change over time to meet overall RMP objectives. The COA's would be attached to permits for oil and gas lease operations to address site-specific concerns or new information not previously identified in the land use planning process. In some cases new lease stipulations may need to be developed and these types of changes may require an RMP amendment. There is no relief from meeting RMP objectives if local conditions were to become drier and hotter during the life of the RMP. In this situation, management practices might need to be modified to continue meeting overall RMP management objectives. An example of a climate related modification is the imposition of additional conditions of approval to reduce surface disturbance and implement more aggressive dust treatment measures. Both actions reduce fugitive dust, which would otherwise be exacerbated by the increasingly arid conditions that could be associated with climate change.

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

3.1 Introduction

This chapter describes the affected existing environment (i.e., the physical, biological, social, and economic values and resources) within the analysis area, which includes the 7 nominated parcels in Harding, Meade, and Fall River Counties, which could be affected by implementation of the alternatives described in Chapter 2.

The existing environment is described by the different resources found throughout the analysis area. Within each resource description, lease parcels containing the resource will be listed and analyzed further in Chapter 4. If the lease parcel does not contain the resource, then the lease parcel will be omitted from the description of that specific resource.

Unless otherwise stated, resource analysis in this chapter, and Chapter 4, will be described in approximate acres due to the scaling and precision parameters associated with the Geographic Information System (GIS), in addition to being referenced to a different land survey.

Only those aspects of the affected environment that are potentially impacted by this project are described in detail. The following aspects of the existing environment were determined to be not present or not potentially impacted by this project include: lands with wilderness characteristics, cave and karst resources, wild and scenic rivers; wilderness study areas (WSAs); hazardous wastes or solids. These resources and resource uses will not be discussed further in this EA.

3.2 Air Resources

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

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

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

3.2.1 Air Quality

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

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

AQI data show that there is little risk to the general public from air quality in the analysis area (Table 3.2.1.1). Based on available aggregate data for Meade and Custer counties (the nearest counties with monitoring data) for years 2009–2011, more than 98 percent of the days were rated "good" and the three-year median daily AQI was 34-35 for monitors in Custer and Meade counties.

Table 3.2.1.1: Air Quality Index Report – Analysis Area Summary (2009-2011)

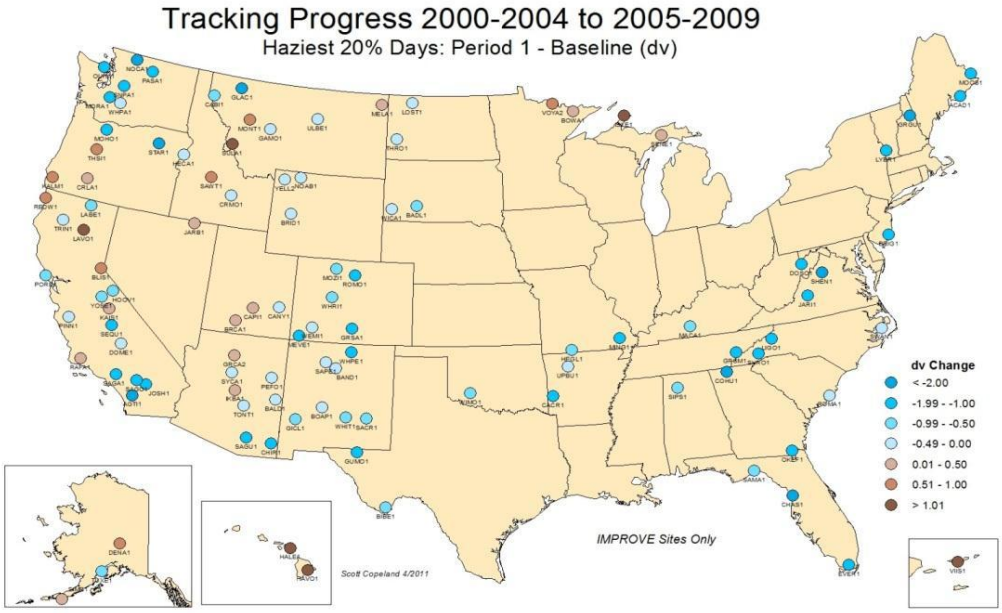
County[1]	# Days in Period	Median AQI	# Days rated Good	Percent of Days Rated Good	# Days Rated Moderate	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy	# Days Rated Very Unhealthy
Custer	1,095	35	1,071	98%	19	1	3	1
Meade	1,071	34	1,065	99%	6	0	0	0

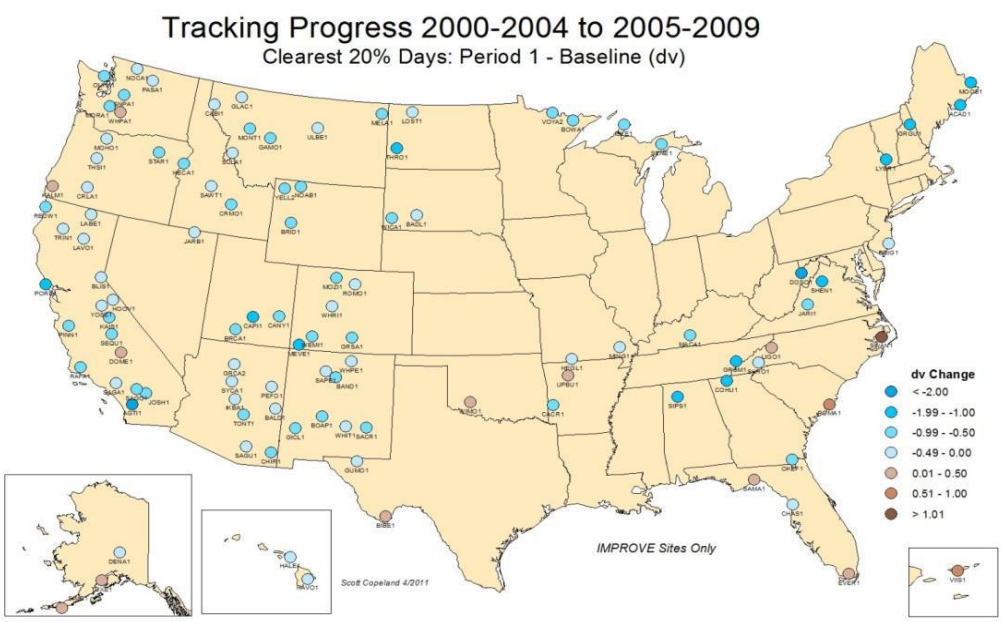
Source: EPA Air Quality Index Report (http://www.epa.gov/airquality/airdata/ad_rep_aqi.html), access on January 6, 2013.

Emissions within Fall River, Harding, and Meade counties are low, due to a small populations and little industrial activity. Based on 2008 emission inventory data available from the EPA National Emission Inventory, emissions were: 8,410 tons per year (tpy) CO, 3,089 tpy NO_x, 3,699 tpy PM_{10} , 374 tpy $PM_{2.5}$, 44 tpy SO_2, and 1,823 tpy VOC. As described above, these emissions occur in an area with good air quality.

Air resources also include visibility, which can be degraded by regional haze caused in part by sulfur, nitrogen, and particulate emissions. Based on trends identified during 2000-2009, visibility has improved slightly near the analysis area on the haziest and clearest days. Blue-

shaded circles in Figure A indicate negative deciview (dv) changes, which mean that people can see more clearly at greater distances.





Source: IMPROVE 2011.

Figure A. Visibility trends on haziest and clearest days, 2000-2009.

3.2.2 Climate Change

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

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

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

As discussed and summarized in the Climate Change SIR, earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, CO_2, methane, and N_2O absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (Climate Change SIR 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere (Climate Change SIR 2010). Increased GHG emissions of CO_2, methane, N_2O, and halocarbons since the start of the industrial revolution have 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, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo) due to soot deposition and other surface changes. It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the

atmosphere. For example, CO_2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR, 2010).

With regard to statewide GHG emissions, South Dakota ranks in the lowest decile when compared to all states. The estimate of South Dakota's 2007 GHG emissions of 31.6 million metric tons (MMt) of carbon dioxide equivalent (CO_2e) accounted for approximately 0.45 percent of the U.S. GHG emissions (WRI 2012).

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 summary characterizes potential changes identified by the EPA (EPA, 2008) that are expected to occur at the regional scale, where the Proposed Action and its alternatives could occur. The EPA identifies South Dakota as part of the Great Plains region (EPA 2008):

- 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 (USGCRP 2009, as cited by Climate Change SIR 2010). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to two 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 have increases insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

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

- Temperature increases in Montana are predicted to be between 3 to 5°F at the mid-21st century.
- Precipitation may increase in winter and spring by up to 25 percent and 20 percent, respectively. Precipitation may decrease by as much as 5 percent during summer and fall.
- Predicted median runoff for 2041–2060 compared to 1901–1970 is expected to decrease by 2–5 percent throughout South Dakota.
- 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.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in western South Dakota based on a 1°C global average temperature increase to be 393 percent.

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

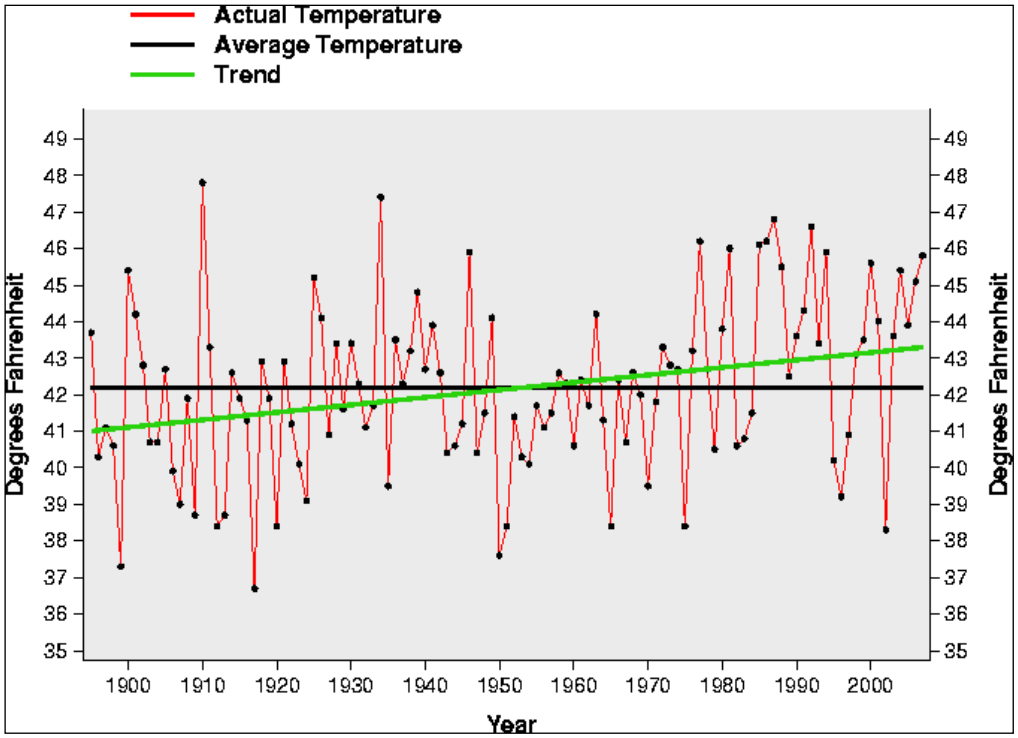


Figure B. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1895-2007. (Source: NOAA website http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html)

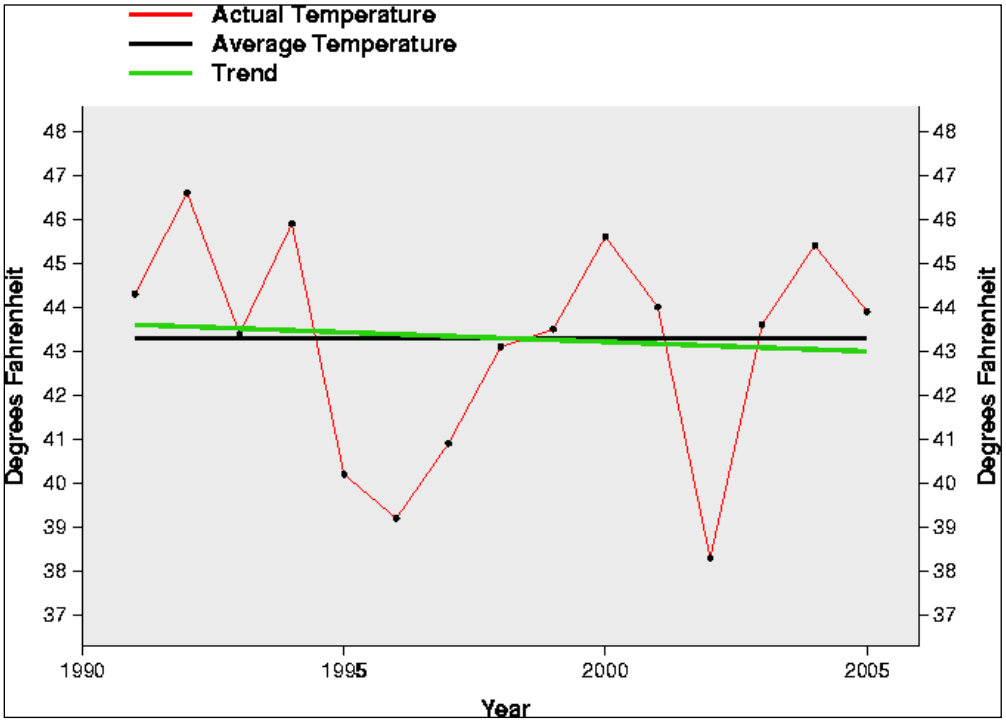


Figure C. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1991-2005. (Source: NOAA website **http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html**)

3.3 Soil Resources

Soils are investigated to determine erosion hazard and reclamation suitability by evaluating slope and soil properties such as texture, organic matter content, structure, permeability, depth, available water capacity, and salt concentration. Detailed soil surveys have been published by the Natural Resources Conservation Service (NRCS) for South Dakota.

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

Key management concerns regarding soil resources are surface use effects on steep slopes and sensitive soils. As slopes become steeper, the risk of soil instability increases. Actions that alter soil characteristics, such as plant cover, soil structure, permeability, and bulk density and compaction, may increase erosion. Sensitive soils are determined based on low fugitive dust resistance and low restoration potential. Sensitive soil characteristics are defined to include: erodibility (by water and wind), compaction, hydric status, fugitive dust resistance, and restoration potential. Soils in the lease parcels commonly have some limitations, such as high sodium and other salt content, poor water holding capacity, inadequate rotting depth, and highly erosive qualities, resulting in difficulties in establishing vegetation and reclaiming a disturbed surface. Sensitive soils would require unconventional and/or site-specific reclamation measures.

3.4 Water Resources

3.4.1 Surface Hydrology

Surface water quality in the planning area is variable due to the highly erratic discharge and highly erosive nature of the geologic parent material and soils. Ephemeral streams cross three parcels, as two intermittent streams cross two parcels with the Clarks Fork Creek and Frozen Man Creek. Runoff from the ephemeral and intermittent tributaries results from snowmelt or intense summer storms. Since many of the smaller tributaries are underlain by Pierre shale or other heavy clay soils, runoff from intense rainfall is rapid and can change from zero to flood stage within a single day.

Total dissolved solids (TDS) range from 200 parts per million (PPM) at high flows to 4,000 PPM during low flows. Sodium and sulfate concentrations in the heavy clay soils and irrigation return flows contribute to an increase in the TDS levels. Major ions include calcium, magnesium, sodium, and sulfate. In late summer, TDS in small water impoundments can approach levels that are toxic for livestock and other animals. The planning area has high suspended sediment concentrations and discharges due to highly erosive soils and less resistant types of bedrocks that formed as sedimentary deposits. Occasionally, a spring or seep can be found near floodplains along drainageways, but these are small and have limited potential.

3.4.2 Groundwater

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 expensive to drill but produce palatable water.

3.5 Vegetation Resources

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.

3.5.1 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.

3.5.2 Sandreed and Bluestem (Sandy Ecological Sites and Thin Claypan Ecolgical Sites)

The sandy ecological sites contains a 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.).

3.5.3 Wetland-Riparian

Riparian-wetland areas are a small part of a larger area composed primarily of the rolling prairies of the Great Plains. Literature defines riparian and wetland areas as those saturated or inundated at a frequency and duration sufficient to produce vegetation typically adapted for life in saturated

soil conditions. These areas are also transitional areas between permanently saturated wetlands and upland areas often referred to as riparian areas; these transition areas have vegetation or physical characteristics reflective of permanent surface or subsurface water influence (Prichard et. al 1999).

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. Riparian and wetland areas are commonly associated with lakes, reservoirs, estuaries, potholes, springs, bogs, and wet meadows as well as ephemeral, intermittent, or perennial streams. Within wetlands, riparian areas are those areas geographically delineated by distinctive resource values and characteristics that compose aquatic and riparian ecosystems. Perennial streams flow continuously and are generally associated with a water table in the localities through which they flow. Intermittent streams flow only at certain times of the year when the area receives water from springs or some surface source (such as melting snow or rain events). Ephemeral streams flow only in direct response to precipitation because the associated channels are above the water table. Intermittent and ephemeral streams are not classified separately for riparian areas until assessments have been conducted for each stream reach. 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 common vegetative species that occur in riparian-wetland areas include prairie cordgrass (*Spartina pectinata*), inland saltgrass (*Distichlis spicata*), three-square bulrush (*Scirpus pungens)* and baltic rush (*Juncus balticus*). Many riparian areas in the analysis area do not support woody vegetation species, however sandbar willow (*Salix exigua*), peachleaf willow (Salix amygdaloides), 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).

