United States Department of the Interior
Bureau of Land Management

Environmental Assessment
DOI-BLM-MT-C040-2010-0021-EA
October 22, 2010 ~~August 12, 2010~~

Project Title:

South Dakota
Oil & Gas Leasing Environmental Assessment

Location: Butte and Harding Counties

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

SDM 79010-DB	T. 21 N, R. 1 E, BHM, SD; Sec. 30 LOTS 1, 2; Harding County (063)
SDM 79010-AV	T. 13 N, R. 4 E, BHM, SD; Sec. 1 LOTS 1, 2, 3, 4, S2N2, S2; Sec. 2 LOTS 1, 2, 3, 4, S2N2, S2; Sec.12 ALL; Butte County (019)
SDM79010-AX	T. 13 N, R. 4 E, BHM, SD; Sec. 11 ALL; Sec.13 ALL; Sec.14 ALL; Sec. 15 ALL; Butte County (019)
SDM 79010-AY	T. 13 N, R. 4 E, BHM, SD; Sec. 22 NE, N2NW, S2; Sec. 23 N2,SW; Sec. 24 ALL; Sec. 25 N2, SW; Butte County (019)
SDM 79010-B1	T. 13 N, R. 4 E, BHM, SD; Sec. 26 NW, S2; Sec. 27 ALL; Sec. 34 N2, SW, S2SE; Sec. 35 NE, N2NW, S2S2; Butte County (019)
SDM 79010-D9	T. 12 N, R. 6 E, BHM, SD; Sec. 14 NE, SWSW, SWSE; Sec. 22 SE; Sec. 23 NWNE, S2NE, W2, NWSE, S2SE; Sec. 24 S2; Sec. 26 W2; Sec. 27 ALL; Butte County (019)
SDM 79010-CJ	T. 14 N, R. 6 E, BHM, SD; Sec. 5 NESE; Sec. 10 S2NE; Sec. 11 W2NE, S2NW; Sec. 18 LOTS 3, 4; Sec. 19 E2SE; Sec. 25 NE; Sec. 35 S2NW, N2SW; Butte County (019)
SDM 79010-CI	T. 14 N, R. 6 E, BHM, SD; Sec. 27 SW; Sec. 28 S2; Sec. 29 S2; Sec. 31 LOTS 1, 2, 3, 4, NE, E2W2; Sec. 32 N2; Sec. 33 N2, SWSW, N2SE, SESE; Sec. 34 NE, E2W2, NWNW, W2SE; Butte County (019)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
South Dakota Field Office
310 Roundup Street
Belle Fourche, South Dakota 57717-1698
www.blm.gov/mt

In Reply Refer To:

1600/3100 (MTC040)

October 22, 2010

Dear Reader:

The Bureau of Land Management (BLM) South Dakota Field Office prepared an Environmental Assessment (EA) in August to assess our decisions to offer eight parcels for leasing from sales that have been delayed. The EA was available for a 30-day public comment period that ended on September 13, 2010.

Based on our analysis and review of comments received, the EA has been updated (refer to Chapter 5 of the EA for a summary of public comments). A competitive oil and gas lease sale is scheduled to be held on December 9, 2010. It will be my recommendation to post the oil and gas lease parcels, along with stipulations identified in the proposed action from the updated EA on October 22, 2010. Lease parcel SDM 79010-AV will not appear on this Lease Sale Notice. As identified as part of the proposed action in the EA, it will also be my recommendation to defer this lease parcel pending additional review and analysis.

We anticipate finalizing our decision record after the December oil and gas lease sale, but prior to lease issuance. Upon finalization, the decision record and accompanying finding of no significant impact will be posted at the website listed below.

Please refer to the Montana/Dakotas BLM website at www.blm.gov/mt for availability of the updated EA and the Lease Sale Notice. From this home page, go to the heading titled "Frequently Requested," where you will find a number of links to information about our oil and gas program. Current and updated information about our EAs, Lease Sale notices, and corresponding information can be found on the link titled "Oil and Gas Lease Sale Information." The BLM's decision to offer lands in the December 9, 2010 Oil and Gas Lease Sale is subject to a 30-day protest period, which begins October 22, 2010. Information on the Lease Sale Notice and protest procedures can also be found on the oil and gas website link.

If you have any questions, or would like more information about the updated EA or upcoming oil and gas lease sale, please contact us at 605-892-7000.

Sincerely,

Marian M. Atkins
Field Manager

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

Finding of No Significant Impact
Environmental Assessment DOI-BLM-MT-C040-2010-0021-EA

This unsigned Finding of No Significant Impact and the attached Environmental Assessment DOI-BLM-MT-C040-2010-0021-EA for the South Dakota Field Office were ~~are~~ available for public review and comment for 30 days beginning on August 12, 2010.

Impact identification and analysis of approving the project proposal and/or alternatives(s) has been completed. Environmental analysis has been conducted based on available inventory and monitoring data files. The proposed action conforms with and is within the scope of the land use decisions described in the South Dakota Resource Management Plan (RMP) (1986) and the Miles City District Oil and Gas EIS Amendment (1994).

Based on my review of the updated EA and supporting documents, I have determined that the project, including the implementation of required stipulations/mitigating measures, is not a major federal action and will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No potential environmental effects associated with the project meet the definition of significance in context or intensity as defined in 40 CFR 1508.27, nor do potential effects exceed those effects described in the South Dakota RMP/FEIS. An environmental impact statement (EIS) is not required. In the event that parcels are leased resultant from this decision, any future proposed development on such parcels would be subject to additional site-specific NEPA analysis and documentation

The decision to approve or deny the proposed action and preparation of a signed Finding of No Significant Impact with rationale, as appropriate, will be finalized and released after the 30-day protest period for the oil and gas lease sale scheduled December 9, 2010, and before lease issuance. ~~consideration of public comments and completion of the EA.~~

Recommended by _____ Date_____
Marian M. Atkins, Field Manager

Concurrence by: _____ Date_____
M. Elaine Raper, District Manager

Approved by _____ Date_____
Theresa M. Hanley, Deputy State Director Division of Resources

South Dakota Oil & Gas Leasing EA
DOI-BLM-MT-C040-2010-0021-EA

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South Dakota Oil & Gas Leasing EA

DOI-BLM-MT-C040-2010-0021-EA

1.0 PURPOSE & NEED

1.1 Introduction

It is the policy of the Bureau of Land Management (BLM) to make mineral resources available for use and to encourage development of mineral resources to meet national, regional, and local needs. This policy is based in various laws, including the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 Sec. 5102(a)(b)(1)(A) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing. The Montana State Office conducts mineral estate lease auctions for lands managed by the federal government, whether 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. Mineral leases can be sold on such lands as well. The Montana State Office has historically conducted five lease sales per year.

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

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of leasing parcels located in the South Dakota Field Office, to be included in as part of a competitive oil and gas lease sale tentatively scheduled to occur towards the end of November, 2010.

The project area covers the area of the proposed lease parcels in northern Butte County and Harding County in northwestern South Dakota. The area is mostly rangeland with private surface with federal minerals (84 percent) but some BLM-administered surface with federal minerals (16 percent).