3.5.4 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)*, salt cedar *(Tamarix ramonsissima)*, crested wheatgrass *(Agropyron cristatum*), field brome *(Bromus arvensis)*, 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, field 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.

3.5.5 Noxious Weeds

Noxious weeds occur in scattered isolated populations throughout the planning area. The most common species of noxious weeds are salt cedar, leafy spurge, and Canadian thistle. Noxious weed control is the responsibility of the Surface Management Agency in cooperation with the

local county weed and pest board. Chemical, mechanical and biological control methods are utilized with chemical control being the more predominant.

3.5.6 Forest and Woodland Resources

Forests, as such, do not occur on the lands nominated for lease. Small quantities of deciduous trees occur in some draws, and pine and juniper trees occur in the foothills parcels of the Cave Hills and Slim Buttes. They have no commercial value. Woody areas are of some value to numerous species as wildlife habitat.

3.6 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.

3.6.1 Special Status Animal Species

3.6.1.1 Aquatic Wildlife

Table 3.6.1.1: Aquatic sensitive or specials status wildlife species in the analysis area

Species	Scientific Name	USFWS/BLM Sensitive	In Range	Suitable Habitat present
Pallid sturgeon	Scaphirhynchus albus	Endangered	No	N/A
Topeka shiner	Notropis topeka	Endangered	No	N/A
Blue sucker	*Cycleptus elongatus*	Sensitive	No	N/A
Northern Redbelly X Finescale Dace		Sensitive	No	N/A
Paddlefish	*Polyodon spathula*	Sensitive	No	N/A
Pearl dace	*Margariscus margarita*	Sensitive	Unlikely	Unlikely
Sicklefin chub	*Macrhybopsis meeki*	Sensitive	No	N\A
Sturgeon Chub	*Macrhybopsis gelida*	Sensitive	Yes	Yes
Snapping Turtle	*Cheldy serpentine*	Sensitive	Yes	Yes
Spiny softshell turtle	*Apalone spinifera*	Sensitive	Unlikely	possible
Northern leopard frog	*Rana pipiens*	Sensitive	Yes	Yes
Plains spadefoot	*Spea bombifrons*	Sensitive	Yes	Yes

3.6.1.2 Terrestrial Wildlife

Table 3.6.1.2: Analysis area occurrence of BLM terrestrial sensitive species and USFWS threatened, endangered, candidate or proposed terrestrial species

Species	Scientific Name	USFWS or BLM Status	In Current Range	Suitable Habitat Present

Species	Scientific Name	USFWS or BLM Status	In Current Range	Suitable Habitat Present
Mammals				
Gray Wolf*	Canis lupus	Endangered	No	No
Black-footed ferret	Mustela nigripes	Endangered	Unlikely	possible
Black-tailed prairie dog	*Cynomys ludovicianus*	Sensitive	Yes	possible
River Otter	*Lutra canadensis*		No	No
Swift fox	*Vulpes velox*	Sensitive	Yes	Yes
Long-legged Myotis	*Myotis evotis*	Sensitive	Yes	Yes
Long-eared Myotis	*Myotis vollans*	Sensitive	Yes	Yes
Fringe-tailed Myotis	*Myotis thysanodes pahasapensis*	Sensitive	No	No
Northern Myotis	*Myotis septentrionalis*	Sensitive	Yes	Yes
Townsend's big-eared bat	*Corynorhinus townsendii*	Sensitive	Yes	Yes
Birds				
Common loon	*Gavia immer*	Sensitive	Yes	Yes
Franklin's gull	*Laris pipixcan*	Sensitive	Yes	Yes
Interior least tern	*Sterna antillarum athalassos*	Endangered	Yes	No
Black tern	*Chlidonias niger*	Sensitive	Yes	Yes
White-faced ibis	*Plegadis chihi*	Sensitive	Yes	Yes
Whooping crane	*Grus americana*	Endangered	Yes	Yes
Yellow rail	*Coturnicops noveboracensis*	Sensitive	Yes	Yes
Piping plover	*Charadrius melodus*	Threatened	Yes	No
Marbled godwit	*Limosa fedoa*	Sensitive	Yes	Yes
Long-billed curlew	*Numenius americanus*	Sensitive	Yes	Yes
Bobolink	*Dolichonnyx oryzivorus*	Sensitive	Yes	Yes
Greater sage-grouse	*Centrocercus urophasianus*	Sensitive	Yes	Yes
Burrowing owl	*Athene cunicularia*	Sensitive	Yes	Yes
Three-toed woodpecker	*Picoides tridactylus*	Sensitive	No	No
Trumpeter swan	*Cygnus buccinator*	Sensitive	Yes	Yes
Bald eagle***	*Haliaeetus leucocephalus*	Sensitive	Yes	Yes
Golden eagle	*Aquila chrysaetos*	Sensitive	Yes	Yes
Ferruginous hawk	*Buteo regalis*	Sensitive	Yes	Yes
Swainson's hawk	*Buteo swainsoni*	Sensitive	Yes	Yes
Peregrine falcon	*Falco peregrinus*	Sensitive	Yes	Unlikely
Northern goshawk	*Accipiter gentilis*	Sensitive	Yes	Unlikely
Sage thrasher	*Oreoscoptes montanus*	Sensitive	Yes	No
Sprague's pipit	*Anthus spragueii*	Sensitive	Yes	Yes
Loggerhead shrike	*Lanius ludovicianus*	Sensitive	Yes	Yes
Chestnut-collared longspur	*Calcarius ornatus*	Sensitive	Yes	Yes
McCown's longspur	*Calcarius mccownii*	Sensitive	Yes	Unlikely
Baird's sparrow	*Ammodramus bairdii*	Sensitive	Yes	Yes
Brewer's sparrow	*Spizella breweri*	Sensitive	Yes	No
LeConte's sparrow	*Ammodramus leconteii*	Sensitive	Yes	Yes
Prairie falcon	*Falco mexicanus*	None	Yes	Yes
Yellow-billed Cuckoo	*Coccyzus americanus*	Sensitive	Yes	Yes
Lewis's woodpecker	*Melanerpes lewis*	None	No	No
Red-headed woodpecker	*Melanerpes erythrocephalus*	Sensitive	Yes	Yes
Black-backed woodpecker	*Picoides arcticus*	Sensitive	No	No

Species	Scientific Name	USFWS or BLM Status	In Current Range	Suitable Habitat Present
Sage sparrow	*Amphispiza belli*	Sensitive	Yes	No
Dickcissel	*Spiza Americana*	Sensitive	Yes	Yes
Blue-gray gnatcatcher	*Polioptila caerulea*	Sensitive	No	No
Reptiles				
Greater short-horned lizard	*Phrynosoma hernandesi*	Sensitive	Yes	Yes
Milk snake	*Lampropeltis triangulum*	Sensitive	Yes	Yes
Western hog-nosed snake	*Heterodon nasicus*	Sensitive	Yes	Yes
Plants				
Narrowleaf Penstemon		Sensitive	Yes	Possible
Narrowleaf Milkweed		Sensitive	Yes	Possible
Schweintz' Flatsedge		Sensitive	Yes	Possible
Double Bladderpod		Sensitive	Yes	Possible
Little Indian Breadroot		Sensitive	Yes	Possible
Plains Phlox		Sensitive	Yes	Possible
Barr's Milkvetch		Sensitive	Yes	Possible
Bractless Blazingstar		Sensitive	Yes	Possible
Scribner's Panicgrass		Sensitive	Yes	Possible
Blue Toadflax		Sensitive	Yes	Possible
Pale-spiked Lobelia		Sensitive	Yes	Possible
Fendler Cat's-eye		Sensitive	Yes	Possible

Table 3.6.1.2 sources: Skarr 2003; Werner, Maxell, Hendricks, and Flath. 2004; Foresman 2001; MTNHP, 2010; BLM, 2009; USDA – NRCS Plants Database, 2010
*Gray wolf will be moved to the bureau sensitive list if delisted by the USFWS.
***Bald eagle has been delisted so has been moved to the sensitive list.

3.6.1.2.1 Threatened, Endangered, Candidate, and Proposed 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 would not be expected to occur in the lease units, as suitable habitat for this species does not exist. 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. Several petitions have been submitted to list greater sage-grouse as threatened; the first petitions were submitted to the USFWS in 2002. In January 2005, the USFWS determined that listing under the ESA was not warranted, but recent court actions have instructed the USFWS to

reconsider that decision. On March 5, 2010, the USFWS determined that the greater sage-grouse is warranted (for listing) but precluded by more precarious listing needs, making it a candidate species. Greater sage-grouse conservation is a priority for the BLM, and emphasis has been placed on planning efforts throughout their range in North America, including South Dakota. Greater sage-grouse are found mainly in the two northwestern South Dakota counties of Butte and Harding.The proposed lease parcels in Meade and Fall River Counties would not be expected to provide habitat for sage grouse. The lease parcels located in Harding County would likely be considered as "unpreferred" habitat for sage grouse because of the overall lack of sagebrush canopy cover; however, they may provide limited brood-rearing habitat. 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 (Effects of Management Practices on Grassland Birds: Sprague's Pipit, 2004). The proposed lease parcels in Harding and Meade counties may provide habitat for Sprague's pipits, although 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.

3.6.1.2.2 Other 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. Sagebrush canopy cover is limited within the lease parcels, and sagebrush obligate species would not be expected to occupy these habitat types; however, the proposed lease parcels have good habitat for a large number of the sensitive bird species that use the 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*)
Le Conte's Sparrow (*Ammodramus leconteii*)
Chestnut-collared longspur (*Calcarius ornatus*)
Dickcissel (*Spiza americana*)
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.

The northern leopard frog is South Dakota's most familiar frog and is found throughout South Dakota in a variety of habitats from temporary wetlands to large lakes. Populations in the planning area appear to be healthy. They have the potential to occur on all proposed lease units.

Fish

There are 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.

3.6.2 Special Status Plant Species

Following is a list of South Dakota's rare and BLM's sensitive plants that may have existing populations and/or suitable habitat on or near the lease parcels by county:

Table 3.6.2.1: SD Rare Species of Concern and BLM Sensitive Plants on or near Lease parcels

Plant Name	Counties it may occur in	Habitat description
White-veined wintergreen	Lawrence	
Dakota buckwheat	West river counties	Badlands outcrops of western SD
Sand Puffs	Harding	Prairie sand and blowouts of northwest SD
Bahia		
Marsh Alkali Aster		
Inflated Sedge		
Great Basin Navarretia		

3.7 Fish and Wildlife

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.

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 are also provide important cover for large mammals, such as mountain lions and bobcats and for small mammals such as ground squirrels and rabbits.

3.7.1 General Wildlife

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.

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 slight potential for 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 may utilize wetlands within or adjacent to the proposed lease parcels 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.

3.8 Cultural Resources

The BLM is responsible for identifying, protecting, managing, and enhancing cultural resources which are located on public lands, or that may be affected by BLM undertakings on non-Federal lands, in accordance with the National Historic Preservation Act (NHPA) of 1966, as amended. The procedures for compliance with the NHPA are outlined in regulation under 36 CFR 800. Cultural resources include archaeological, historic, and architectural properties, as well as traditional life-way values and/or traditional cultural properties important to Native American groups.

Common prehistoric archaeological site types in Harding, Meade, 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 7 nominated lease parcels and a one-mile search radius. Records were reviewed to determine what types and 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, and Montana for additional cultural information.

There are 3 lease parcels in Harding County that are being considered for this Environmental Analysis. Based on the review of available information, none of the 476.29 acres of surface areas within the identified lease parcels have been previously inventoried for cultural resources. There is one 10-acre small block survey adjacent and one highway survey in the vicinity. Records also indicate there are no previously recorded cultural resource sites located within or surrounding the lease parcels inside a 4-mile radius.

Three of the lease parcels, with a total of 423.29 acres, are located in Meade County, approximately 4-miles south of Mud Butte. There are 5 previous cultural resource inventory projects surrounding these proposed leases; however none of the lease parcels have been previously surveyed for cultural resources. The surveys were completed for a 10-acre small block, BLM parcel block surveys, and NRCS range improvements. The nearest previously recorded cultural resource site is 39MD2054 approximately 1-mile southeast. Site 39MD2054 is a portion of the Bismarck to Deadwood Wagon Trail that is considered eligible for the NRHP. The site consists of a portion of the Trail or ruts in the road that are visible. There is a marker for the trail by the road. There are no other previously known cultural resource sites in the 1-mile radius.

The remaining 40-acre lease parcel in Fall River County is located adjacent to the Cheyenne River, 2-miles from Edgemont, South Dakota. There is no previous cultural resource survey coverage inside the parcel. Cultural surveys were completed for land exchanges and transmission lines in the vicinity. There are no previously documented cultural resource sites inside the lease parcels; however, the bluff top along the river to the northeast has numerous previously recorded cultural resource sites including:

39FA0464: Site is a large habitation area located at the base of the southeast corner of a large elongated knoll on a flat ridge. The site has been disturbed by water runoff from the knoll and the runoff has cut three small washes through the site. Previously determined not eligible for NRHP, based on deflation and 1-negative shovel test; however,there is a good chance of buried material at the base of the knoll and the actual site size is larger. A projectile point recovered from the site is corner-notched, finely made and generally placed as post-Mckean Complex. A point midsection was found but could not be placed to any particular time period. Material types: Hogback Quartzite, unid chert, Morrison Silicifed siltstone, plate chalcedony, Minnelusa Chert.

39FA1361: Unevaluated prehistoric occupation site. Site is located on a high ridge top overlooking the Cheyenne River to the west. It consists of a dense lithic scatter/procurement

area. It also contains various size gravels, sandstone, and 75+ flakes, 14 stone tools, and 4 prehistoric type features. FCR is scattered about the site with one small concentration. A Besant projectile point base, and Oxbow Projectile point were found. Features include a quartzite cobble concentration, rock alignment, knapping station, and a rock cairn. Site is undisturbed.

39FA1362: Unevaluated prehistoric occupation and historic artifact scatter. Site is located on a ridge above the Cheyenne River. Artifacts observed include 65+ flakes, 20+ FCR, 15+ tooth enamel, a thinning flake concentration, 1-projectile point, possibly Duncan or Hanna affiliation, a hammerstone, a .303 savage cartridge casing, and a modern whiskey bottle. Two features were found, a stone circle and a cobble concentration. Site is undisturbed.

39FA1363: Unevaluated prehistoric occupation site. Site consists of area a where 26 flakes, 2 projectile points, 1 uniface, 1 core, 1 retouched flake, 1 hammerstone, 1 piece of tooth enamel, and 2 bifaces were found. Area B contains shell fragments, 85+ flakes, 30+ shatter, 15+ FCR, 15+ bone fragments, 7 hearth features, FCR and bone concentration areas. Site is located on the first terrace overlooking the Cheyenne River to the southwest. Area A and B are separated by a drainage and both are being eroded. Many buried soil horizons exhibit cultural material eroding out. Cultural deposits were found down to 75 to 100 centimeters below the surface.

Additional numerous cultural resource sites have been previously documented in the surrounding vicinity especially to the north and east toward the Black Hills and Red Canyon.

The list above displays known cultural resource sites in the one-mile radius of the lease parcel. The four prehistoric occupation sites are located on top the bluff on the north side of the Cheyenne River. Likely the bluff on the south side of the Cheyenne River would contain the same type of historic properties. Lease parcel SDM 97300-KU is located at the base of these slopes on the floodplain of the Cheyenne River and likely cultural resources related to these sites is not present in this location.

There are seven lease parcels that are proposed for the July 2013 oil lease sale. No cultural resource surveys have covered any of the nominated parcels. Of the 5 known previously recorded cultural resource sites in the one-mile radius of the 7-lease parcels, 1 is considered eligible for consideration to the NRHP, as part of the Bismark to Deadwood Historic Wagon Trail. The remaining sites are all prehistoric occupation sites located along the Cheyenne River bluff top. One is considered not eligible for nomination to the National Register of Historic Places and three have not been evaluated. None of the previously documented cultural resource sites are located in an area of potential affect for the proposed leases.

The Bureau of Land Management follows standard procedures for the consideration of potential impacts to cultural resources resulting from Oil and Gas leasing and development projects. These procedures allow for a “phased” approach to the identification and evaluation of cultural properties. The detailed Level I/Class I overview of cultural resource information (previous survey and known sites) was compiled for all proposed lease parcels identified from Expressions of Interest (EOIs). In addition, tribal consultation efforts were initiated to identify culturally significant areas or traditional cultural properties in close proximity to the proposed lease parcels that may be of particular concern to tribes. This information is then compiled into this

Environmental Assessment and a decision is made to lease the parcel or defer leasing on the parcel.

In all cases the Standard Lease Notice and the following stipulation identified in IM-2005-003 would be attached to the leases recommended for sale:

> "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."