DB – 77 acres BLM-administered surface - Harding County
CI – 160 acres BLM-administered surface – Butte County
AX – 640 acres BLM-administered surface – Butte County
AY – 720 acres BLM-administered surface – Butte County
B1 – 320 acres BLM-administered surface – Butte County

1.2 Purpose and Need for the Proposed Action

The purpose of offering parcels for competitive oil and gas leasing is to allow private individuals or companies to explore for and develop oil and gas resources for sale on public markets.

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

The decision to be made is whether to sell oil and gas leases on the parcels in question, and, if so, what stipulations would be identified as required for specific parcels at the time of lease sale.

1.3 Conformance with Land Use Plan(s)

This EA is tiered to the decisions, information, and analysis contained in the South Dakota RMP of April 1986 and its associated environmental impact statement (EIS) and the Miles City District Oil and Gas EIS Amendment of February 1994. A more complete description of activities and impacts related to oil and gas leasing, development, production, etc. can be found in these documents. The Miles City District Oil and Gas RMP/EIS Amendment (1994) was written for all public land and minerals in the state of South Dakota. See the Summary on page iii, which gives the lands subject to leasing under various stipulations provided for in the preferred alternative. The section in Appendix B of that document, pages 139-175, gives the lease forms and stipulations for alternatives; and map numbers 3, 4, and 5 show where stipulations apply. Lease terms would also be added to all the leases (see pages 166 and 167). Lease terms refer to the need to be in compliance with 43 CFR 3100, which provides its own protections.

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

At the time of this review it is unknown whether a particular parcel will be sold and a lease issued. It is unknown when, where, or if future well sites, roads, and facilities might be proposed. Assessment of projected activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development Scenario developed in October of 2009 and documented in conjunction with the revision of the South Dakota RMP. Detailed site-specific analysis of activities associated with any particular parcel would occur when a lease holder submits an application for permit to drill (APD).

The proposed project would not be in conflict with any local, county, or state laws or plans. The proposed action is in conformance with the applicable land use plans because it is specifically provided for in the following land use plan 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 show where stipulations apply. Lease terms will also be added to all the leases (see pages 166 and 167). Lease terms refer to the need to be in compliance with 43 CFR 3100, which provides its own protections.

1.4 Public Scoping and Identification of Issues

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posting on the field office website NEPA (National Environmental Policy Act) notification log. Scoping was initiated May 25, 2010; however, comments were received through June 21, 2010. Several scoping comment letters pertained to overall issues/concerns from oil and gas leasing within the Montana/Dakotas BLM while other scoping comment letters were specific to this EA planning area. Refer to Section 5.2 of this EA for a more complete summary of the scoping comments received.

Planning issues identified through scoping related to oil and gas leasing and include: greenhouse gas (GHG) emissions and impacts to climate change; protection of wildlife and fisheries habitat and corridors; preservation of wildlands/pristine landscapes; protection of scenic quality/viewsheds; protection of cultural areas; minimization of surface (soil) disturbance; and identification of mitigation measures to minimize impacts from operations. One comment specifically suggested considering a no leasing alternative.

In addition to the planning issues identified above, one comment was specific to the South Dakota Field Office and identified concerns regarding surface disturbance from potential development.

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 offering eight (8) lease parcels covering 14, 286 acres in the South Dakota Field Office from the upcoming lease sale. Surface management would remain the same, and ongoing oil and gas development would continue on surrounding federal, private, and state leases.

2.2 Alternative B - Proposed Action

The Proposed Action would be to offer seven (7) lease parcels of federal minerals for oil and gas lease sale and issuance. The parcels include 12,362 acres administered by the South Dakota Field Office (SDFO). The parcels are located in northern Butte and western Harding counties. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Maps 1 and 2 show the general location of each parcel.

Of the approximately 12,362 acres of federal mineral estate considered in this EA, approximately 1, 917 acres are public surface with federal mineral estate, and approximately 10,445 are split-estate (private surface with federal mineral estate). The seven proposed lease sale parcels would be subject to leasing stipulations as per the oil and gas leasing decisions in the South Dakota RMP, as amended, that would protect identified resources or resource uses that otherwise might be impacted by the proposed action.

The Proposed Action would defer one (1) lease parcel (parcel AV, as identified in Appenidx A) from oil and gas leasing of federal minerals covering 1,923.46 acres administered by the South Dakota FO, pending further environmental review/analysis. Standard terms and conditions as well as special stipulations listed in the RMP would not be applied to the deferred lease sale parcel.

Where the parcels are split estate, the BLM provided courtesy notification to the landowners that their lands would be included in this analysis. In the event of activity on such split estate parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

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

Standard operating procedures, best management practices and required conditions of approval and the application of lease stipulations change over time to meet overall RMP objectives. 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

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

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

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

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

3.1 Air Resources

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

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

3.1.1 Air Quality

Project area air quality is very good. The EPA air quality index (AQI) is an index used for reporting daily air quality (http://www.epa.gov/oar/data/geosel.html). It tells how clean or polluted an area's air is and whether associated health effects might be a concern. The AQI focuses on the potential health effects a person may experience within a few hours or days after breathing polluted air. The EPA calculates the AQI for the five major criteria air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. An AQI value of 100 generally corresponds to the

national air quality standard for the pollutant, which is the level the EPA has set to protect public health. The following terms help interpret the AQI information:

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

In the context of ozone, all areas throughout Montana and the Dakotas (including near the Billings FO) are currently meeting federal standards in all locations. Light and dark blue circles in Figure 1 indicate standards being met in 2008. Open circles in Figure 2 indicate static trends.

For haze, trends appear to be improving for the clearest days (Figure 3), while there are no apparent trends for the haziest days (Figure 4).