Once a parcel has been leased, a Level III/Class III cultural resources inventory is required prior to any ground disturbing activities. Any cultural properties identified within the Area of Potential Effect (APE) are evaluated for significance and eligibility to the National Register of Historic Places. In a majority of cases, potential impacts to cultural resources are avoided through project abandonment or redesign. In rare instances, potential impacts are mitigated through other means in consultation with the South Dakota State Historic Preservation Office, the Advisory Council on Historic Preservation, and tribes that have expressed interest or concern. Specific "Guidance for Cultural Resource Investigations on Oil and Gas Projects" has been outlined in Instruction Memo MT-2006-040.

3.9 Native American Religious Concerns

BLM's management of Native American Religious concerns is guided through its 8120 Manual: *Tribal Consultation Under Cultural Resources Authorities* and 8120 Handbook: *Guidelines for Conducting Tribal Consultation*. Further guidance for consideration of fluid minerals leasing is contained in BLM Washington Office Instruction Memorandum 2005-003: Cultural Resources, Tribal Consultation, and Fluid Mineral Leasing. The 2005 memo notes leasing is considered an undertaking as defined in the National Historic Preservation Act. Generally areas of concern to Native Americans are referred to as "Traditional Cultural Properties" (TCPs) which are defined as cultural properties eligible for the National Register because of its association with cultural practices or beliefs that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community.

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 is one known TCP, Slim Buttes, and the sacred Black Hills within 10 miles of the lease parcels in Harding and Fall River

Counties. Mud Butte, a prominent topographic feature, which are typically considered culturally sensitive areas, is located 4 miles north of the proposed parcels in Meade County.

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."

Past information exchange during previous projects has resulted in a good record of topographic areas in South Dakota that are considered culturally sensitive to some Native American Tribes. Summary reports that included the cultural resource site and survey information as well as surrounding prominent topographic features for each lease parcel were sent to Tribal Historic Preservation Officers. Copies were also sent to Tribal Chairmen or Tribal Presidents from tribes in the Table below. These summary report cover letters requested any additional information, concerns, or comments for culturally sensitive areas that may be affected by leasing the parcels (letters dated November 15, 2012; December 07, 2012).

Table 3.9.1: List of Native American Tribes with aboriginal ties or interests in the area.

Cheyenne River Sioux Tribe
Crow Creek Tribe
Fort Peck Tribes
Lower Brule Sioux Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe
Rosebud Sioux Tribe
Sisseton-Wahpeton Oyate Tribes
Standing Rock Sioux Tribe
Three Affiliated Tribe, (Mandan, Hidatsa, Arikara Nations)
Yankton Sioux Tribe

No comments have been received from these tribes to date.

3.10 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 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.

The northern boundary of the state in the western half encompasses the tertiary deposits, which contain some significant or rare fossils. These deposits were designated a Class 4 grading to a Class 3. Included in this grouping are the following formations; 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 formations.

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

Review of Potential Fossil Yield Category (PFYC) formation Classes indicates 6 lease parcels are located within PFYC formations rated Class 4 or 5. The parcels were identified within the Hell Creek, Ludlow, and Slim Buttes formations that are considered significant PFYC formations to the field office. Previous research projects and paleontological surveys in southwestern North Dakota and northwestern South Dakota on BLM land and other lands have located significant fossil remains. The remaining parcel is located in PFYC Class 3. Although formations in the Class 3 category are not considered as prospective as the Hell Creek and Ludlow formations, they do have potential to produce and are basically unknown until better field survey can define the presence or absence of fossil remains.

Most paleontological 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.

3.11 Visual Resources

Visual Resource Management (VRM) is the system used to designate and manage the visual resources on public land. A Class II VRM area classification means that the character of the landscape has unique combinations of visual features such as land, vegetation, and water. The existing character of the landscape should be retained. Activities or modifications of the environment should not be evident or attract the attention of the casual observer. Changes caused by management activities must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

A Class III VRM area classification means the level of change to the character of the landscape should be moderate. Changes caused by management activities should not dominate the view of the casual observer and should not detract from the existing landscape features. Any changes

made should repeat the basic elements found in the natural landscape such as form, line, color and texture.

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

No Visual Resource Management (VRM) classes have been established in the project area by a formal written decision document. 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 Visual Resource Inventory (VRI) classes. The BLM acres included in the lease parcels are thereby assigned VRI class IV, allowing modification to the characteristic landscape.

VRI is only applied to federally managed surface acres; therefore the affected environment for visual resources only consists of 40 acres of the 939.58 acres in the proposed action.

3.12 Livestock Grazing

There are two of the lease parcels located within one BLM grazing allotment located in Harding County. The allotment is grazed with cow calf pairs allocated 178 AUMs of BLM administered lands. The allotment has several range improvements including fences, pipelines, stock ponds, wells, roads and windmills. Table 3.12.1 identifies allotment specific information for each of the lease parcels and whether or not they are part of an allotment or unallocated for livestock grazing.

Table 3.12.1: Lease parcels located within BLM grazing allotments

Parcel ID	Allotment Name and Number	Livestock Kind	Season of Use	Allotment Category	Surface Ownership
SDM-97300-H3 SDM-97300-H5	Jones Creek Allotment #01725	Cattle	03/01 to 02/28	Custodial	Private surface with unfenced BLM in allotment
SDM-97300-KU	Unallocated for livestock grazing				

The remaining lease parcels are not located within grazing allotments.

3.13 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 40 acres of BLM-administered public lands (surface).

None of the 7 lease parcels fall within SRMAs or recreation areas.

The 40 BLM-administered acres proposed for lease consist of one small and isolated tract 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. However, parcel SDM-97300-KU contains public land on both sides of the Cheyenne River. The river is considered a public highway (South Dakota codified law 43-17-2). Since access to the BLM parcel is public, the use on this parcel may be more extensive than the other parcels. No activity may limit the public use or access to this parcel.

3.14 Lands and Realty

Lands and realty actions will only occur on BLM-administered surface. The affected environment consists of 40 acres of BLM-administered public lands (or 4 percent of the total acreage proposed for lease).

The 40 BLM-administered acres proposed for lease consist of one small and isolated tract. There are no Rights-of-Ways across the one 40 acre BLM parcel in Fall River County.

3.15 Minerals

3.15.1 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.

Currently there are 180 federal oil and gas leases covering approximately 136,360 acres in the SDFO. The number of acres leased and the number of leases can vary on daily basis as leases are relinquished, expired, or are terminated. Existing production activity occurs on approximately 134 leases, covering 43,140 acres or 32 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 3.15.1. Numbers of townships, leases acres within those townships, and development activity for all jurisdictions are summarized in Table 3.15.2.

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

Table 3.15.1: Existing Development Activity

	FEDERAL WELLS	PRIVATE AND STATE WELLS
Drilling Well(s)	3	1
Producing Gas Well(s)	27	32
Producing Oil Well(s)	32	91
Water Injection Well(s)	7	21
Shut-in Well(s)	8	3
Temporarily Abandoned Well(s)	1	8

From AFMSS January 2013

Table 3.15.2: Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels

	Harding County	Meade County	Fall River County
Number of Townships Containing Lease Parcels	2	2	1
Total Acres Within Applicable Township(s)	46,080	46,080	23,040
Acres of Federal Oil and Gas Minerals	6,542	3,337	6,258
Percent of Township(s)	14.2%	7.2%	27.2%
Acres Leased Federal Oil and Gas Minerals	0	0	0
Percent of Township(s)	0%	0%	0%
Acres Leased Federal Oil and Gas Minerals Held by Production	0	0	0
Percent of Township(s)	0%	0%	0%
Federal Wells	0	0	0 active, 3 abandoned
Private and State Wells	3 active, 3 abandoned	0	3 active, 27 abandoned

3.15.2. Solid Minerals

3.15.2.1. Coal

There is no current coal production, nor any leased coal, in the lease parcel areas.

3.15.2.2. Locatable Minerals

Locatable minerals are subject to provisions of the 1872 Mining Law. These generally include metallic minerals such as gold and silver and other materials not subject to lease or sale, such as bentonite. There is currently no locatable mineral production or potential for economic production in the lease parcel areas, although some bentonite does exist.

3.15.2.3. Salable Minerals

Salable minerals (mineral materials) are those common varieties of sand, stone, gravel, porcellanite, and clay that may be acquired under the Materials Act of 1947. Mineral materials are disposed of by free-use and community/common-use permits granted to municipalities or non-profit entities, respectively. Contracts for sale of mineral materials are offered to private entities on both a competitive and non-competitive basis. Disposal of salable minerals is a discretionary decision of the BLM authorized officer. Future potential resource development conflicts would be avoidable either by not issuing sales contracts in oil and gas development locations or conditioning the APD or salable mineral contracts in a manner to avoid conflicts between operations.

None of the lease parcels proposed to be leased for oil and gas in the Project Area conflict with current permits and contracts for salable minerals awarded on federal lands. Therefore, this subject will not be discussed further in this document.

3.16 Special Designations

3.16.1 National Historic/Scenic Trails

None of the potential lease parcels are within or affect areas with National Historic or Scenic Trails.

3.16.2 Areas of Critical Environmental Concern (ACECs)

None of the potential lease parcels are within or affect Areas of Critical Environmental Concern.

3.17 Social and Economic Conditions

3.17.1 Social and Environmental Justice

This section focuses on Harding County in the northwestern corner of South Dakota and directly south of western North Dakota where extensive oil and gas exploration and development is currently occurring. The 2010 population of Harding County was 1,255, which was a decline of 7% from the 2000 figure. In comparison, the state population increased 8% between 2000 and 2010. The 2010 population of Buffalo, the county seat of Harding County, was 188 in 2010.

The 2010 population density for Harding County was very low at 0.5 persons per square mile in 2010, compared to 10.7 for South Dakota as a whole. The areas in the vicinity of the leases are home to large farms and ranches. There is some current oil and gas development in Harding County but a very small amount of the acreage in these potential leases is near or adjacent to existing oil fields. Most of the acreage is between five and fifteen miles from existing fields. Approximately 12% of the acreage being considered is split-estate where BLM does not manage the surface. Seventy-two % of the leases are solely subsurface leases.

In 2010, the percent American Indian was 1.5% in Harding County compared to 8.8% for the state as a whole. Tribes in South Dakota, North Dakota, Montana and elsewhere have an interest

in lands in Harding County. XXX 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 2009 was 15.6% compared to a statewide figure of 14.2%.

3.17.2 Economics

There are three counties in South Dakota with parcels nominated for leasing; Fall River, Harding, and Meade. In 210 these counties were reported to have 7,094, 1,255, and 25,434 residents and 3,200, 515, and 9,933 households respectively. Between 2000 and 2010 Meade County experienced considerable population growth, gaining 1,181 new residents; while populations declined in Fall River and Harding. Over the last decade populations declined by 4.8 and 7.2 percent, or by 359 and 98 residents, respectively in these counties (U.S. Department of Commerce, 2012). Populations of these three counties are not very racially or ethnically diverse. In 2010, 90 percent or more of residents in these counties identified themselves as being white alone, and only 1-3 percent of residents reported having Hispanic ancestry. Although overall diversity in the region remains low, South Dakota has historically had high concentrations of Native American populations. Sioux and Shoshone tribe members currently live in Fall River, Harding, and Meade counties and combined account for 1-3 percent of the population in these counties (U.S. Department of Commerce, 2012).

Employment in the region is supported by a varying number of industrial sectors. In 2010 Meade County, which had the most diversified economy, supported 16,750 jobs in 161 industries; while Fall River supported 3,063 jobs in 118 industries, and Harding supported 915 jobs in 72 industries. The government sector supports a large share of employment in the three counties with nominated parcels, accounting for 24.7 percent in Fall River, 15.9 percent in Harding, and 14.9 percent of employment in Meade. These counties were also highly specialized in agricultural industries, which include grain farming and livestock production, when compared to the overall U.S. economy (IMPLAN 2010).

Total personal income (TPI) in 2010 was estimated to be $254 million in Fall River, $42 million in Harding, and $872 million in Meade County. This breaks down to an average household income of $80,142, $92,575, and $94,991; and per capita of $35,248, $37,658, and $36,493 respectively (IMPLAN 20100). Total personal income includes labor and non-labor income, including money earned on investments (interest, dividends, and rents) and transfer payments relating to age (Medicare and Social Security payments) or poverty (Medicaid or welfare assistance). In 2010 labor earnings (wages) accounted for 51 to 68 percent on TPI in these three counties, while investment earnings accounted for 16 to 22 percent and income maintenance (U.S. Department Commerce, 2012).

Nature of the Oil and Gas Industry in South Dakota:

While several South Dakota counties lease land for the development of minerals estates, Custer, Fall River, and Harding are the only three counties with production. In 2010, there were 138 producing oil wells and 92 producing gas wells, with more than 98 percent of the state's production taking place in Harding County (IPAA, 2012). The average wellhead price for oil in South Dakota was $60.04/bbl in 2010. While estimates for natural gas wellheads have been unavailable in recent years, the average price in South Dakota was last reported as $7.94/ MCF

in 2008. Between 2008 and 2009 natural gas prices plummeted, in neighboring North Dakota average wellhead prices fell from $8.55 to $3.74 in single year. Because of Harding County's close proximity to North Dakota, it is highly likely that South Dakota wellhead prices drastically fell during this period as well. The cost of drilling and equipping wells in South Dakota is also likely to have fallen in recent years. In 2009 the average cost of drilling and equipping a well was $3,860,085 (oil), $2,071,750 (gas), and $1,939,751 (dry). While updated cost estimates for oil and dry wells are unavailable for 2010, the cost of drilling and equipping a gas well fell by nearly 84 percent to $340,438 (IPAA, 2011, 2012).

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:

As of December 2012, there were 87,309 acres of federal mineral estates leased for oil and gas exploration and development in South Dakota. Of these, More than 78,000 of these acres are managed by the BLM in Fall River (1,960.09 acres) and Harding (76,315.71 acres) counties. Annual lease rental is paid on the 41,795 acres that are not held by production. Estimated annual average lease and rental revenue to the federal government was about$378,417. 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; but bonus bids averaged $39.00 per acre in South Dakota in 2011. 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 37 percent of the leased acres are held by production.

All 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 annual average of about $378,417 in lease bids and rent; of which an estimated $185,424 are distributed to the state/local governments.

Production:

Between 2005 and 2010, production from federal minerals in the South Dakota Field Office averaged 176,444 barrels of oil and 206,353 MCF of natural gas (Office of Natural Resource Revenue, 2010) per year. It is estimated that about 80 percent of all federal mineral production comes from federal minerals for which BLM makes the land use and leasing decisions. 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 estimated to be $966,395; of which about $473,534were distributed to the state and counties.

Local Economic Contribution:

Although only three South Dakota counties had land nominated for mineral leasing, additional oil and gas development on these lands can stimulate economic activity throughout the region. Since many of the companies drilling and servicing oil and gas wells operate out of nearby counties, this analysis extended the impact area to include Butte, Custer, and Pennington. Modeling all six of these counties as a regional economy will more accurately capture economic contributions in the region by including business patterns between counties and accounting for household spending by oil and gas workers who may live outside the three counties with nominations. The economic contribution of oil and gas activities 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 (IMPLAN sector 20), drilling oil and gas wells (IMPLAN sector 28), and support activities for oil and gas operations (IMPLAN sector 29) supported an estimated 305 total jobs and $6.92 million in total employee compensation and proprietor's income in the local economy (IMPLAN, 2010).

Total federal revenues from BLM-federal oil and gas leasing, rents, and royalty payments are an estimated $1.3 million annually. Federal revenues distributed to the state of South Dakota average an estimated $659,000 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 16 total local jobs and $664,000 in local labor income, respectively (IMPLAN, 2010). This amounts to about 0.02 percent of the local employment and local labor and proprietor's income. Table Econ. 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 3.17.2.1. Current Contributions of Federal Oil and Gas Leasing, Exploration, Development, and Production to the Local Economy

Industry	Employment (jobs)		Labor Income (Thousands of 2010 dollars)	
	Area Totals	BLM-Related	Area Totals	BLM-Related
Agriculture	3,320	0	$79,458	$0
Mining	508	3	$21,216	$164
Utilities	395	0	$39,991	$2
Construction	6,658	1	$257,130	$39
Manufacturing	3,052	0	$149,194	$2
Wholesale Trade	2,472	0	$142,168	$11
Transportation & Warehousing	2,501	0	$122,834	$7
Retail Trade	11,844	1	$312,273	$33
Information	1,141	0	$54,626	$3
Finance & Insurance	5,328	0	$234,219	$16
Real Estate & Rental & Leasing	2,901	0	$37,264	$3
Prof, Scientific, & Tech Services	3,871	0	$180,380	$11
Mngt of Companies	682	0	$55,900	$6
Admin, Waste Mngt & Rem Serv	3,428	0	$67,320	$3
Educational Services	1,358	0	$53,378	$2
Health Care & Social Assistance	11,280	1	$622,326	$37
Arts, Entertainment, and Rec	2,235	0	$38,687	$2
Accommodation & Food Services	9,612	1	$151,673	$8
Other Services	5,615	0	$156,544	$11
Government	16,735	7	$1,024,223	$305
Total	94,937	16	3,800,803	664
BLM as Percent of Total	---	0.02%	---	0.02%

Source: IMPLAN, 2010

4.0 ENVIRONMENTAL IMPACTS

4.1 Assumptions and Reasonably Foreseeable Development Scenario Summary

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

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

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

The following assumptions are from the Reasonably Foreseeable Development RFD Scenario developed for the South Dakota Field Office. The BLM administers approximately 1,471,000 acres (about 44 percent) of the federal oil and gas mineral lands available for leasing within the South Dakota Field Office's geographic area of responsibility. The South Dakota RFD forecasts the following level of development in the planning area.