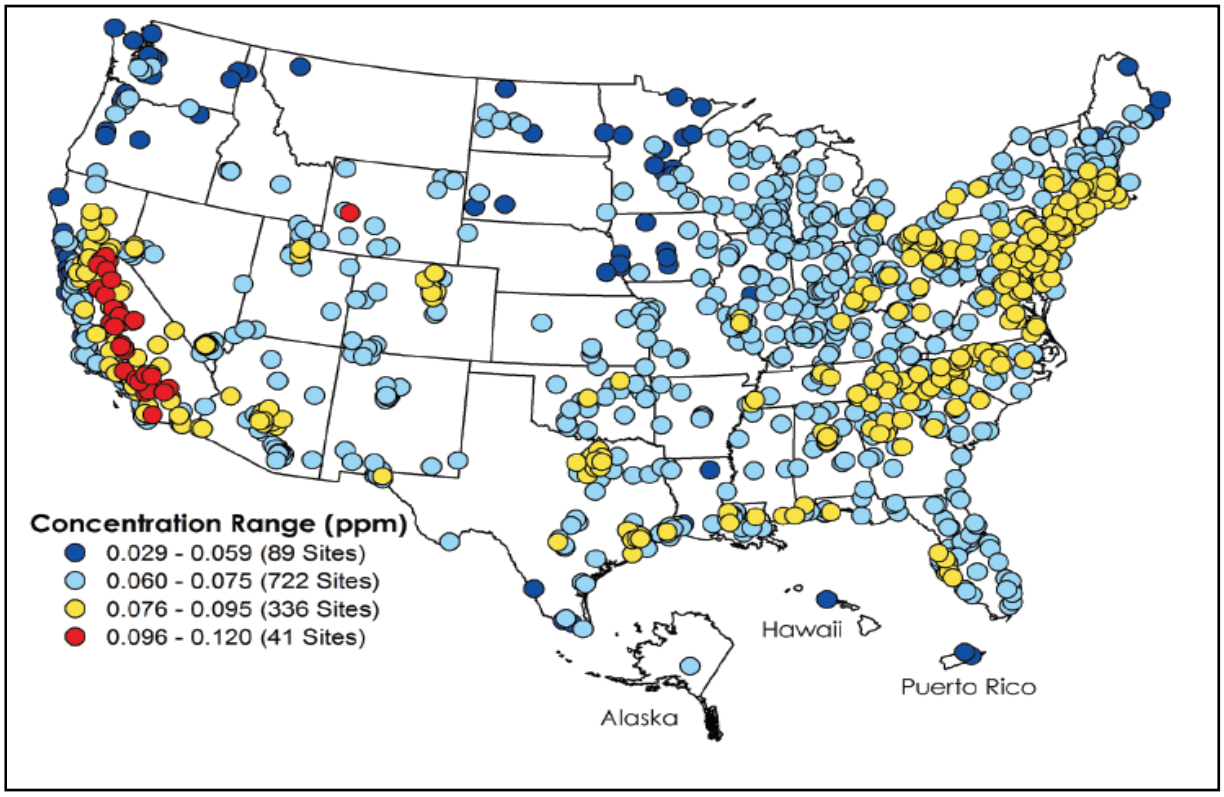

Figure 1. Ozone concentrations in ppm, 2008 (fourth highest daily maximum 8-hour concentration).

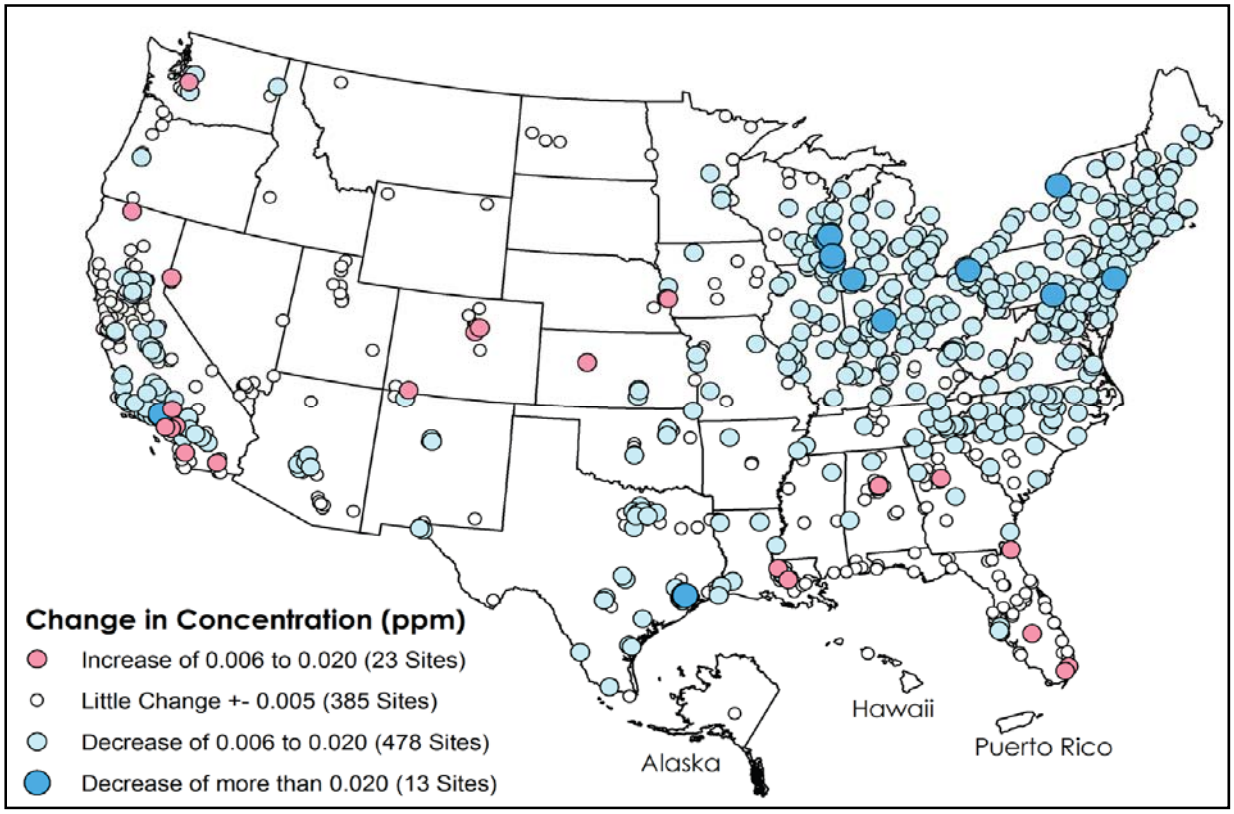

Figure.2. Change in ozone concentrations in ppm, 2001-2003 vs. 2006-2008 (three-year average of the annual fourth highest daily maximum 8-hour concentrations).