4.1.1 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.

No alternative would affect the demographics, social trends, or social organization in the 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 4.1.1 and 4.1.2).

Table 4.1.1: 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-December 2009)	436	65			1,128	122
Total Wells	960	163		Total Short-Term Disturbance	3,659	642

Table 4.1.2: 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.

Alternative A (No Action Alternative)

Under the No Action Alternative, the 7 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.

Analysis Assumptions for Alternative B
Under alternative B, the 7 proposed parcels would all be leased. By itself, the act of leasing the parcels would 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 be linked to the resource potential. These areas are in the very low and moderate development areas as identified in the RFD. Moderate development potential would result in up to 10 wells drilled per township, and very low development potential would result in less than one well per township.

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

See Appendix A for stipulations which would be applied to the parcels, and where they would be applied.

Analysis Assumptions for Alternative C
By itself, the act of leasing the parcels in Alternative C would 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 be linked to the resource potential. These areas are in the very low and moderate development areas as identified in the RFD. Moderate development potential would result in up to 10 wells drilled per township, and low development potential would result in less than one well per township. No parcels would be deferred.

The 7 parcels parcels are located in Harding County, Meade County, and Fall River County, South Dakota. If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within two to five years). Long-term impacts are those that would substantially remain for more than five years.

See Appendix A for stipulations which would be applied to the parcels, and where they would be applied.

4.2 Alternative A (No Action Alternative)

4.2.1 Direct Effects Common to All Resources
Under Alternative A, the 7 parcels would not be offered for competitive oil and gas lease sale. Under this alternative, the state and private minerals could still be leased in surrounding areas.

There would be no new impacts from oil and gas exploration or production activities on the federal lease parcel lands. No additional natural gas or crude oil would enter the public markets, and no royalties would accrue to the federal or state treasuries from the parcel lands. The No Action Alternative would result in the continuation of the current land and resource uses on the

lease parcels. 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.

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

4.2.2 Economics

The economic contributions of the oil and gas industry to the local economy were discussed earlier in the Affected Environment section. These contributions were measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production stimulate economic activity and brings money into the region and creates jobs in various industrial sectors. The economic impacts of changing the level of oil and gas activities in the region will depend on the number of acres leased, rents paid, and level of production. Table Econ.2 summarizes changes in local revenues, employment, income, population, and households.

Under Alternative A, none of the nominated parcels would be leased. Consequently, local revenues, employment, and wages would remain at current levels described in the Affected Environment section. Alternative A would not generate any additional revenue from leasing, rents, or royalties associated with production, and would not support any additional jobs or income in the region.

Table 4.2.2.1 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	940	$8,285	0	$12	0	0
Alt. C	940	$8,285	0	$12	0	0

4.2.2.1 Direct and Indirect Effects:

Economic effects are summarized and displayed in comparative form in Tables 3.17.2.1 and 4.2.2.1. Under Alternative A, none of the nominated parcels would be leased. Consequently, no federal, state, or local revenues would be generated from leasing, rents, or royalties associated with production. No additional employment or income would be generated from the nominated parcels if none of the parcels are leased.

4.3 Alternative B (Proposed Action)

Under Alternative B, 7 parcels, 939.58 federal mineral acres under (40 acres of federal surface and 899.58 acres of private surface), would be offered for competitive oil and gas lease sale. No parcels would be deferred.

4.3.1 Direct Effects Common to All Resources

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

4.3.2 Indirect Effects Common to All Resources

Oil and gas exploration and development activities such as construction, drilling, production, infrastructure installation, vehicle traffic and reclamation are indirect effects from leasing the parcels in Alternative B. It is unknown when, where, how, or if future surface disturbing activities associated with oil and gas exploration and development such as well sites, roads, facilities, and associated infrastructure would be proposed. It is also not known how many wells, if any, would be drilled and/or completed, the types of technologies and equipment would be used and the types of infrastructure needed for production of oil and gas. Thus, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. The potential impacts from exploration and development activities would be analyzed after receipt of an APD or sundry notice.

Typical impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the Miles City District Oil and Gas RMP/EIS Amendment 1994 Land Use Plan.

4.3.3 Air Resources

4.3.3.1 Direct and Indirect Effects

4.3.3.1.1 Air Quality

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

Potential impacts of development could include increased airborne soil particles blown from new well pads or roads; exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHGs and VOCs during drilling or production activities. The amount of increased emissions cannot be precisely quantified at this time since it is not known for certain how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g., compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact would also vary according to the characteristics of the geologic formations from which production occurs, as well as the scope of specific activities proposed in an APD.

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

4.3.3.1.2 GHG Emissions at the SDFO and Project Scales

Sources of GHGs associated with development of lease parcels under Alternative B 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 authorized for any parcels being considered in this EA. Potential development activities would be analyzed if the BLM receives an APD on any of the parcels considered here.

Anticipated GHG emissions presented in this section are taken from the Climate Change SIR, 2010. Data are derived from emissions calculators developed by air quality specialists at the BLM National Operations Center in Denver, Colorado, based on methods described in the Climate Change SIR (2010). Based on the assumptions summarized above for the SDFO RFD, Table 4.3.3.1.2.1 discloses projected annual GHG source emissions from BLM-permitted activities associated with the RFD.

Table 4.3.3.1.2.1: BLM projected annual emissions of GHGs associated with oil and gas exploration and development activity in the SDFO.

Source	BLM Long-Term GHG Emissions for RFD (tons/year)				Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	CO_2e	CO_2e
Conventional Natural Gas	456	99	0.01	2,538	2,302
Coal Bed Natural Gas	284	17	0.00	641	582
Oil	704,440	804	12.53	725,199	657,900
Total	**705,180**	**920**	**12.54**	**728,378**	**660,784**

To estimate GHG emissions associated with the action alternatives, 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 relative to the total acreage of federal mineral acreage available for leasing in the RFD.
2. This ratio was then used as a multiplier with the total estimated GHG emissions for the entire RFD (with the highest year emission output used) to estimate GHG emissions for that particular alternative.

Under Alternative B, approximately 940 acres of lease parcels with BLM managed federal minerals would be leased. These acres constitute approximately 0.03 percent of the total federal

mineral estate of approximately 3,374,457 acres identified in the SDFO RFD. Applying this percentage to total estimated GHG emissions would result in approximately 3,184 metric tons/year CO_2e (i.e., 0.57 percent of 660,784 metric tons/year) if the parcels within Alternative B were to be developed.

4.3.3.1.3 Climate Change

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

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

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

4.3.3.2 Mitigation

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

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

- 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;
- operate vapor recovery systems where petroleum liquids are stored;
- use Tier II or greater, natural gas or electric drill rig engines;
- operate secondary controls on drill rig engines;
- use no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing volatile organic compounds (VOCs));
- operate gas or electric turbines rather than internal combustions engines for compressors;
- use nitrogen oxides (NO_x) emission controls for all new and replaced internal combustion oil and gas field engines;
- water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- perform interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.
- co-locate wells and production facilities to reduce new surface disturbance;
- use directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- operate gas-fired or electrified pump jack engines;
- install velocity tubing strings;
- use cleaner technologies on completion activities (i.e. green completions), and other ancillary sources;
- use centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- forward looking infrared (FLIR) technology to detect fugitive emissions; and
- perform air monitoring for NO_x and ozone (O_3).

Specifically with regard to reducing GHG emissions, Section 6.0 of the Climate Change SIR identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas, coal bed natural gas, and oil production operations. Technologies discussed in the Climate Change SIR and as summarized below in Table 4.3.3.2.1 (reproduced from Table 6-2 in Climate Change SIR), display common methane emission technologies reported under the EPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

Table 4.3.3.2.1: Selected Methane Emission Reductions Reported Under the EPA 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

Table 4.3.3.2.1: Selected Methane Emission Reductions Reported Under the EPA 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)
Compressors					
Install electric compressors	40 – 16,000	>$10K	>$1K	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	$324K	Negligible	10 mo	$7
Flare Installation	2,000	>$10K	>$1K	None	NR

Source: Multiple EPA Natural Gas STAR Program documents. Individual documents are referenced in Climate Change SIR (2010).
[1] Unless otherwise noted, emission reductions are given on a per-device basis (e.g., per well, per dehydrator, per valve, etc).
[2] Emission reduction is per completion, rather than per year.
K = 1,000
mo = months
Mcf = thousand cubic feet of methane
NR = not reported
yr = year

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

In an effort to disclose potential future GHG emissions reductions that might be feasible in individual field offices, the BLM estimated GHG emissions reductions based on the RFD for the South Dakota FO. For analysis purposes, the South Dakota FO RFD was selected based on the high potential development scenario. Similar emission reductions may be possible in the SDFO. For emission sources subject to BLM (federal) jurisdiction, the estimated emission reduction represents approximately 51 percent reduction in total GHG emissions compared to the estimated South Dakota federal GHG emissions inventory (Climate Change SIR, as updated October 2010, Section 6.5 and Table 6-3). The emission reduction 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 However, EPA is expected to promulgate new regulations in April 2012 that will require GHG emission reductions from certain types of oil and gas sources.).

4.3.4 Soil Resources

4.3.4.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on soil resources. Any potential effects from the sale of leases would occur at the time the leases are developed. Land uses associated with oil and gas exploration and development could cause surface disturbances. Such acts reduce ground cover (e.g., biological soil crust, vegetation, litter, and rock) exposing the soil resource to accelerated erosion by wind and water. Along with this, soils have altered structure, heterogeneity (variable characteristics), temperature regimes, nutrient cycling, biotic richness, and diversity. Soils could be mixed, resulting in decreased bulk density, and altered porosity, infiltration, air-water relationships, salt content, and pH (Perrow and Davy, 2003; Bainbridge

2007). Soil compaction could also occur, increasing bulk density, and reducing porosity, infiltration, moisture, air, nutrient cycling, productivity, and biotic activity (Logan 2001; Perrow and Davy, 2003; Bainbridge 2007). Altering such characteristics diminishes the soil system's ability to withstand future disturbances (e.g., wildland fire, drought, high precipitation events, etc.). The probability and magnitude of these effects are dependent upon local site characteristics, climatic events, and the specific mitigation applied to the project. Generally sites would be revegetated and erosion would return to natural rates within 2 to 5 years. Exceptions would be sites poorly suited to reclamation,

4.3.4.2 Mitigation

Measures would be taken to reduce, avoid or minimize potential impacts to soil resources from exploration and development activities. Prior to authorization, proposed actions would be evaluated on a case-by-case basis and would be subject to mitigation measures in order to maintain the soil system. Mitigation could include avoiding areas poorly suited to reclamation, limiting the total area of disturbance, rapid reclamation, erosion/sediment control, soil salvage, decompaction, revegetation, weed control, slope stabilization, surface roughening, and fencing. Development on steep slopes would have specially stipulated provisions to plan for the problems of reclamation, while sensitive soils would have no stipulated provision to plan for the problems of reclamation, since such reclamation stipulations have not been approved in a current land use plan.

4.3.5 Water Resources

4.3.5.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on water resources. Any potential effects on water resources from sale of lease parcels would occur at the time the leases are developed. The magnitude of the impacts to water resources would be dependent on the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success. Surface disturbance effects typically are localized, short-term, and occur from implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so could the effects on water resources.

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

Spills, drilling fluids, fracking fluids, or produced fluids could potentially impact surface and ground water resources in the long term. Oil and gas exploration/development could contaminate aquifers with salts, drilling fluids, fluids and gases from other formations,

detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004). Groundwater removal would result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features. Typically produced water from conventional oil and gas wells is from a depth below useable aquifers or coal seams (FSEIS 2008).

4.3.5.2 Mitigation

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would minimize potential impacts and would be included with the lease when necessary (refer to Appendix A). Stipulation NSO 11-2 Riparian Area/Floodplain will be applied to four parcels. In the event of exploration or development, measures would be taken to reduce, avoid, or minimize potential impacts to water resources including application of appropriate mitigation. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, and expedite rapid reclamation (including interim reclamation) would maintain water resources. Methods to reduce erosion and sedimentation could include: reducing surface disturbance acres; installing and maintaining adequate erosion control; proper road design, road surfacing, and culvert design; road/infrastructure maintenance; use of low water crossings; and use of isolated or bore crossing (HDD) methods for waterbodies and floodplains. In addition, applying mitigation to maintain adequate, undisturbed, vegetated buffer zones around waterbodies and floodplains could reduce sedimentation and maintain water quality. Appropriate well completion, the use of Spill Prevention Plans, and Underground Injection Control (UIC) regulations would mitigate groundwater impacts. Site-specific mitigation and reclamation measures would be described in the COAs.

4.3.6 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.

4.3.6.1 Direct and Indirect Effects

Impacts to vegetation would depend on the vegetation type/community, soil community 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. Roads increase the potential for invasive species and create barriers for natural seed dispersal for some species causing fragmentation of habitats. Disturbance to vegetation is of concern because protection of soil resources, maintenance of water quality, conservation of wildlife habitat, and livestock production capabilities may be diminished or lost over the long-term through direct loss of vegetation (including direct loss of both plant communities and specific plant species).

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

Other direct impacts, such as invasive species and noxious weed invasion could result in loss of desirable vegetation. Invasive species and noxious weeds may also reduce livestock grazing forage, wildlife habitat quality, and native species diversity. Cheatgrass is an invasive species well known for replacing areas of native vegetation and changing fire regimes.

Rare plants are not known to be present within the affected area. Fugitive 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.

4.3.6.2 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 depending on soils and re-vegetation success.

Mitigation would be addressed at the site specific APD stage of exploration and development. If needed, COAs would potentially include re-vegetation with desirable plant species, soil enhancement practices, direct live haul of soil material for seed bank re-vegetation, reduction of livestock grazing, fencing of reclaimed areas, and the use of seeding strategies consisting of native grasses, forbs, and shrubs.

4.3.7 Riparian-Wetland Habitats

4.3.7.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on riparian-wetland habitats. Any potential effects on riparian-wetland habitats from sale of lease parcels would occur at the time the leases are developed. The exploration and development of oil and gas within uplands or adjacent to riparian-wetland areas could reduce riparian/wetland functionality by changing native vegetative species, composition, richness, and diversity; accelerating erosion; increasing sedimentation; and changing hydrologic characteristics. Healthy and diverse riparian and wetland areas are important for watershed functionality. Impacts that reduce the functioning condition of riparian and wetland areas would impair the ability of riparian/wetland areas to reduce nonpoint source pollution (MDEQ 2007) and provide other ecosystem benefits.

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

4.3.7.2 Mitigation

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

4.3.8 Wildlife

4.3.8.1 Direct and Indirect Effects

Leasing these parcels would have no direct or indirect impacts on wildlife. Impacts (both direct and indirect) would occur when the lease is developed in the future. Any potential effects on wildlife from sale of lease parcels would occur at the time the leases are developed. The potential impacts would be analyzed on a site specific basis prior to oil and gas development and during the APD stage of development. All impacts would be linked to the resource potential. These areas are mainly in the low and moderate development areas as identified in the RFD. Moderate development potential would result in up to ten wells drilled per township, and low development potential would result in up to two wells per township.

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

4.3.8.1.1 Threatened, Endangered Proposed, and Candidate Species

Habitat within the lease parcels exists to support USFWS Threatened, Endangered, Proposed, or Candidate species including the whooping crane, greater sage grouse, and Sprague's pipit.

Birds

BLM has determined that the act of issuing leases within the whooping crane migration corridor will not affect the whooping crane. However, impacts to whooping cranes are possible from subsequent oil and gas development activities that would be permitted at the APD stage. At this time, stipulations do not currently exist to protect any known whooping crane migration staging areas. Line strikes, collisions with vehicles, habitat fragmentation, and other anthropogenic activities can disturb, displace, or cause direct mortality of whooping cranes.

Therefore, if development of these leases is proposed, BLM would consult with the USFWS pursuant to section 7(a)(2) of ESA. An outcome of the consultation process may be that conditions of approval are attached to the permit or the permit may not be approved. Other BMP's would also be developed through consultation, including minimizing disturbance, adherence to Avian Powerline Interaction Committee (APLIC) guidelines, and others as deemed appropriate.

Sage grouse are offered species specific protections through stipulations. However, the proposed lease parcels are located at distances greater than 2 miles from sage grouse leks, and specific stipulations for sage grouse do not apply to these parcels. As stated in chapter 3, the parcels in Harding County may provide only limited habitat for sage grouse due the lack of appropriate sagebrush canopy cover. Although stipulations do not apply, a sage grouse Lease Notice (LN 14-11) will be attached to these parcels because of some potential for sage grouse to utilize habitat within the parcels at least seasonally. The lease notice would require an operator to implement specific measures to reduce impacts of oil and gas operations on sage grouse populations and habitat quality. The application of this lease notice would be expected to reduce, but not eliminate, impacts to sage grouse and habitats.

It has been shown that oil and gas development negatively impacts sage grouse. The development of two to ten wells per township would be additive to the current well density. There may be impacts to sage grouse when these leases are developed, from well densities that exceed the threshold that affects sage grouse brood rearing and other possible utilization of existing habitat.