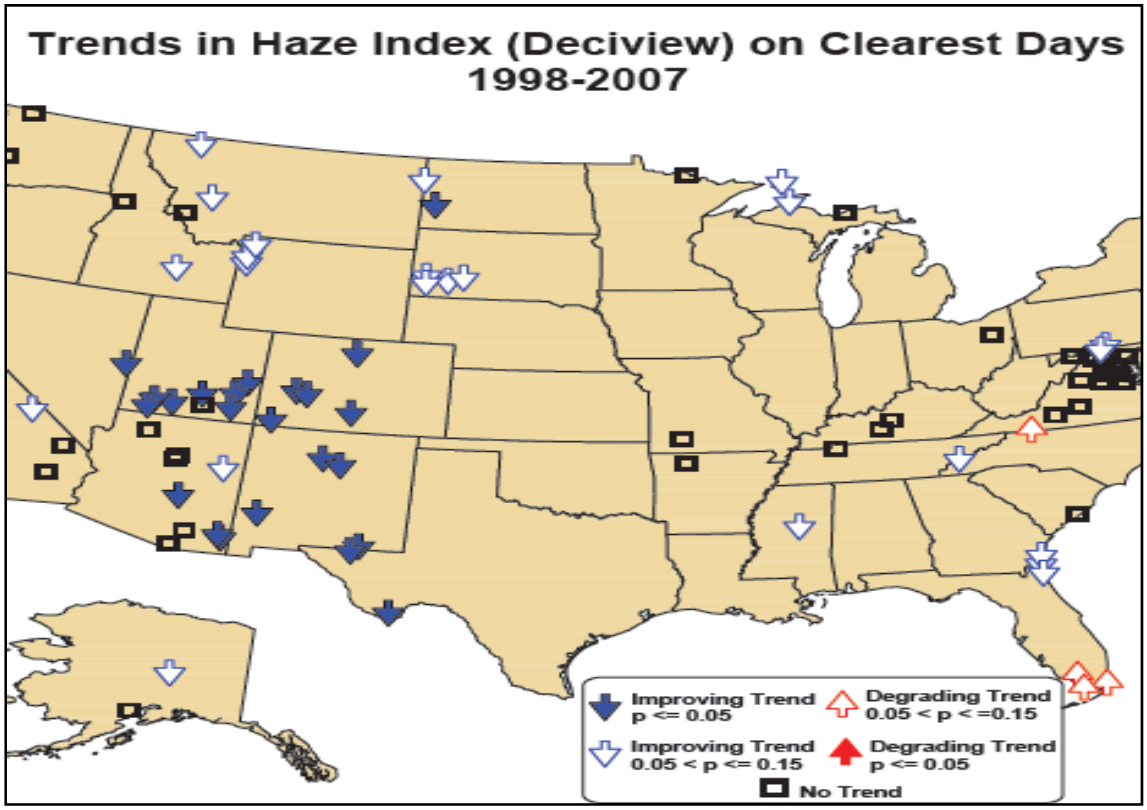

Figure 3. Trends in haze index (deciview) on clearest days, 1998-2007.

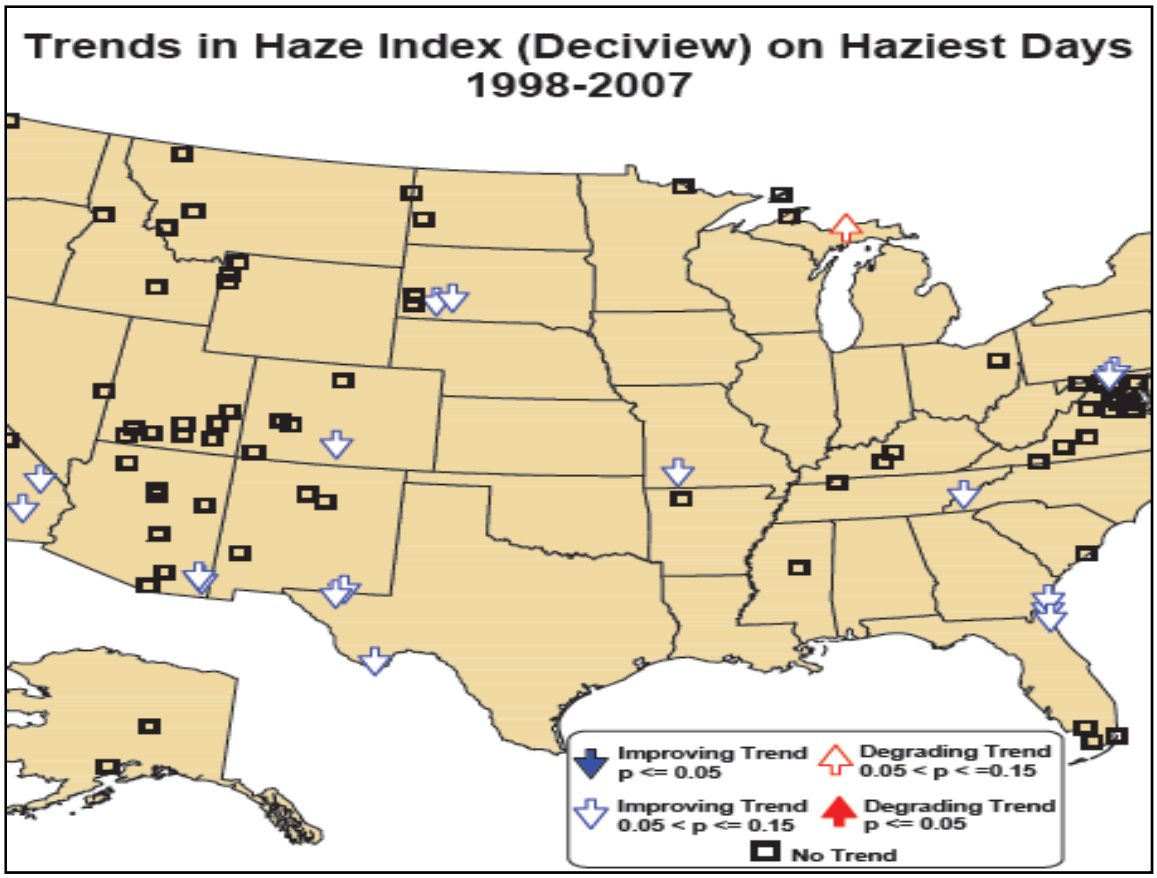

Figure.4. Trends in haze index (deciview) on haziest days, 1998-2007.

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

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

In 2008, lands within the SDFO were in compliance with all air quality standards. Sulfur dioxide reached 7 percent of the standard (1 annual); nitrogen dioxide reached 13 percent; ozone reached 89 percent, $PM_{2.5}$ reached 80 percent (24-hour), and PM_{10} reached 81 percent of the standard. This indicates that current air quality is very good, falling well below applicable standards.

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

There are two Class 1 areas in South Dakota-- Badlands National Park and Wind Cave National Park. Both of these areas are located at least 100 miles to the southeast of the project location. The prominent wind direction for Wind Cave and Badlands national parks is from the southwest; therefore, any disturbance from the project area would not likely affect these areas. Within South Dakota there are no non-attainment areas, which makes South Dakota one of only 13 states to comply with all federal ambient air quality standards.

3.1.2 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes

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

The Intergovernmental Panel on Climate Change (Climate Change SIR, 2010) states, "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." Global average temperature has increased approximately 1.4°F since the early 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 in the Climate Change SIR include:

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

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

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

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

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the Climate Change SIR describes impacts of climate change in detail at various scales, including the state-scale when appropriate. The following bullet points summarize potential changes identified by the EPA (EPA, 2008) that are expected to occur at the regional scale, where the proposed action and its alternatives are to take place. The EPA identifies this area as part of the Mountain West and Great Plains region (http://www.epa.gov/Region8/climatechange/pdf/ClimateChange101FINAL.pdf):

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

Other impacts could include:

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

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

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (Climate Change SIR, 2010). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.

- Fires, insect epidemics, disease pathogens, and invasive weed species have increased, and these trends are likely to continue. Changes in timing of precipitation and earlier runoff increase fire risks.
- Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increased insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations, while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

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

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

While long-range regional changes might occur within this project area, it is impossible to predict precisely when they could occur. The following example summarizing climate data for the West North Central Region (MT, ND, SD, WY) illustrates this point at the regional scale. A potential regional effect of climate change is earlier snowmelt and associated runoff. This is directly related to spring-time temperatures. Over a 112-year record, overall warming is clearly evident with temperatures increasing 0.21 degrees per decade (Figure 5). This would suggest that runoff may be occurring earlier than in the past. However, data from 1991-2005 indicates a 0.45 degree per decade cooling trend (Figure 6). This example is not an anomaly, as several other 15-year windows can be selected to show either warming or cooling trends. Some of 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 regional or site-specific changes or conditions which may be due to climate change during any specific time frame.

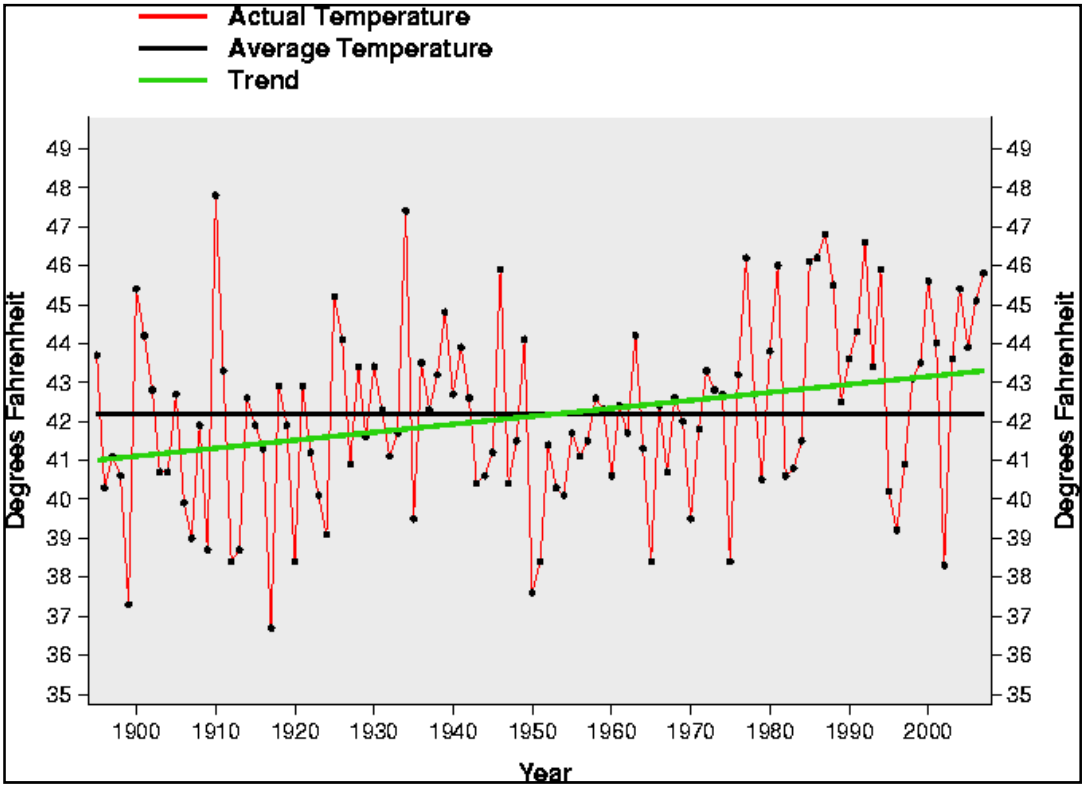

Figure 5. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1895-2007. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html**)**

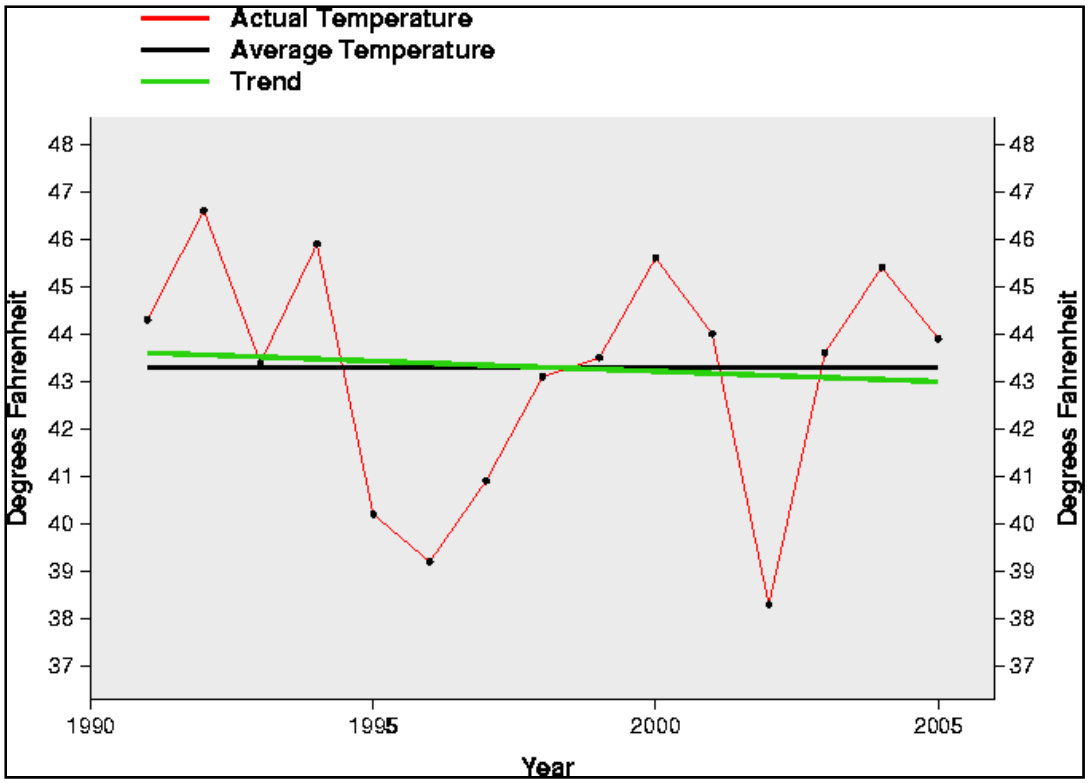

Figure 6. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1991-2005. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html**)**

3.2 Soil Resources

The lease area includes many soil types and complexes. These include several that are sensitive and that could be adversely impacted by oil and gas related activities. This includes those that have high erosion ratings, those with steep slopes, and those with limitations related to construction activities and reclamation.

The most common soil in parcel AV is Winler clay, which is not particularly difficult to reclaim. The predominant soils in parcel AX are Winler clay, as well as Sage-Slickspots complex which would provide more challenges to reclamation efforts. Parcels AY and B1 are composed mostly of Winler clay and Lismas clay, which are not great reclamation challenges. Parcel CJ is composed of a large number of different soils with Twilight fine sandy loam, Chinook fine sandy loam, and Sorum fine sandy loam predominating; the Sorum presents some reclamation challenges. Parcel CI is quite a complex of mapping units with no particularly common soil. It would present some moderate reclamation challenges. Parcel D9 is composed primarily of various Pierre clay soil mapping units and would not present large areas with reclamation difficulty. Parcel DB is primarily composed of evenly divided areas of Cabbart rock outcrop, as well as Parchin-Bullock fine sandy loams, which would be challenging regarding reclamation achievement.

3.3 Water Resources

Hydrology – Surface Water Quality

The lease parcels cumulatively include approximately 10 miles of named perennial or intermittent streams. Of these creeks, none have been categorized or identified as impaired by the South Dakota Department of Environment and Natural Resources. Since these streams have not been categorized regarding impairment, they have no probable cause or probable source assigned. They all run into the Moreau River. The probable causes and sources of impairment are identified in Table 3.3.1 for the Moreau River. The referenced streams have floodplain areas of varying sizes associated with them.