Impacts to leks from energy development are most severe near the lek, and remained discernable out to distances more than 6 km (3.6 miles) (Holloran 2005, Walker et al. 2007a), and have resulted in the extirpation of leks within gas fields (Holloran 2005, Walker et al. 2007a). Holloran (2005) shows that lek counts decreased with distance to the nearest active drilling rig, producing well, or main haul road, and that development influence counts of displaying males to a distance of between 4.7 and 6.2 km (2.9 and 3.9 miles). All well-supported models in Walker et al. (2007a) indicate a strong effect of energy development, estimated as proportion of development within either 0.8 km (0.5 miles) or 3.2 km (2 miles), on lek persistence. Buffer sizes of 0.25 mi., 0.5 mi., 0.6 mi. and 1.0 mi. result in an estimated lek persistence of 5 percent, 11 percent, 14 percent, and 30 percent. Lek persistence in the absence of CBNG development averages approximately 85 percent. Models with development at 6.4 km (4 miles) had considerably less support, but the regression coefficient indicated that impacts were still apparent

out to 6.4 km (4 miles) (Walker et al. 2007a). Tack (2009) found impacts of energy development on lek abundances (numbers of males per lek) out to 7.6 miles.

Noise has been shown to affect sage-grouse and associated sagebrush obligates. Sage-grouse are known to select highly visible leks with good acoustic properties. Effects to sage-grouse would be a decrease in numbers of males on leks and activity levels and lower nest initiation near oil and gas development. Sage-grouse numbers on leks within 1.6 km (1 mile) of coal bed natural gas compressor stations in Campbell County, Wyoming were shown to be consistently lower than on leks not affected by this disturbance (Braun et al. 2002). Holloran (2005), Holloran et. al (2005a, 2005b), and Anderson (2005) reported that lek activity by sage-grouse decreased downwind of drilling activities, suggesting that noise had measurable "negative" impacts on sage-grouse. The actual level of noise (measured in decibels) that would not affect greater sage-grouse breeding and nesting activities is presently unknown.

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

Sprague's pipit is known to occur in Harding and Meade counties, but there is no detailed information on the location of habitats in Harding or Meade counties. Therefore, inventories would be conducted at the APD stage of development to determine the presence or absence of Sprague's pipits. The Sprague's pipit lease notice, LN 14-15, is issued with those leases, six parcels in total, and would be applied if Sprague's pipits are found in the area. If Sprague's pipits are found, protective measures would be applied as conditions of approval to minimize impacts to Sprague's pipits and their habitat. In the event oil and gas development is proposed within Sprague's pipit habitat, at the APD stage BLM would conference with the USFWS pursuant to section 7(a)(4) of ESA, or if the Sprague's pipit has been listed as threatened or endangered, BLM would consult with the USFWS pursuant to section 7(a)(2).

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.

4.3.8.1.2 Other Special Status Species

As noted, up to 44 wildlife species that BLM has designated as "sensitive" have the potential to occur within the parcel areas. Stipulations are not provided for all BLM sensitive species in the current Resource Management Plans. For those species afforded some protections through existing stipulations, impacts would be minimized, but not eliminated. Impacts to BLM sensitive species would be similar to those described above, unless they are afforded protective measures from other regulations such as the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703.) or the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668c). BLM does not consult with the USFWS on "sensitive" species and likewise would not receive terms and conditions from USFWS requiring additional protections of those species.

Birds

Numerous species of birds were identified as inhabitants across the analysis area. With the impacts associated with development, it is reasonable to assume there would be impacts to nesting and migrating bird species. The primary impacts to these species would include disturbance of preferred nesting habitats, improved habitat for undesirable competitors and/or a species shift to disturbance associated species, and increased vehicle collisions.
Research in Sublette County, Wyoming on the effects of natural gas development on sagebrush steppe passerines documented negative impacts to sagebrush obligates such as Brewer's sparrows, sage sparrows, and sage thrashers. (Ingelfinger, 2001) The impacts were reported greatest along roads where traffic volumes are high and within 100 meters of these roads. Sagebrush obligates were reduced within these areas by as much as 60%. Sagebrush obligate density was reduced by 50% within 100 meters of a road even when traffic volumes were less than 12 vehicles /day. It would be expected that similar population declines would occur to this guild of species from similar development proposals within sagebrush habitats.

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

Effects to migratory birds from oil and gas development at the APD stage could include direct loss of habitat from roads, well pads and other infrastructure, disturbance, powerline strikes and accidental direct mortality, fragmentation of habitat, change in use of habitats, and potential threats and competition from edge species. Field surveys for nesting birds at proposed development sites would be conducted for activities planned between April 15 and July 15. Mitigation measures would be assigned at the APD stage to ensure there would be no measurable negative effect on migratory bird populations, in compliance with Executive Order 13186 and MBTA. These mitigation measures would be required as Conditions of Approval. An NSO stipulation for oil and gas surface disturbing activities in riparian and wetland areas would prohibit any potential oil and gas development in those habitats unless approval was granted

through the "Waivers, Exceptions, and Modifications" (WEM) process. BLM would coordinate WEMs with USFWS to assure MBTA compliance.

All raptor species known to exist within the analysis area are considered migratory under MBTA. Surveys for raptor nests have not occurred in or adjacent to the lease parcels. Take of bald and golden eagles and any other migratory raptors is not anticipated through this action; however, take may occur indirectly as a result of vehicle collisions and other related actions associated with development. Field surveys for raptors at proposed development sites would be conducted for activities planned between March 1 and August 1. Mitigation measures would be assigned at the APD stage to ensure there would be no measurable negative effect on raptor populations, including bald and golden eagles. These mitigation measures would be required as Conditions of Approval. The application of stipulations and COA's at the project level is expected to comply with MBTA and BGEPA.

Mammals
The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in minor impacts to mammals at the site-specific scale and negligible at the population and landscape scales. The impacts to mammals will be lessened by restrictions on sagebrush habitat and riparian areas.

Reptiles and Amphibians
The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in minor impacts to reptiles and amphibians at the site-specific scale and negligible at the population and landscape scales. The impacts to reptile and amphibians will be lessened by restrictions on riparian areas.

Fish
The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in minor impacts to fish at the site-specific scale and at the population and landscape scales. The impacts to fish will be lessened by restriction on riparian areas, erosion control, and floodplains.

4.3.8.1.3 Other Fish and Wildlife
The types and extent of impacts to wildlife species and habitats from development are similar to those described above for other species. Impacts include loss of habitat from development infrastructure, mortalities resulting from collisions with vehicles and power lines, electrocution on power lines, and displacement of wildlife species from initial disturbance caused by human presence. Indirect impacts would include habitat fragmentation and subsequent vehicle traffic, human presence, and other continual development activities.

Based on the RFD scenarios, a wide range of direct habitat loss is possible. Initial disturbance would change the occupation of those areas to disturbance-oriented species (i.e. horned larks), or species with more tolerance for disturbances. These changes would also be expected to decrease the diversity of wildlife. Although bladed corridors would be reclaimed after the facilities are constructed, some changes in vegetation would occur along the reclaimed areas. The goal of reclamation is to restore disturbed areas to pre-disturbed conditions. The outcome of

reclamation, unlike site restoration, will therefore not always mimic pre-disturbance conditions and offer the same habitat values to wildlife species.

It is anticipated that some development may occur adjacent to existing disturbances of some type. Depending on proximity and species tolerance, wildlife species within these areas would either have acclimated to the surrounding conditions, previously been displaced by construction activities, or may be caused to be displaced to other areas with or without preferred habitat.

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

Additional mitigation will occur as conditions of approval at the APD stage. These conditions might include the placement of earthen berms and oil skimmers (in ephemeral drainages where fish passage will not be blocked) which should help protect aquatic wildlife habitat in case of oil spills.

Oil development is allowed within big game crucial winter range with a timing restriction from December 1 to March 31. The proposed lease parcels H4 and KU have been identified as providing big game winter range. This stipulation does not apply to operation and maintenance of production facilities. The goal of this stipulation is to protect crucial big game habitats from disturbance during the winter use season. This stipulation provides protection to big game winter habitats and species only during that timeframe, and does not provide protection during the long-term operation and maintenance periods. Development can occur outside of those dates and will exist thereafter until reclamation, thus only delaying impacts until after that year of construction.

Mule deer would be impacted by this project from habitat fragmentation and disturbance. . Development would affect mule deer use of winter range habitat in those areas. Studies conducted in the Pinedale anticline of Wyoming found that mule deer avoided areas in close proximity to well pads with no evidence of well-pad acclimation during 3 out of 4 years. During year 4 of development habitat selection patterns were influenced more by road density, and not proximity of well pads. The authors attributed this to an unusually severe winter, where movement options and available habitat was limited. Densities of mule deer decreased by an estimated 46% within the developed area over the four years, and indirect impacts were observed out to 2.7-3.7 km of well sites. Mule deer distribution shifted toward less preferred and presumably less suitable habitat. (Sawyer et al, 2005) Similar impacts would be expected from development with this proposal.

Pronghorn would be impacted by this project from habitat fragmentation and disturbance. Preliminary studies in the upper green river basin in Wyoming report that some pronghorn

exhibit movement patterns that suggest almost complete avoidance of gas field areas of intensive development in the Jonah field during the winter, whereas pronghorn in the PAPA (Pinedale Anticline Project Area) apparently have not been avoiding human activities. It is speculated that the difference may exist due to different levels in well densities, as the Jonah field was reported as 1 well/57 acres, and the PAPA at 1 well/124 acres. (Berger et al., 2007) Effects to winter range within existing and future oil and gas development and exploration would be similar to those referenced above and would depend on rate and location of development.

Although limited research exists that documents impacts to sharp-tailed grouse from development activities, it is expected that sharp-tailed grouse would be impacted similarly to sage grouse. Sharp-tailed grouse would be impacted by this project from habitat fragmentation and disturbance. Vehicles and human activity during breeding and nesting seasons may reduce breeding activity, displace nesting hens and reduce the suitability of habitat for brood-rearing. Mortality may increase as a result of collisions with vehicles.

No known sharp-tailed grouse leks exist within the lease parcels. One sharp-tailed grouse lek has been identified approximately 5.08 miles southeast of parcel H4, 6.6 miles from H5, and 7.4 miles from H3. It is unknown if any recent surveys have been conducted adjacent to the other parcels. Surveys for sharp-tailed grouse leks would need to occur within 2 miles of those lease parcels lacking sufficient inventory data in order to provide some protections through NSO and timing stipulations for this species. Wild turkeys, pheasants, and hungarian partridge may also be affected by disturbance and direct mortality through nest destruction and vehicle collisions during the development stages. See the other special status species section above for impacts to sage grouse.

4.3.8.2 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to fish and wildlife animal species from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could include rapid revegetation, project relocation, or pre-disturbance wildlife species surveying. If oil and gas development is proposed in suitable habitat for threatened or endangered species, consultation with the USFWS would occur to determine if additional terms and conditions would need to be applied. Lease stipulations to mitigate impacts on wildlife will be placed on leases for crucial winter range (timing limitation), Sprague's pipit (lease notice) Sage grouse (lease notice), Endangered Species Act (Section 7 Consultation), and steep slopes (controlled surface use) stipulations which will protect additional habitat.

4.3.9 Special Status Plant Species

4.3.9.1 Direct and Indirect Effects

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

4.3.9.2 Mitigation

Stipulations applied to wildlife resources, steep slopes, waterbodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would likely also provide protections for special status plant species. Proposed development would be analyzed on a site-specific basis

prior to approval of oil and gas exploration or development activities at the APD stage**.** Mitigation would also be addressed at the site-specific APD stage. Surveys to determine the existence of any BLM Special Status Species would occur on BLM-administered surface or minerals prior to approval of exploration and development activities at the APD stage.

4.3.10 Cultural Resources

4.3.10.1 Direct and Indirect Effects

Leasing a nominated parcel gives a basic right to the operator to develop the lease in accordance with any stipulations incorporated into the terms of the lease for the protection of resource values. However, it is during surface disturbing activities associated with the proposed development of the lease that there is a potential for cultural resources to be affected by the proposed action. It is only when the decision is made to develop the lease that drilling locations are known and cultural resource investigations can be completed for the proposed development and any other ancillary activities such as roads, transmission lines, and pipelines.

When the Application for a Permit to Drill (APD) is received, specific oil and gas development actions are proposed, the site status number is assigned, the resulting area of potential effect (APE) is defined, and then assessments of the impacts on cultural resources can be undertaken in order to comply with Section 106 of the National Historic Preservation Act (NHPA). A Class III cultural resource inventory will be necessary for those parcels where the proposed APE has not been previously surveyed and/or for those parcels where the APE has been judged inadequately surveyed in the past. Lease Notice LN 14-2 will apply to all parcels (Appendix A). In the event that cultural resources are identified within the APE, an evaluation of National Register eligibility will occur for each identified cultural property. Measures for the protection of cultural resources determined to be eligible to the National Register of Historic Places (NRHP) will have to be followed for those cultural resources directly and/or indirectly impacted by the proposed development in accordance with Lease Notice 16-1 (Appendix B).

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 direct impacts to cultural resources at the APD stage include damage to archaeological sites through construction activities (e.g. pad construction, road building, well drilling, etc.). Other effects to cultural resources from surface disturbance activities include the destruction, damage, or alteration to all or part of the cultural resource and diminishing the property’s significant historic features as a result of the introduction of visual, atmospheric, or audible elements. This could include altering or diminishing the elements of a National Register eligible property and diminish an eligible property’s eligibility status.

Potential indirect impacts from lease development may include increased erosion resulting from surface disturbing activities, increased vandalism resulting from improved access to the area, abrasive dust and vibrations from drilling equipment and damage to rock art sites from gas emissions. Indirect effects from development activities have the potential to alter the characteristics of a significant cultural or historic property by diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Conversely, cultural resource investigations associated with development potentially adds to our

understanding of the prehistory/history of the area under investigation and discovery of sites that would otherwise remain undiscovered due to lack of inventory or investigation.

Climate change may have an effect on cultural resources by changing the frequency and severity of natural events, such as heavy rain and wildfires (Agee 1993; Maslin 2004). Heavy rain increases the likelihood of flooding and soil erosion which could impact an archaeological site by exposing, removing, and displacing archaeological materials. Wildfires can affect the morphology of artifacts through fracturing and discoloration which can reduce an artifact's ability to render information about the past (Winthrop 2004). Wildfires can also destroy organic materials such as bone, wood, and pollen that provide information about past environments and subsistence. Furthermore, fire suppression activities (e.g. fire retardant and fire line construction) and increased artifact exposure from vegetation burn-off, can also have an adverse impact on archaeological sites.

Alternative B—Proposed Action and Alternative C—Prefered Action
The Proposed Action Alternative would be to offer 7 parcels of federal minerals for oil and gas leasing, covering 939.58 acres administered by the South Dakota Field Office.

Of the total acres proposed for lease none have been covered by adequate cultural resource inventory surveys in the past. A small percentage of cultural resource inventories in the vicinity of the lease parcels have documented five cultural resource sites related to prehistoric occupations and a historic wagon trail in the one-mile radious of the proposed lease parcels. Of these sites one occupation is considered not eligible but may have additional information to offer; the remaining three occupation sites are unevaluated and the hisotoric trail is considered eligible for nomination to the National Register of Historic Places. None of the historic properties are located within or adjacent to the lease parcel. They will not be affected by any future proposed development. Additionally, a known TCP is located 8-miles from lease parcels in Harding County and will not be affected by any future development of these parcels.

4.3.10.2 Mitigation
Under Alternatives B and C, it is recommended that lease parcels SDM 97300-H3, SDM 97300-H4, SDM 97300-H5, SDM 97300-JU, SDM 97300-JV, SDM 97300-JW, and SDM 97300-KU,), be leased with cultural resource Lease Notice 14-2. See Appendix A for specific legal location description and Appendix B for description of Lease Stipulations. In addition to specific Lease Stipulations, such as the Cultural Resource Lease Stipulation 16-1, to protect known resource values, additional site specific avoidance and/or mitigation measures, would have to be determined after project specific development proposals are received and Level III/Class III cultural resource inventories have been completed. In almost all situations, direct impacts to cultural resources will be avoided by project redesign and/or relocating the surface disturbing activities (e.g., roads, well pads and pipelines, etc.).

BLM has discretional control over mitigation stipulations measures imposed on a project. Although a lessee has a right to develop a lease, BLM may require development activities to be moved up to 200 meters in any direction. This should allow nearly all cultural properties to be avoided. Should development uncover subsurface sites, the lessee is required to halt all work until the site can be evaluated and proper mitigation measures can be implemented

The use of standard lease terms, and the cultural lease notice, protect significant cultural resource values on these lease parcels (refer to Appendix B). The application of these requirements at the leasing phase provide protection to cultural values or at least notification to the lessee that potentially valuable cultural resource values are or are likely to be present on the lease parcels.

4.3.11 Native American Religious Concerns

4.3.11.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on Native American religious concerns. Any potential effects from the sale of leases would occur at the time the leases are developed.

The BLM WO IM-2005-003 notes that while a lease does not authorize specific on-the-ground activities, and no ground disturbance can occur without further authorization from BLM and the surface management agency, but unless proscribed by stipulation, lessees can expect to drill somewhere on a lease, unless precluded by law. Leasing 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. Indirect effects from site specific development proposals could have an impact to Native American religious practices and TCPs.

Alternative B—Proposed Action

The Proposed Action Alternative would be to offer 7 parcels of federal minerals for oil and gas leasing, covering 939.58 acres administered by the South Dakota Field Office.

Information on TCPs and other culturally sensitive areas was researched in past documentation and records for the area (Sundstrom 2009); and was sought from Native American Tribes with request letters and a report of known previous cultural resource sites and projects (November **and December **, 2012. Previous cooperative meetings have been held to collect culturally sensitive information for areas in Harding County. The nearest previously known Traditional Cultural Property is located 8-miles from the proposed lease parcels. There will be no direct or indirect effect to this property from leasing.

Based on our assessment of affects for known cultural resource sites including: the 1 NRHP eligible historic trail site, 4 potentially eligible prehistoric occupation sites, in the one-mile radius and known TCPs in 8-miles from the lease parcels; we recommend leasing parcels SDM 97300-H3, SDM 97300-H4, SDM 97300-AC, SDM 97300-H5, SDM 97300-JU, SDM 97300-JV, SDM 97300-JW, and SDM 97300-KU, with cultural resource Lease Notice 14-2 and Cultural Resources Lease Stipulation 16-1 attached.

4.3.11.2 Mitigation

Cultural Resources Lease Stipulation 16-1 will apply to all 7 lease parcels proposed for leasing (Appendix A). The application of Stipulation 16-1 to lease parcels ensures that BLM's obligations under NHPA, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, and other statutes as applicable will be met. At the

APD stage when specific oil and gas development actions are proposed, the area of potential effect (APE) will be defined and the interested federally recognized tribes will be consulted further. Additional stipulations may be necessary if TCPs or properties of religious and cultural importance are identified at the APD stage.

4.3.12 Paleontology

4.3.12.1 Direct and Indirect Effects

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

The surface disturbances associated with oil and gas exploration and development activities could have indirect effects to paleontological resources primarily in areas classified as Potential Fossil Yield Classification (PFYC) 4 or 5 areas. Surface-disturbing activities could potentially alter the characteristics of paleontological resources through damage, fossil destruction, or disturbance of the stratigraphic context in which paleontological resources are located, resulting in the loss of important scientific data. However, in most surface-disturbing situations, paleontological resources would be avoided by project redesign or relocation before project approval which would negate the need for the implementation of mitigation measures.

Conversely, surface-disturbing activities can also potentially lead to the discovery of paleontological localities that would otherwise remain undiscovered due to burial or omission during review inventories. The scientific study to retrieve and interpret important paleontological resource information provides a better understanding of the nature and distribution of those resources. The retrieval and interpretation of information is most successful and meaningful when a site is left intact.

As a section of the Omnibus Public Lands Act (March 30, 2009), the Paleontological Resources section of the Act (Title VI, Subtitle D) 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 was developed to provide a tool for predicting the potential management areas have for fossil locales. The BLM PFYC classification system 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. The intent of the classification system is to eliminate or reduce adverse impacts to paleontological resources from authorized actions.

Alternative B

Of the 7 nominated lease parcels, 6 parcels are in areas classified as high potential for significant fossil finds (Class 4 or 5) according to the PFYC system map. The remaining parcel is located in an area considered moderate or unknown for paleontological resources (Class 3). Presently, there are no known localities or previous research areas for significant fossil or paleontological resources inside or adjacent to the nominated parcels. The potential for direct, indirect and

cumulative affects to paleontological resources is moderate based on the formations the leases are located in. To offer the best protection to the resource, Lease Stipulation CSU 12-20 would be applied to all 7 lease notices that fall in the Class 3, 4, and 5.

4.3.12.2 Mitigation

The use of standard lease terms CSU 12-20 protect the paleontological resource values on these lease parcels (refer to Appendix B). The application of these requirements at the leasing phase provides protection to paleontological values. The paleontological lease notice would be applied to those lease parcels that fall within the PFYC 3, 4 or 5 areas, requiring a field survey prior to surface disturbance. These inventory requirements should result in the identification of paleontological resources and avoidance or mitigation of significant localities before permit approval and prior to surface disturbance. However, the application of standard lease terms only allows the relocation of activities up to 200 meters, unless documented in the NEPA document, and cannot result in moving the activity off lease.

Specific mitigation measures would include, but are not limited to, site avoidance or excavation. These measures would be determined when site-specific development proposals are received. For known highly significant paleontological resources, 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, such as PFYC Class 3, 4, and 5, a survey would be conducted in areas of specific development according to Lease Notice 14-12.

Based on the above analysis, in order to protect potential paleontological values all of the leases proposed for leasing are recommended to have the Paleontological Lease Stipulation CSU 12-20 applied per guidance identified in Instructional Memorandums 2009-011 and 2008-009. This includes no leases in Alternative A; 7 leases proposed in Alternative B, and the 7 leases proposed in the preferred Alternative C.

4.3.13 Visual Resources

4.3.13.1 Direct and Indirect Effects

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

No Visual Resource Management (VRM) classes have been established in the project area by a formal written decision document. 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 Visual Resource Inventory (VRI) classes. The BLM acres included in the lease parcels are thereby assigned VRI class IV, allowing modification to the characteristic landscape.

VRI is only applied to federally managed surface acres; therefore the affected environment for visual resources only consists of approximately 40 acres of the 939.58 acres in the proposed action.

4.3.13.2 Mitigation

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

Specifically, visual impacts could be minimized in the Class II areas by the use of the lease stipulation. The stipulation states "all surface-disturbing activities, semi-permanent and permanent facilities in VRM Class II, areas may require special design, including location, painting, and camouflage, to blend with the natural surroundings and meet the visual quality objectives for the area." In addition those modifications should follow the existing form, line, color and texture of the current landscape. Measure would be taken to mitigate the visual impacts within a Class III and Class IV area to protect the scenic value.

4.3.14 Livestock Grazing

4.3.14.1 Direct and Indirect Effects

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

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

Oil and gas development activity would reduce BLM's ability to manage livestock grazing while meeting or progressing towards meeting the Standards of Rangeland Health. Development and associated disturbances would reduce available forage or alter livestock distribution which could lead to overgrazing or other localized excess grazing impacts. Construction of roads, especially in areas of rough topography can improve livestock distribution throughout an allotment.

4.3.14.2 Mitigation

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

4.3.15 Recreation and Travel Management

4.3.15.1 Direct and Indirect Effects

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

Recreation impacts may exist where oil and gas development and recreational user conflicts may occur. In areas where a high level of oil and gas development is likely, there may be user conflicts between motorized recreationists (OHV activities), hunting, target shooting, camping, fishing, river use, picnicking, and winter activities such as snowmobiling and the oil and gas/industrial activities. The intensity of these impacts is moderate and could exist in both the short-term (exploration and construction phases of oil and gas development) and in the long-term (producing wells, maintenance of facilities, etc.). Recreationists would lose some benefit outcomes such as loss of important sense of place, solitude and possible increase of stress.

Where there are other land use activities occurring, including oil and gas development, in areas frequented by recreationists, the public may perceive these areas as inaccessible or unavailable because of the facilities or recreationists may use lease roads to access areas for recreational activities. Potential public safety hazards/risks include: moving equipment, operator vehicles, transport vehicles for oil and gas, oil and gas wells, etc. However, this will be addressed in more detail at the development stage.

As oil and gas development occurs, new routes are created which often attract recreationists seeking additional or new areas to explore for motorized recreational opportunities. Motorized recreational opportunities could be enhanced through the additional opportunities to explore; however, user conflicts and public safety issues could result from the use of the new travel routes. The creation of routes from oil and gas activities could lead to a proliferation of user-created motorized routes, resulting in adverse impacts to the scenic qualities of the area and increased level of surface disturbance. These impacts would be isolated to BLM-administered public lands and could be minimized and avoided through mitigation and reclamation of industrial routes when no longer needed.

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

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

4.3.15.2 Mitigation

To reduce the threat of loss of important sense of place, solitude and possible increase of stress developments, including roads and trails,shall be situated no closer than 200 meters to the

Cheyenne River. Ideally developments would be located out of sight from the river, however topography may limit locations.

4.3.16 Lands and Realty

4.3.16.1 Direct and Indirect Effects

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

Rights-of-way could be required across federal surface for "off-lease" or third party facilities required for potential development of the parcel.

4.3.16.2 Mitigation

Measures would need to be taken to avoid disturbance to or impacting any existing rights-of-way on federal surface in the event of any exploration and development activities on the leased parcels. Any new "off-lease" or third party rights-of-way required across federal surface for future exploration and/or development of the parcels would be subject to stipulations to protect other resources as determined by environmental analyses which would be completed on a case-by-case basis.

4.3.17 Minerals

4.3.17.1 Fluid Minerals

4.3.17.1.1 Direct and Indirect Effects

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

Issuing a lease provides opportunities to explore for and develop oil and gas. Additional natural gas or crude oil produced from any or all of the 7 parcels would enter the public markets. The production of oil and gas results in the irreversible and irretrievable loss of these resources. Royalties and taxes would accrue to the federal and state treasuries from the lease parcel lands. There would be a reduction in the known amount of oil and gas resources.

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

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

4.3.17.2 Solid Minerals

4.3.17.2.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts solid minerals. As described in Chapter 3, none of the parcels proposed to be leased for oil and gas in the analysis area conflict with currently active or existing claims, patents, permits or leases for all solid materials issued on federal lands within the analysis area.

4.3.18 Special Designations

4.3.18.1 Direct and Indirect Effects

None of the parcels are on areas with special designations, including Wilderness Study Areas, Special Recreation Management Areas (SRMA), or any other such categories.

4.3.18.2 Mitigation

Mitigation measures would not apply.

4.3.19 Social and Economic Conditions

4.3.19.1 Social

4.3.19.1.1 Direct and Indirect Effects

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 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 could benefit the residents of Harding, Meade, and Fall River counties. 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 lease development were not received from interested Tribes for this sale, and 4 out of 7 parcels are adjacent to culturally sensitive sites. There are low income people in the counties, but they do not appear to be associated with any specific BLM resources or activities.

4.3.19.2 Economics

4.3.19.2.1 Direct and Indirect Effects

Public Revenues related to leasing, rent, and production:

Leasing an additional 939.58 acres of federal minerals (Alternative B) would increase estimated average annual oil and gas leasing and rent revenues to the federal government by an estimated $5,309. Estimated average annual leasing and rent revenues that would be distributed to state/local governments would increase by an estimated $2,601. Average annual federal oil and gas royalties would increase by an estimated $11,600 with Alternative B. Average annual royalties distributed to the state/counties would increase by an estimated $5,684.

Total average annual BLM federal revenues related to leasing 79,215 acres (78,276 acres currently leased and 940 additional acres nominated and considered under Alternative B) of federal minerals and associated annual rent and royalty revenues related to average annual production of BLM federal minerals would amount to an estimated $977,996. This would be an estimated average annual increase of about $11,600 compared to current management and Alternative A. Total annual revenues distributed to the state and counties would be an estimated $479,218 an estimated $5,684 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 5 total jobs and $676,000 within the local economy (IMPLAN, 2010). Table Econ.2 shows that this would be an annual increase of about zero total jobs and $12,000 in labor income over levels anticipated with Alternative A. There would also be a corresponding increase in local population of about five people and the number of households would increase by about two.

Conclusion: Total federal contribution of Alternative B (leasing an additional 940 acres of BLM federal minerals and anticipated related exploration, development, and production of oil and gas) would have almost no 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 acres and anticipated exploration, development, and production under alternative B would provide an estimated $8,285 per year of additional funds for education in Harding and Fall River counties. Leasing the additional acres and anticipated exploration, development, and production would not change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), or economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates).

4.3.20 Cumulative Impacts- Alternative B

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions. 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. The average current density of wells per township in the proposed lease areas are two to ten. The majority of the leases are in the moderate development potential area, which is expected to host up to ten wells per township. There could be small localized areas with drilling at rates higher than ten wells per township. In the very low development potential area, less than one well might be drilled per township.

4.3.20.1 Past, Present and Reasonably Foreseeable Future Actions

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

4.3.20.2 Cumulative Impacts by Resource

Cumulative effects for all resources in the South Dakota Field Office are described in the Land Use Plans: Final South Dakota Resource Management Plan, approved in April 1986, and the Miles City District Oil and Gas RMP/EIS Amendment (otherwise referred to as the MCDO document), approved on February 2, 1994. Anticipated exploration and development activities associated with the lease parcels considered in this EA are within the range of assumptions used and effects described in this cumulative effects analysis for resources other than air, climate, and socio-economics resources. This previous analysis is hereby incorporated by reference for resources other than for air, climate, and socio-economics resources.

4.3.20.2.1 GHG Emissions and Cumulative Impacts on Climate Change

The cumulative effects analysis area is the SDFO, with additional discussion at statewide, national, and global scales for GHG emissions and climate change.

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

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

Table 4.3.20.2.1.1 displays projected GHG emissions from non-federal activities included in the SDFO RFD. When non-federal and federal Alternative B potential GHG emissions are summed, total Alternative B GHG emissions would be 197,824 metric tons/year CO_2e. Potential federal and non-federal cumulative GHG emissions under Alternative B would be approximately 23 percent of the estimated CO_2e emissions of 855,085 for the entire RFD.

Table 4.3.20.2.1.1: Projected non-BLM GHG emissions associated with the SDFO Reasonably Foreseeable Development Scenario for fluid mineral exploration and development.

Source	Non-BLM Long-Term GHG Emissions (tons/year)				Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	CO_2e	CO_2e
Conventional Natural Gas	1,796	384	0.03	9,869	8,953
Coal Bed Natural Gas	1,386	306	0.02	7,818	7,092
Oil	190,614	215	3.53	196,223	178,013
Total	**193,796**	**905**	**3.58**	**213,910**	**194,058**

South Dakota's Contribution to U.S. and GHGs

South Dakota's GHG inventory http://www.wrapair.org/ClimateChange/SD_GHG_I&F_Report_WRAP_08-20-07.pdf, CCS 2007) shows that activities within the state contribute 0.5 percent of U.S and 0.074 percent of global GHG emissions (based on 2004 global GHG emission data from the IPCC, summarized in the Climate Change SIR 2010). Based on 2005 data in the state-wide inventory, the largest source of South Dakota's emissions is agriculture, which accounts for approximately 46 percent of the state's emissions. The next largest contributors are the electricity generation and transportation sectors (each at approximately 19 percent).

GHG emissions from all major sectors in South Dakota in 2005 added up to a total of approximately 36.5 million metric tons of CO_2e (CCS 2007). Potential emissions from development of Alternative B federal and non-federal lease parcels represent approximately 0.54 percent of the statewide total of GHG emissions based on the 2005 statewide inventory.

The EPA (EPA 2010, as summarized by the 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 cumulative emissions under Alternative B of this project would amount to approximately 0.003 percent of gross U.S. total emissions. Global GHG emissions for 2004 (IPCC 2007, summarized by the Climate Change SIR 2010) indicated approximately 49 gigatonnes (10^9 metric tons) of CO_2e emitted. Potential annual emissions under Alternative B would amount to approximately 0.0004 percent of this global total.

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

Mitigation measures identified in the Chapter 4 Air Quality section above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development on lease parcels

under Alternative B. This is likely because many operators working in Montana, South Dakota, and North Dakota are currently EPA Natural Gas STAR Program Partners and future EPA regulations may impose GHG emission controls for a variety of industries, including the oil and gas industry (Climate Change SIR 2010).

4.3.20.2.2 Cumulative Impacts of Climate Change

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

4.3.20.3 Cumulative Impacts to Wildlife

Cumulative impacts are those impacts on the environment which result "from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." (40 CFR 1508.7). In this case, past and presently on-going actions and activities in the project vicinity include oil and gas development, fire, farming, livestock grazing, traffic, and any other forms of human and natural disturbances.

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

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

With the addition of various forms of stipulations, mitigation, and terms and conditions applied during the development stage, the assessed resources of concern are not expected to approach conditions where additional stresses associated with the proposed action and, past, present and future foreseeable actions will have consequential cumulative effects.

4.4 Alternative C (BLM Preferred)

4.4.1 Direct Effects Common to All Resources

Under Alternative C, 7 parcels (97300 – H3, H4, H5, JV, JW, JU, and KU), containing 939.58 surveyed federal mineral acres would be offered for competitive oil and gas lease sale. No parcels would be deferred.

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

4.4.2 Indirect Effects Common to All Resources

Oil and gas exploration and development activities such as construction, drilling, production, infrastructure installation, vehicle traffic and reclamation are indirect effects from leasing the lease parcels in Alternative C. It is unknown when, where, how, or if future surface disturbing activities associated with oil and gas exploration and development such as well sites, roads, facilities, and associated infrastructure would be proposed. It is also not known how many wells, if any, would be drilled and/or completed, the types of technologies and equipment would be used and the types of infrastructure needed for production of oil and gas. Thus, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. The potential impacts from Alternative C would be analyzed after receipt of an APD or sundry notice.

Typical impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the Land Use Plans: Final South Dakota Resource Management Plan, approved in April 1986, and the Miles City District Oil and Gas RMP/EIS Amendment (otherwise referred to as the MCDO document), approved on February 2, 1994.

4.4.3 Air Resources

4.4.3.1 Air Quality

4.4.3.1.1 Direct and Indirect Effects

Alternative C effects to air quality would be the same as those for Alternative B.

4.4.3.1.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.3.2 GHG Emissions

4.4.3.2.1 Direct and Indirect Effects

Under Alternative C, the same number of acres of lease parcels with BLM managed federal minerals could be leased as were discussed under Alternative B. Direct and indirect GHG emissions would be the same under Alternative C as under Alternative B.