Parcel	Stream Name	Miles (estimate)	Probable Cause	Probable Source
AX	Fourmile Creek	2.75	Not categorized	N/A
CJ	Muddy Creek	0.75	Not categorized	N/A
CJ	Second Sand Creek	0.25	Not categorized	N/A
CJ	Granger Creek	0.25	Not categorized	N/A
CI	Hay Creek	1.25	Not categorized	N/A
D9	Frog Creek	4.75	Not categorized	N/A
None, but all creeks listed above are tributaries	Moreau River – Impaired without approved TMDL	0.00	Total dissolved solids; Specific conductance	Natural Sources http://denr.sd.gov/draftir2010.pdf The 2010 South Dakota Integrated Report for Surface Water Quality Assessment: South Dakota Department Natural Resources; pp. 132-134 (2010)

Table 3.3.1 – Moreau River Segments

Hydrology – Ground Water

The quality and availability of ground water varies greatly across South Dakota. Residents in western South Dakota commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials or consolidated sedimentary rock formations. Aquifers that residents most commonly used 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 to 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 produce more salty, or mineralized, water compared to some moderately deep formations that are more expensive to drill but produce more palatable water.

3.4 Vegetation Resources

Vegetation of the project area is characteristic of the Northern Great Plains in the 13 to 16-inch precipitation zone (NRCS 2003). Vegetation cover primarily consists of mixed prairie grasslands on benches, slopes, and drainages where soils are deeper. Big sagebrush is present throughout portions of the planning area.

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

3.4.1 Vegetation Communities

The mixed grassland community is dominated by perennial grasses. Perennial grasses can be both warm season and cool season grasses. Furthermore, these perennial grasses can be both tall and short grasses. The mixed grass prairie within the planning area consists of multiple ecological sites, with a major portion of the area consisting of dense clay, shallow dense clay, clayey and saline lowland ecological sites.

3.4.1.1 Western Wheatgrass

The identified 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 American vetch (*Vicia americana*), wild parsley (*Musineon* sp.), and wild onion (*Allium ascalonicum*) are common on the dense clay sites. The saline lowland sites have western wheatgrass as a major component but may also have more saline tolerant plants such as Nuttall's alkaligrass (*Puccinellia nutalliana*), alkali sacaton (*Sporobolus airoides*), Nuttall's saltbush (*Atriplex nuttallii*) and greasewood (*Sarcobatus vermiculatus*).

Wyoming big sagebrush (*Artemisia tridentata ssp. Wyomingensis*) is a minor component of the clayey, dense clay, and shallow dense clay ecological 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.

3.4.1.2 Wetland-Riparian

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

contrasted to temperature extremes in adjacent areas, and contribute to ground water recharge and base flow (Hansen et. al. 1995).

3.4.1.3 Invasive, Non-Native Species

Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the project area. Several invasive, non-native plant species occupy the project area including: Canada thistle (*Cirsium arvense),* leafy spurge (*Euphorbia esula),* crested wheatgrass *(Agropyron cristatum*), Japanese brome *(Bromus japonicas),* cheatgrass/downy brome *(Bromus tectorum),* and foxtail barley *(Hordeum jubatum).* Crested wheatgrass occurs in areas as a result of being planted to increase forage production or to stabilize soils by reducing erosion. Cheatgrass/downy brome, Japanese brome, and foxtail barley are all aggressive invasive species that out-compete desirable vegetation for water and soil nutrients. These species may also reduce cattle grazing performance, wildlife habitat quality, and native species diversity. Cheatgrass/downy brome is an invasive species well known for completely replacing native vegetation and changing fire regimes.

3.4.1.4 Noxious Weeds

Noxious weeds occur in scattered isolated populations throughout the planning area. The most common species of noxious weeds are leafy spurge and Canada thistle. Noxious weed control is the responsibility of the surface management agency in cooperation with the local weed control board. Chemical and biological control methods are utilized, with chemical control being the predominant.

3.5 Special Status Species

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

3.5.1 Threatened or Endangered Species

Birds

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

One threatened species of bird 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 the lack of wetland habitat.

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

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 its 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 SDFO 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 the eastern rivers and tributaries of South Dakota.

Insects
Insects considered special status species include the American burying beetle (*Nicrophorus americanus)* (a threatened species) and the Dakota skipper butterfly(*Hesperia dacotae* (a candidate species). They do occur in the SDFO planning area but are not known to occur on the proposed lease areas.

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

Grassland Birds
Seventeen of the 33 sensitive bird species are associated with grassland habitat. The proposed lease parcels have good habitat for a large number of the sensitive bird species that use the grassland habitat including the shrub-steppe, short, and mid-grass prairie habitats. These birds may occur on these units for some or all of their life cycle.

Baird's Sparrow (*Ammodramus bairdii*)
Brewer's Sparrow (*Spizella breweri*)
Le Conte's Sparrow (*Ammodramus leconteii*)
Sage sparrow (*Amphispiza belli*)
Sprague's Pipit (*Anthus spragueii*)
Chestnut-collared longspur (*Calcarius ornatus*)
Dickcissel (*Spiza americana*)
Sage Thrasher (*Oreoscoptes montanus*)
Bobolink (*Dolichonyx oryzivorus*)
Loggerhead shrike (*Lanius ludovicianus*)

Long-billed Curlew (*Numenius americanus*)
Marbled Godwit (*Limosa fedoa*)
Swainson's hawk (*Buteo swainsoni*)
Ferruginous Hawk (*Buteo regalis*)
Golden Eagle (A*quila chrysaetos*)
Burrowing Owl (*Athene cunicularia*)
Trumpeter Swan (*Cygnus buccinators*)

Mammals
The two sensitive mammal species that have the potential to occur in the proposed lease parcels are the swift fox and the black-tailed prairie dog. Both species are associated with prairie communities and are found in western South Dakota.

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

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

Reptiles and Amphibians
There are four BLM-listed sensitive species of reptiles and amphibians that have potential to occur on the proposed lease parcels.

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 parcels.

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 parcels.

The short-horned lizard is a ground-dwelling lizard that inhabits semiarid short-grass 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 parcels.

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

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

3.5.2 Special Status Plant Species
There are no known sensitive plant species within the proposed lease parcels.

3.5.3 Fish and Wildlife Resources
Falling within the Northern Great Plains ecosystem, the proposed lease parcels are important to many wildlife species due to habitat diversity which supports breeding populations.
The assortment of topography, vegetation, and climate 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 are representative of those species found within the Northern Great Plains ecosystem, including grasslands, sagebrush, and riparian habitats. Sagebrush habitats provide perennial habitat for mule deer, greater sage-grouse, and pronghorn antelope.

Riparian and wetland habitats are used extensively by wildlife, including neo-tropical 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.