4.4.3.2.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.3.3 Climate Change
4.4.3.3.1 Direct and Indirect Effects
Effects to climate change could be the same as those for Alternative B.

4.4.3.3.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.4 Soil Resources
4.4.4.1 Direct and Indirect Effects
Direct and indirect effects would be the same as Alternative B

4.4.4.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.5 Water Resources
4.4.5.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B; however the area potentially impacted would be 120 acres due to lease parcels proposed.

4.4.5.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.6 Vegetation Resources
4.4.6.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B; however the area potentially impacted would be 120 acres due to lease parcels proposed.

4.4.6.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.7 Riparian-Wetland Habitats
4.4.7.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B; however the area potentially impacted would be 120 acres due to lease parcels proposed.

4.4.7.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.8 Wildlife
4.4.8.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B. No parcels are proposed for deferral because of wildlife resource concerns.

Sage grouse habitat delineations have been developed for the sage grouse conservation alternatives in the South Dakota RMP. None of the parcels are within the delineated polygons that would result in deferrals for sage grouse.

4.4.8.2 Mitigation
Mitigation would be that same as Alternative B.

4.4.9 Special Status Plant Species
4.4.9.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B.

4.4.9.2 Mitigation
Mitigation would be that same as Alternative B.

4.4.10 Cultural
4.4.10.1 Direct and Indirect Effects
Under the BLM Preferred Alternative, all 7 of the lease parcels would be offered with Cultural Resources Lease Stipulation CR 16-1 and/or lease notice MT-14-2 (Appendix A) for protection of important culturally sensitive resources under the competitive oil and gas lease sale and lease issuance.

Direct and indirect impacts would be same as Alternative B since there are no deferrals.

4.4.10.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.11 Native American Religious Concerns
4.4.11.1 Direct and Indirect Effects
Under the BLM Preferred Alternative, all 7 of the lease parcels would be offered with Cultural Resources Lease Stipulation CR 16-1 and/or lease notice MT-14-2 (Appendix A) for protection of important culturally sensitive resources under the competitive oil and gas lease sale and lease issuance.

Direct and indirect impacts would be same as Alternative B since no parcels would be deferred.

4.4.11.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.12 Paleontology
4.4.12.1 Direct and Indirect Effects

Of the 7 total nominated lease parcels, 6 parcels are in areas classified as high (Class 4 or 5) according to the PFYC system map. The remaining parcel is located in an area considered moderate or unknown for paleontological resources (Class 3). Presently, there are no known localities or previous research areas for significant fossil or paleontological resources inside or adjacent to the nominated parcels. The potential for direct, indirect and cumulative affects to paleontological resources is moderate based on the formations the leases are located in. For the

7 lease parcels that are recommended for leasing, Lease Stipulation CSU 12-20 would be applied to offer the best protection to paleontological resources that fall in the Class 3, 4, and 5.

Once a parcel is leased, the application of standard lease terms (movement of activities by 200 meters or delay of up to 60 days) would protect vulnerable significant paleontological resource values on these lease parcels. In most instances this may be sufficient to provide the necessary protection to paleontological values. However, the application of standard lease terms may not always adequately protect paleontological values. In order to protect paleontological values, paleontological resources management relies on the application of Lease Stipulation 12-20 at the leasing phase to notify the lessee that potentially significant paleontological resources are or are likely to be present on the lease parcels.

The paleontological lease stipulation 12-20 would be applied to those lease parcels that fall within the PFYC 3, 4 or 5 areas, (or all 7 lease parcels), requiring a field survey prior to surface disturbance. Paleontological resource surveys conducted prior to surface-disturbing activities could locate additional paleontological resources and would result in a better understanding of the nature and distribution of those resources.

Direct and indirect impacts would be same as Alternative B.

4.4.12.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.13 Visual Resources
4.4.13.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B

4.4.13.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.14 Livestock Grazing
4.4.14.1 Direct and Indirect Effects
Direct and indirect effects to livestock grazing would be similar to those described under Alternative B; however one grazing allotment would be affected due to approximately 320 acres of lease parcels proposed.

4.4.14.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.15 Recreation and Travel Management
4.4.15.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B.

4.4.15.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.16 Lands and Realty
4.4.16.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B.

4.4.16.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.17Minerals
4.4.17.1 Fluid Minerals
4.4.17.1.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B.

4.4.18 Special Designations
4.4.18.1 Direct and Indirect Effects
None of the parcels are on areas with special designations, including Wilderness Study Areas, Special Recreation Management Areas (SRMA), or any other such categories.

4.4.18.2 Mitigation
Mitigation measures would not apply.

4.4.19 Social and Economic Conditions
4.4.19.1 Social
The social effects would be the same as for Alternative B.

There would be no disproportionate effects to American Indians from leasing or development. There are low income people in the counties, but they do not appear to be associated with any specific BLM resources or activities.

4.4.19.1.1Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B.

4.4.19.2 Economics
4.4.19.2.1 Direct and Indirect Impacts
Public Revenues related to leasing, rent, and production:

Total federal contribution of Alternative C would be the same as Alternative B. The economic effects would continue to be spread unevenly among the counties.

4.4.20 Cumulative Impacts- Alternative C
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.

4.4.20.1 Past, Present and Reasonably Foreseeable Future Actions

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

4.4.20.2 Cumulative Impacts by Resource

Cumulative effects for all resources in the SDFO are described in the Land Use Plans: Final South Dakota Resource Management Plan, approved in April 1986, and the Miles City District Oil and Gas RMP/EIS Amendment approved on February 2, 1994. 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 resources other than air, climate, and socio-economics resources. This previous analysis is hereby incorporated by reference for resources other than for air, climate, and socio-economics resources.

4.4.20.3 GHG Emissions and Cumulative Impacts on Climate Change

Alternative C GHG emissions and cumulative impacts on climate change would be the same as those for Alternative B. GHG emissions from all major sectors in South Dakota in 2005 added up to a total of approximately 36.5 million metric tons of CO_2e (CCS 2007). Potential emissions from development of federal and non-federal lease parcels under Alternative C have the potential to represent less than 0.53 percent of the statewide total of GHG emissions based on the 2005 state-wide inventory (CCS 2007).

The EPA (EPA 2010, as summarized by the 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 cumulative annual emissions under Alternative C would amount to approximately 0.0028 percent of gross U.S. total emissions. Global GHG emissions for 2004 (IPCC 2007, summarized by the Climate Change SIR 2010) indicated approximately 49 gigatonnes (10^9 metric tons) of CO_2e emitted. Potential annual emissions under Alternative C would amount to approximately 0.00040 percent of this global total.

As indicated above, although the effects of GHG emissions in the global aggregate are well-documented, it is currently not credibly possible to determine what specific effect GHG emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under Alternative C, 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 Chapter 4 Air Quality section above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development on lease parcels under Alternative C. This is likely because many operators in South Dakota are currently EPA 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).

4.4.20.4 Cumulative Impacts of Climate Change
Cumulative impacts of climate change on resources would the same as those for Alternative B.

4.4.20.5 Cumulative Impacts to Wildlife
Cumulative impacts to wildlife under this alternative would be the same as those listed under Alternative B.

4.21.2.6 Cumulative Impacts to Cultural Resources
Long term oil and gas exploration and extraction activities could compound the effects of vandalism of archaeological and paleontological materials by increased visibility and providing easier access to such localities.

Indirect and cumulative effects from oil and gas development and associated road construction include potential erosion in areas of exposed surfaces. The removal of vegetation and cover within these areas may promote a change in conditions that could lead to additional erosion from natural elements.

Additional effects also include vehicular access to the historic properties, which could promote future vandalism of cultural sites, and/or disturbance to contributing features and artifacts by recreationists.

There will be no effect to cultural resources within this analysis area for the action alternatives provided that all eligible and potentially eligible properties, Traditional Cultural Properties, and culturally significant areas are avoided or have mitigation measures developed in consultation with the SHPO, THPO's and other interested parties.

5.0 CONSULTATION AND COORDINATION:

5.1 Persons, Agencies, and Organizations Consulted
BLM has coordinated with SDGFP and USFWS in the completion of this EA in order to prepare analysis, identify protective measures, and apply stipulations associated with the 7 lease parcels being analyzed.

The BLM consults Native Americans under a variety of laws, regulations, executive orders, and manual guidance including: the National Environmental Policy Act and Section 106 of the National Historic Preservation Act. BLM sent letters to tribes in Montana, North and South Dakota informing them of the potential for the 7 parcels to be leased and inviting them to submit issues and concerns BLM should consider in the environmental analysis.

BLM corresponded with THPOs and other cultural resource specialists from the Rosebud Sioux Tribe, Sisseton Wapeton Oyate Tribe, Oglala Sioux Tribe, Crow Creek Sioux Tribe, Lower Brule Sioux Tribe, Cheyenne River Sioux Tribes, Standing Rock Sioux Tribe, Fort Peck Sioux Tribe; Mandan, Hidatsa, and Arikara Nation, and Northern Cheyenne Tribe of Montana. In a summary report the BLM provided an overview of the federal oil and gas leases as well as specific information on previous cultural resource surveys and recorded cultural resource sites

within and surrounding the 7 parcels nominated for the July 2013 competitive oil and gas lease sale. This report was sent to the THPOs from each of the above listed tribes, then courtesy copies of the cover letters asking for information or comments was sent to Tribal Chairmen or Presidents for each of the tribes listed above.

Information on TCPs as well as concerns for other culturally sensitive areas was obtained previously from interested consulting Native American Tribes. There is an area identified in Harding County that is a known Traditional Cultural Property (TCP). It is located 8 miles from the proposed lease parcels. No other correspondence regarding culturally sensitive areas was received from the tribes at this time.

Coordination and consultation with interested Native American Indian Tribes resulted in a finding that there are known or identified culturally sensitive properties of religious and cultural importance to tribes within or adjacent to the proposed lease parcels. To ensure there will be no direct, indirect, or cumulative effects; the cultural resource lease stipulation will be applied to all 7 proposed oil lease parcels in Harding, Meade, and Fall River counties. If further information is received for culturally sensitive properties, then proper avoidance measures will be developed during cooperative meetings with the interested Native American Tribes and the State Historic Preservation Office.

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, 2012; however, scoping comments were received through January 2, 2013. 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 6 surface owner notification letters, and 10 agency scoping letters were distributed for the oil and gas leasing analysis process in the SDFO. The written and verbal communication resulted in a total of no individual scoping comments pertaining to this EA.

The Environmental Assessment and associated Finding of No Significant Impact is being made available to the public on February 11, 2013 with comments accepted until March 12, 2013. Comments will be received from the public during this time frame.

Table 5.2.1: List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Brenda Shierts	Cultural Resource Specialist	Cultural Resources, Paleontology
Bobby Baker	Wildlife Biologist	Wildlife, Sensitive Species,
Bitsy Stiller	Recreation Planner	Recreation, Visual Resource Management
Carmen Drieling	Range Management Specialist	Vegetation, Grazing, Soil, Water
Gerald Moller	Range Technician	Invasive Species

Russell Pigors	Physical Scientist	Preparer, Minerals, Lands and Realty
Susan Bassett	Air Resource Specialist	Air Resources, Climate Change
	Social Scientist	Social Analysis
John Thompson	Planning &Environmental Specialist	Economic Analysis
Jennifer Dodd	Economic Modeler; U.S. Forest Service Enterprise Team	Economic Modeling
Jennifer Nagy	Natural Resource Specialist (GIS)	GIS Analyses and Maps
Terra Gusler	Legal Land Examiner-Sale Lead	Expressions of Interest/Lease Sale

In addition to the primary preparers listed above, the following individuals provided document review:

Table 5.2.2: List of Reviewers

Name	Title	Reviewed the Following Section(s) of this Document
John Carlson	Wildlife Biologist	Wildlife, Sensitive Species,
Wendy Velman	Botanist	Vegetation, Invasive Species
Susan Bassett	Air Resource Specialist	Air Quality, Climate Change
Kim Prill	Planner	All
John Thompson	Economist	Economics
Casey Buechler	Mineral Resource Specialist	All

6.0 REFERENCES

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7.0 DEFINITIONS

NAICS: 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). IMPLAN Version 3 and the 2010 IMPLAN data set was used in this analysis is.

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING IF EA INCLUDES ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING
SDM 97300-H3	T. 18 N, R. 5 E, BHM, SD SEC. 1 E2SE; HARDING COUNTY 80.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-20 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-11 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)		NONE
SDM 97300-H4	T. 18 N, R. 6 E, BHM, SD SEC. 4 S2S2; HARDING COUNTY 160.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-20 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-11 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 4 S2SE; TES 16-2 (ALL LANDS) TL 13-1 SEC. 4 SESW, S2SE;		NONE
SDM 97300-H5	T. 18 N, R. 6 E, BHM, SD SEC. 6 LOTS 4,5; SEC. 6 SE; HARDING COUNTY 236.29 AC PD	CR 16-1 (ALL LANDS) CSU 12-20 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-11 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)		NONE
SDM 97300-JV	T. 11 N, R. 10 E, BHM, SD SEC. 1 N2SW; SEC. 2 SESE; SEC. 10 NWSE; SEC. 11 W2NW,SESE; MEADE COUNTY 280.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-20 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 2 SESE; SEC. 11 NWNW, SESE; TES 16-2 (ALL LANDS)		NONE
SDM 97300-JW	T. 11 N, R. 10 E, BHM, SD SEC. 17 SWNE,NWSW; MEADE COUNTY 80.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-20 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)		NONE

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING IF EA INCLUDES ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING
SDM 97300-JU	T. 11 N, R. 11 E, BHM, SD SEC. 6 LOTS 4,5; MEADE COUNTY 63.29 AC PD	CR 16-1 (ALL LANDS) CSU 12-20 (ALL LANDS) LN 14-2 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 6 LOT 4; TES 16-2 (ALL LANDS)		NONE
SDM 97300-KU	T. 8 S, R. 2 E, BHM, SD SEC. 27 NENW; FALL RIVER COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-20 (ALL LANDS) LN 14-2 (ALL LANDS) NSO 11-02 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)		NONE

Appendix B - Stipulations Applied to each parcel and used during the analysis			
Stipulations and Lease Notices applied to lease parcels and used in the analysis for this portion of the July 16, 2013 Sale			
Stipulation #	**Stipulation Name**	**Stipulation**	**Reason**
No Surface Occupancy NSO 11-2	flood plains	No surface occupancy or use is allowed within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams.	To protect the unique biological and hydrological features associated with riparian areas, 100-year flood plains of major rivers, and water bodies and streams; and to maintain riparian/wetlands function and water quality. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.
Timing Limitation TL 13-1	winter range	No surface use is allowed within crucial winter range for wildlife for the following time period: December 1 to March 31 This stipulation does not apply to the operation and maintenance of production facilities.	Protect crucial white-tailed deer, mule deer, elk, antelope, moose, bighorn sheep and sage grouse winter range from disturbance during the winter use season, and to facilitate long-term maintenance of wildlife populations. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.
Lease Notice LN 14-2	LEASE NOTICE CULTURAL RESOURCES	The Surface Management Agency is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures.	This notice would be consistent with the present Montana State Office guidance for cultural resource protection related to oil and gas operations (NTL-MSO-85-1).
Lease Notice LN 14-11	LEASE NOTICE GREATER SAGE-GROUSE HABITAT	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.	
Controlled Surface Use CSU 12-20	PALEONTOLOGICAL RESOURCES	Surface occupancy or use is subject to the following special operating constraint: Prior to undertaking any surface-disturbance activities on lands covered by this lease, the lessee or operator, unless notified by the contrary by the BLM, shall: 1. Contact the BLM to determine if a site specific vertebrate paleontological inventory is required. If it is required, the operator 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 operation is submitted. 2. Implement mitigation measures required by the BLM to preserve, avoid or recover vertebrate paleontological resources. Mitigation may include relocation of proposed facilities or other protective measures. All cost associated with the inventory and mitigation will be borne by the lessee or operator. 3. The lessee or operator shall immediately bring to the attention of the BLM any vertebrate paleontological resources discovered as a result of surface operations under this lease and shall leave such discoveries intact until directed to proceed by the BLM.	To protect key paleontological resources from disturbance, or mitigate the effects of disturbance to conserve scientific and interpretive values, and the interests of the surface owner.
Lease Notice LN 14-15	LEASE NOTICE SPRAGUE'S PIPIT	The lease area may contain habitat for the federal candidate Sprague's pipit. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on Sprague's pipits, their habitat and overall population. Such measures would be developed during the application for permit to drill and environmental review processes, consistent with lease rights. If the U.S. Fish and Wildlife Service lists the Sprague's pipit as threatened or endangered under the Endangered	-

		Species Act, the BLM would enter into formal consultation on proposed permits that may affect the Sprague's pipit and its habitat. Restrictions, modifications, or denial of permits could result from the consultation process.	
Cultural Resources Lease Stipulation CR 16-1	Cultural Resources Lease Stipulation	This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. 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.	-
Endangered Species Act Section 7 Consultation Stipulation TES 16-2	Endangered Species Act Section 7 Consultation Stipulation	The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.	-

APPENDIX C: MAPS

Vicinity Map:

Overview vicinity map of Lease Parcels covered in EA. Map features three extent rectangles which represent the preceding maps, each map covering Harding, Meade, and Fall River County (respectively).

Map 1:

Detail map of parcels in Harding County.