3.6 Fish and Wildlife Species
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, shrubland, 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 Neo-tropical Birds
Migratory birds can be classified as canopy nesters, shrub nesters, and cavity nesters. The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC. 703-711) states that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried, or received

any migratory bird, part, nest, egg or product, manufactured or not. Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (2001), addresses the need to "minimize . . . adverse impacts." While site-specific surveys for neo-tropical birds were not done, the proposed lease units support more than 250 species of grassland and neo-tropical migrant birds. 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. Neo-tropical migrants exhibit quite variable habitat requirements and are found in most habitat types. Most birds found here are or have the potential to be migrant birds.

Upland birds

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

Waterfowl, Shorebirds and Wading Birds

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

Mammals

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

3.7 Cultural Resources

Common prehistoric archaeological site types in Butte and Harding 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, Civilian Conservation Corps (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 eight nominated lease parcels within a one-mile search

radius to determine what types of numbers of known cultural resources are present within or adjacent to the lease parcels. Additional cultural resource information was reviewed for the general area in the 1986 South Dakota Resource Management Plan and the South Dakota Statewide Comprehensive Historic Preservation Plan (Sundstrom 2009). Requests were made to tribal historic preservation offices in South Dakota, North Dakota, and Montana for additional cultural information or areas of concern.

Three lease parcels have no previous cultural resource inventory survey. The remaining five parcels contain portions of cultural resource surveys conducted previously for range improvements, energy development (oil and gas), telephone cable utility lines, and a geophysical seismic line project. These inventories resulted in the documentation of the following cultural resources.

One previously documented cultural resource site is known inside a proposed lease parcel boundary. The site is a large prehistoric lithic procurement that continues outside the nominated lease boundary.

The statement of significance on the State Archaeological Site Form says: The lithic procurement needs more detailed recording and testing to evaluate the integrity of the prehistoric site. It is recommended that the site will be protected until the determination of eligibility is made based on the requirements of the National Register (on file State Archaeological Research Center, Rapid City, South Dakota and BLM Field Office, Belle Fourche, South Dakota).

Six cultural resource sites are documented in a one-mile search radius of the lease parcels and include the following types and numbers: two archaeological sites with stone circles and rock cairns, one site containing a single rock cairn, one archaeological quarry, one isolated find consisting of a Late Archaic projectile point and lithic flake, and the St. Anthony Cemetery that contains grave markers from 1910 to 1930.

Site 39BU0451 is located within a mile east of two proposed parcels. It is an unevaluated cultural site that contains one stone cairn. One proposed lease parcel is within one mile of site 39BU0416, the site of an isolated find Archaic projectile point and a lithic flake.

One of the proposed lease parcels contains separate land parcels. A 20-acre parcel is proposed approximately three-fourths of a mile southeast of the St. Anthony Cemetery. The St. Anthony Cemetery contains grave markers from 1910 to 1930, with a majority from the 1930s. A second proposed 40-acre parcel is located one mile from sites 39BU0006, 39BU0028, and 39BU0029, all stone circle, cairn and artifact scatter sites.

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

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

3.8 Paleontology

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

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

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

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

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

The late Cretaceous/early Tertiary formations in the northern Great Plains region are world renowned for their dinosaur and early mammal fossils; many of the major museums in the United States have fossils from this region. Historically, most of the research and collecting

occurred in Montana and Wyoming; however, recent finds have shown that similar fossils are preserved in equivalent formations in North and South Dakota. The Eocene/Oligocene/Miocene formations have also produced a huge number of significant mammal fossils over the last 130 years.

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

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

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

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

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

Of the eight proposed lease parcels, four parcels or portions of the parcels are in areas classified as high (Class 5) according to the Potential Fossil Yield Classification (PFYC) system map. The remaining four nominated parcels are located in an area considered moderate or unknown (Class 3).

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. Some fossil resources have been revealed during the course of the investigation of illegal collecting activities. There are presently no known localities or previous research areas for fossil or paleontological resources inside or adjacent to the nominated parcels.

3.9 Native American Religious Concerns

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

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

Summary reports that included the site and survey information as well as surrounding prominent topographic features for each lease parcel were sent to Tribal Historic Preservation Officers for the Oglala Sioux Tribe, the Standing Rock Sioux Tribe, the Northern Cheyenne Tribe, the Cheyenne River Sioux Tribe, the Rosebud Sioux Tribe, and the Mandan, Hidatsa, Arikara Nation (June 15, 2010). No comments, identified TCPs, or additional information was received as a result of this request.

3.10 Visual Resources

No visual resource management (VRM) classes have been established in the project area in a formal written decision document. While an existing visual resource inventory (VRI) has been conducted nearby, the inventory did not extend into this area. Nevertheless, since the inventoried area was selected to be representative, it is reasonable to assume that the class identified would apply to adjacent areas. Butte and Harding counties are thereby assigned VRI class IV, allowing modification to the characteristic landscape. VRI is only applied to federally managed surface; therefore, the affected environment for visual resources only consists of approximately 1,917 acres of the 12,362 acres in the proposed action. The South Dakota RMP revision will formally address VRM through a range of alternatives based on the VRI data; however, in the interim, and as directed by BLM Manual 8400 (Visual Resource Management), the affected environment is described using the existing VRI classes.

3.11 Livestock Grazing

Of the seven parcels identified for lease, six are within BLM grazing allotments. Parcel #SDM-79010-AX is located within the Four Mile Creek Allotment #02310 and the Crago Allotment #02407. Parcel #SDM-79010-AY and Parcel #SDM-79010-B1 are located within the Crago Allotment #02407 and the Van Kirk Allotment #03251. Parcel #SDM-79010-AY is also located in the Four Mile Creek Allotment #02310. Parcel #SDM-79010-B1 is also located within the Off Center Allotment #02720. Parcel #SDM-79010-CI and Parcel #SDM-79010-CJ are located within the Tributary Allotment #02762 and the Lone Draw Allotment #07317. All of these parcels are located on intermingled unfenced BLM and private lands within the allotments. Parcel #SDM-79010-CJ is also located within the Home Ranch – East Allotment #02478 on private surface with intermingled, unfenced BLM lands within the allotment. Parcel #SDM-79010-DB is located within the Wagon Creek-North Allotment #02757 on BLM land with intermingled, unfenced private lands within the allotment. The remaining Parcel #SDM-79010-D9 is located on private surface that is not within a grazing allotment.

The Four Mile Creek Allotment has one lessee running cattle and sheep with a season of use from April 14 to December 31. It is a Maintain (M) allotment. The allotment has multiple pastures divided by fences.

The Crago Allotment has one lessee running yearling cattle with a season of use from May 5 to November 5. It is a Maintain (M) allotment. The Crago allotment has eight pastures divided by fences. The Crago allotment has a pipeline with multiple water troughs located throughout the pastures. There are numerous reservoirs/holding ponds throughout the allotment for livestock watering.

The Home Ranch-East Allotment and the Wagon Creek Allotment both have one lessee on each allotment running sheep with a season of use from March 1 to February 28. Livestock are not on the public land continuously for the entire season. They are both Custodial (C) allotments.

The Off Center Allotment has one lessee running cattle with a season of use from March 1 to February 28. Livestock are not on the public land continuously for the entire season. It is a Custodial (C) allotment. The allotment has five pastures and they are divided by fences. There are multiple stock reservoirs throughout the allotment.