Map features the following parcels: H3, H4, H5

Map 2:

Detail map of parcels in Meade County.

Map features the following parcels: JU, JV, JW

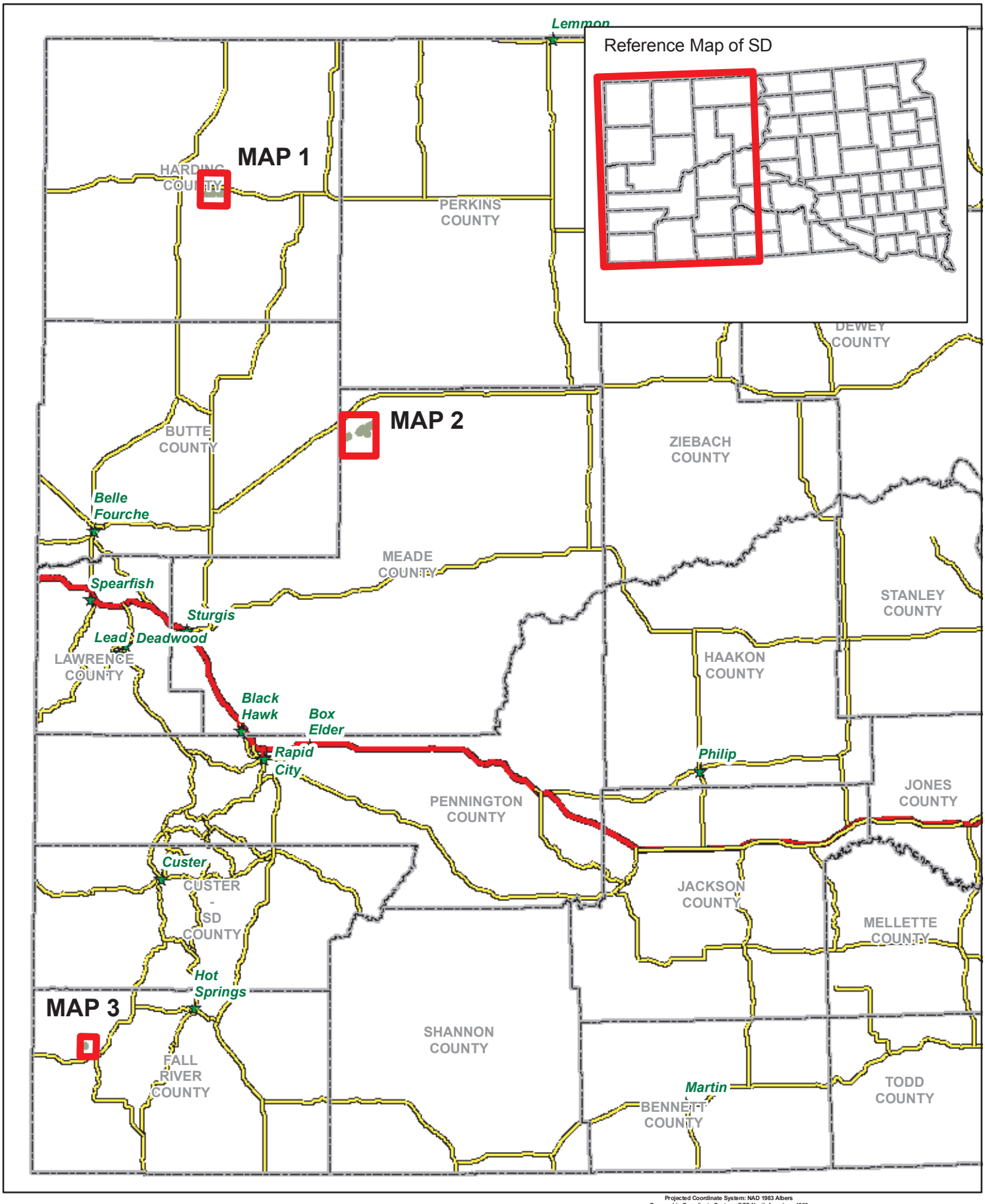
Map 3:

Detail map of parcel in Fall River County.

Map features the following parcel: KU

Vicinity Map: July 16, 2013 Competitive Oil and Gas Lease Sale

November 7, 2012



Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

1:1,436,076

0 2 4 8 12 16 Miles

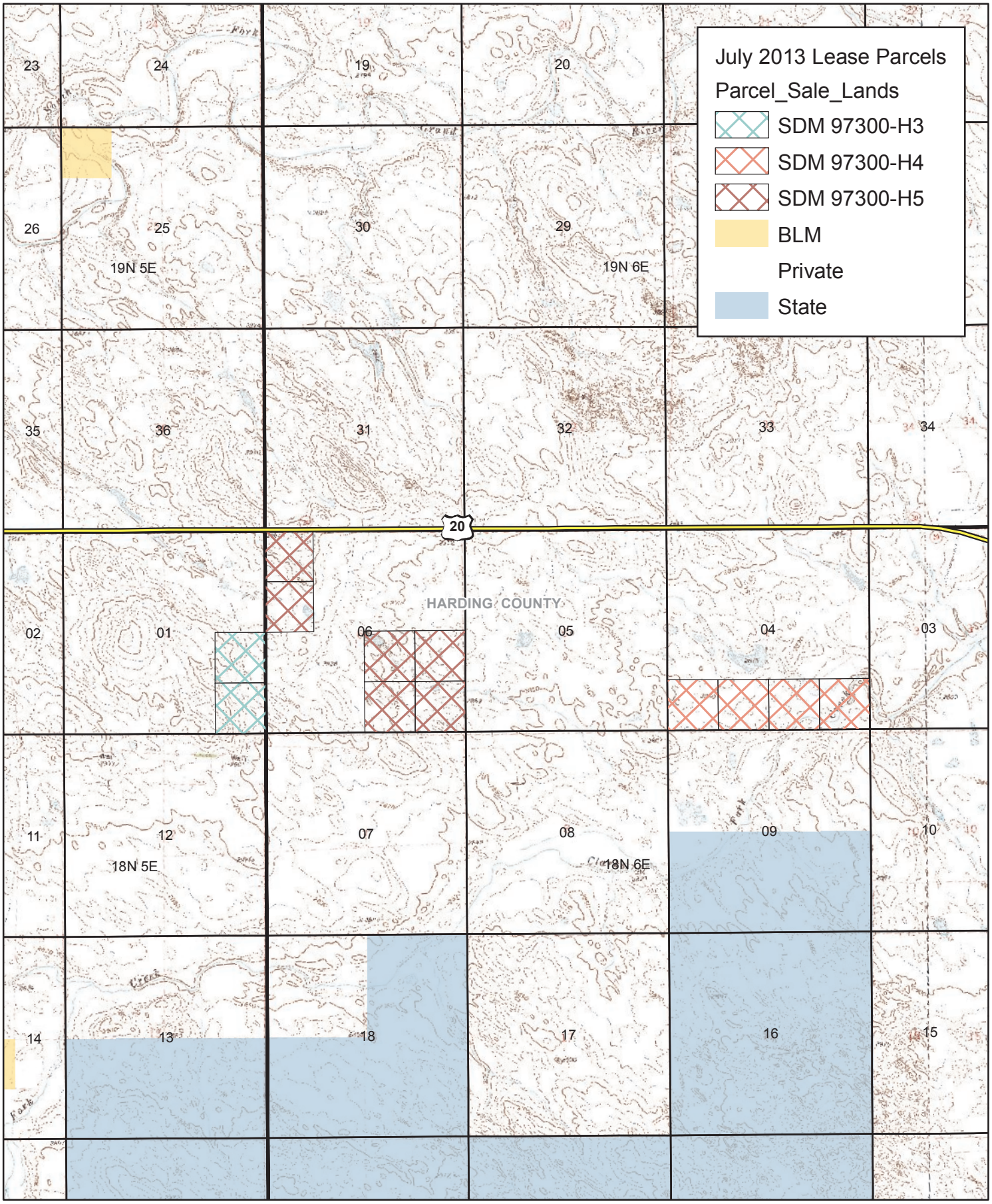
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SOUTH DAKOTA FIELD OFFICE

DISCLAIMER:
Land ownership status is derived from the accurate data from the LR2000 work base map. Therefore, land ownership may not be accurate due to data transfer from 40 acres and land ownership lines may not be plotting true due to source data.

No warranty is made by the Bureau of Land Management for the use of this data for purposes not intended by the BLM.

Map 1 [Harding County]: July 2013 Competitive Oil and Gas Lease Sale

November 7, 2012



Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

1:1,436,076

0 2 4 8 12 16 Miles

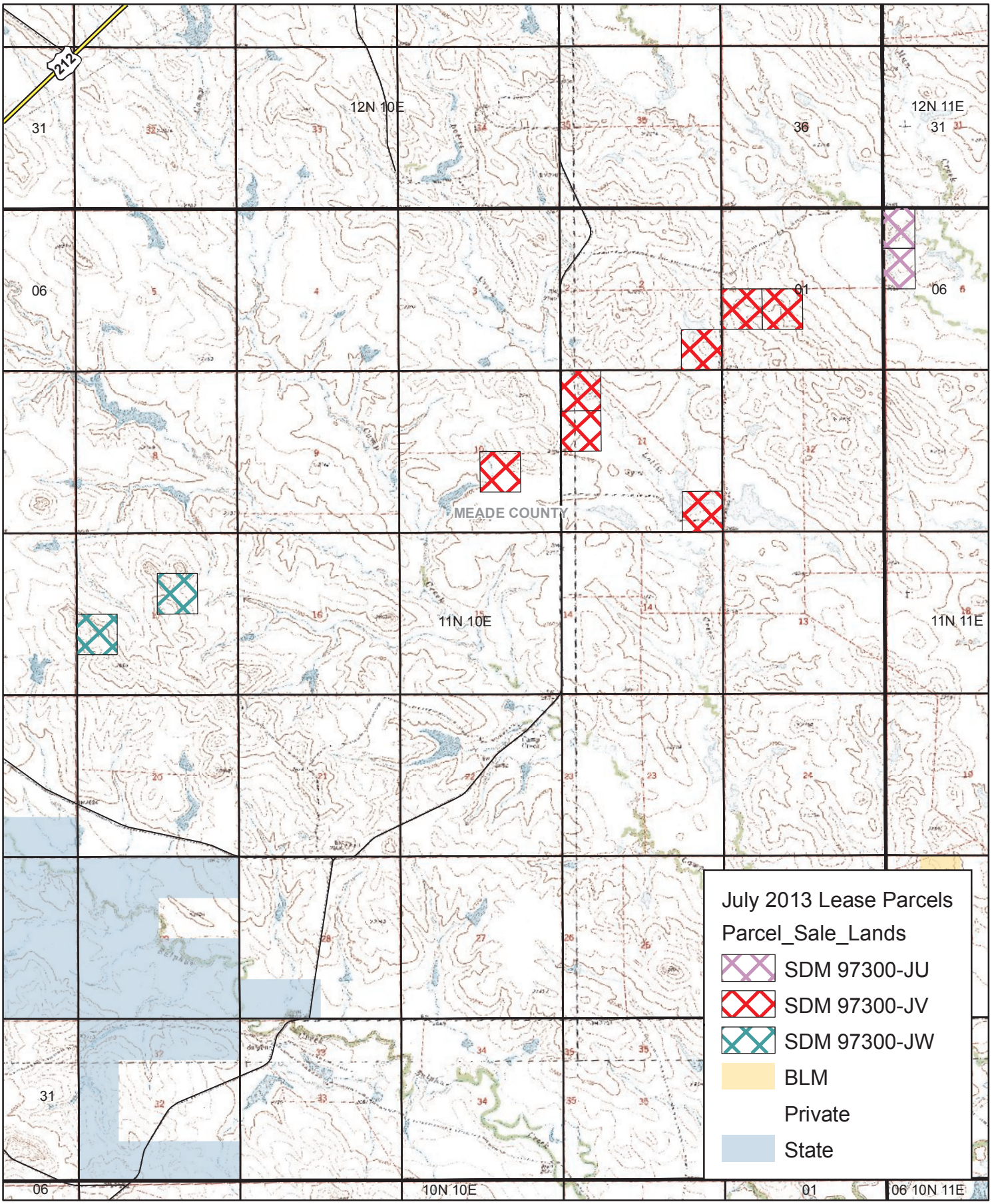
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SOUTH DAKOTA FIELD OFFICE

DISCLAIMER:
Land ownership status is derived from the accurate data from the LR2000 work base map. Therefore, land ownership may not be accurate within approximately ten 40 acres, and land ownership lines may not line up perfectly due to source data.

Map compiled by the Bureau of Land Management for the use of the BLM for purposes not intended by the BLM.

Map 2 [Meade County]: July 16, 2013 Competitive Oil and Gas Lease Sale

November 7, 2012



Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

1:1,436,076

0 2 4 8 12 16 Miles

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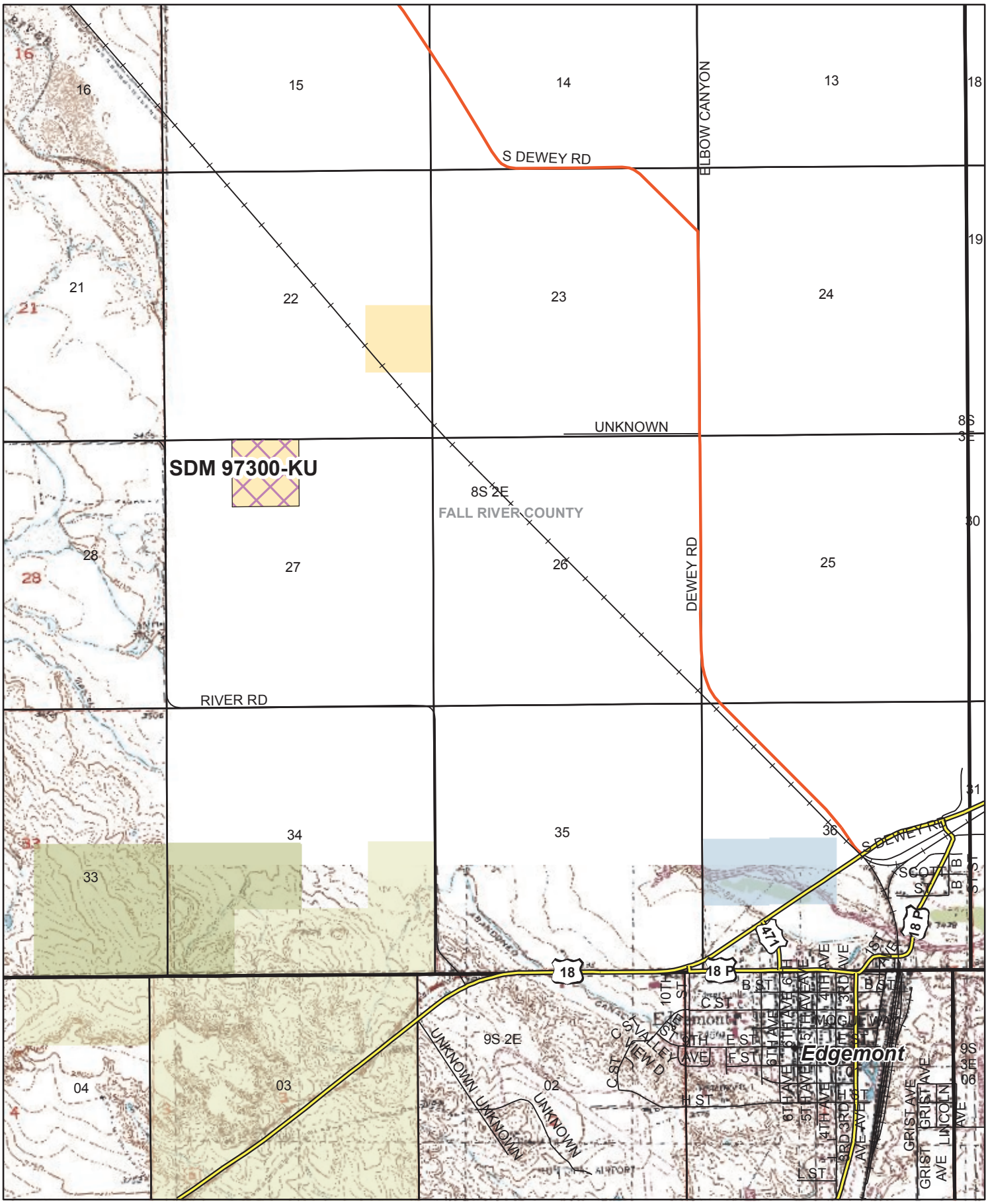
DISCLAIMER:
Land ownership status derived from the accurate data from the LR2000 tools base map. Therefore, land ownership may not be accurate within 40 acres. Minor (40 acres and less) ownership lines may be off by one line due to source data.

Map was produced by the Bureau of Land Management for the use of the BLM for purposes not intended by the BLM.

Map 3: [Fall River County] July 16, 2013 Competitive Oil and Gas Lease Sale

November 7, 2012



Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

1:1,436,076

0 2 4 8 12 16 Miles

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SOUTH DAKOTA FIELD OFFICE

DISCLAIMER:
Most Township distance derived from the accurate data from the LR2000 note base map. Therefore, land ownership may not be accurate within approximately ten 40 acres, and land ownership lines may not line up perfectly due to source data.

No warranty is made by the Bureau of Land Management for the use of this data for purposes not intended by the BLM.