The Tributary Allotment has one lessee running cattle with a season of use from March 1 to February 28. Livestock are not on the public land continuously for the entire season. It is a Custodial (C) allotment. The allotment has multiple pastures divided by fences.

The Van Kirk Allotment has one lessee running yearling cattle with a season of use from May 1 to November 1. It is a Custodial (C) allotment. The allotment is a single pasture with intermingled private and BLM lands. There are multiple stock reservoirs within the allotment.

The Lone Draw Allotment has one lessee running cattle with a season of use from May 1 to October 1. It is a Custodial (C) allotment.

3.12 Recreation and Travel Management

Recreational opportunities and experiences managed for by the BLM are only available on BLM-administered surface. The affected environment consists of approximately 1,917 acres (or 13 percent of the total acreage proposed for lease) of BLM-administered public lands (surface). None of the eight proposed lease parcels fall within special recreation management areas (SRMAs).

Much of the 1,917 BLM-administered acres proposed for lease consists of small, isolated, and scattered tracts with limited legal public access (i.e., no public easements or rights-of-way across private property). The lack of public access limits the general public's use of the BLM parcels for recreational purposes. The types of limited public use on these parcels can be characterized as casual dispersed recreational activities including hiking and hunting.

3.13 Lands and Realty

The lands proposed for competitive leasing of the federal mineral estate are mainly (84 percent) scattered split estate mineral parcels under the jurisdiction of BLM. Five parcels contain 1,917 acres of BLM surface and federal mineral estate under the jurisdiction of BLM. Seven parcels contain 10,445 acres of split estate.

Parcel DB is federal estate (77 acres) located north and west of Camp Crook in western Harding County. There is no existing legal access through the private land to access this parcel.

Parcel AX is a federal and split estate parcel (640 acres of BLM-administered surface) in Butte County located 14 miles south-southwest of Redig. There are no gravel roads that go through this parcel from private land and adjacent federal land. There is no legal access through the private land.

Parcel AY is a federal and split estate parcel (720 acres of BLM-administered surface) in Butte County located 15 miles south-southwest of Redig. There is a primitive road that goes through this parcel from private land. There is no legal access through the private land.

Parcel B1 is a federal and split estate parcel (320 acres of BLM-administered surface) in Butte County located 17 miles south-southwest of Redig. There are several primitive roads that go through this parcel from private land and adjacent federal land. There is no legal access through the private land.

Parcel D9 is a split estate parcel in Butte County located four miles northeast of Castle Rock. A couple of primitive roads go through this parcel from private land. There is no legal access through the private land.

Parcel CJ is a split estate parcel in Butte County located 16 miles southeast of Redig. A gravel road in the area goes through a portion of this parcel from private land. There is no legal access through the private land to the majority of the parcel.

Parcel CI is a federal and split estate parcel (160 acres of BLM-administered surface) in Butte County located 15 miles southeast of Redig. There is a major county road (old 79) that goes through this parcel and a couple of primitive roads that go east off of the county road.
New rights-of-way associated with the development of the leases would need to be located outside of greater sage-grouse priority habitat areas and be restricted in lek and brood rearing areas within the sage grouse general habitat area. See lease notice LN 14-11.

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

3.14 Fluid Minerals

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

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

Currently there are 167 oil and gas leases covering approximately 140,259 acres in the South Dakota Field Office. Existing production activity holds approximately 30 percent of this lease acreage. Information on numbers and status of wells on these leases and well status and numbers of private and state wells within the external boundary of the field office is displayed in Table 3.17.1. Numbers of townships, leases acres within those townships, and development activity for all jurisdictions are summarized in Table 3.17.2.

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

Table 3.17.1 Existing Development Activity

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

Table 3.17.2 Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels

	Butte County	Harding County
Number of Townships Containing Lease Parcels	3	1
Total Acres Within Applicable Township(s)	68,761	20,128
Acres of Federal Oil and Gas Minerals	31,875	4,936
Percent of Township(s)	46.3	24.5
Acres Leased Federal Oil and Gas Minerals	23,519	75
Percent of Township(s)	34.2	0.4
Leased Federal Oil and Gas Minerals Suspended	0	0
Percent of Township(s)	0	0
Federal Wells		
Private and State Wells		

3.15 Social and Economic Conditions

Economic Conditions

Certain existing demographic and economic features influence and define the nature of local economic and social activity. Among these features are the local population, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant land and water features, and unique area amenities. The affected local economy is made up of 10 counties in South Dakota (Butte, Custer, Fall River, Haakon, Harding, Lawrence, Meade, Pennington, Perkins, and Stanley) within the BLM SD Field Office boundaries. Although only five of these counties (Butte, Fall River, Harding, Meade, and Stanley) currently have federal oil and gas leases, the distribution of economic effects is based on acres leased and levels of production as well as business patterns.

Affected Environment

The 10-county local economy had an estimated 2007 population of 176,858 people. Total employment was estimated to be 114,028 full and part-time jobs; there were an estimated 73,669 households; there were 235 North American Industry Classification System (NAICS (NAICS is the standard used by Federal statistical agencies in classifying business statistical data related to the US business economy)) industrial sectors represented in the local economy; average income per household was $78,307; and total personal income was $5.768 million (IMPLAN, 2007). The local economy includes about 22 percent of the South Dakota population and most of the larger business centers in Western South Dakota, including Rapid City, Sturgis, Spearfish,

Deadwood, Lead, Custer, and Belle Fourche. Within this local economy, there were 1.55 people per job.

Nature of the Oil and Gas Industry in South Dakota

Only three counties (Harding, Custer, and Fall River) currently have oil and/or gas production. The vast majority of the production came from Harding County. In 2007, there were 163 producing oil wells and 64 producing gas wells. Average wellhead prices paid in 2007 were $62.78/bbl (barrel) for oil and $7.22 /MCF (thousand cubic feet) for natural gas. The average cost of drilling and equipping a well was $43,019,260 (oil), $423,072 (gas), and $414,247 (dry) (Independent Petroleum Association of American (IPAA), 2010).

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

Leasing

In 2010, 140,259 acres of federal minerals were leased for oil and gas in the South Dakota Field Office. Currently, annual lease rental is paid on 97,668 acres that are not held by production. Estimated minimum total annual average lease and rental revenue to the federal government was about $28,000. Lease rents were not paid on 42,591 acres that were held by production. Instead, royalties are paid on oil and gas production from these leases.

Federal oil and gas leases generate a one-time lease bid as well as annual rents. The minimum lease bid is $2.00 per acre; lease rental is $1.50 per acre per year for the first five years and $2.00 per acre per year thereafter. Typically, oil and gas leases expire after 10 years unless held by production. Annual lease rentals continue until one or more wells are drilled that result in production and associated royalties. Within the South Dakota Field Office, about 47 percent of the federal leases and about 30 percent of the leased acres are held by production. Forty-nine percent of these federal leasing revenues are distributed to the state. For revenues received from public domain lands, the state of South Dakota distributes the revenues to public schools or other public educational institutions within the counties in which the minerals were produced (SD statute 13-14-3.1). The federal government collects an estimated minimum annual average of about $200,000 in lease bids and rent, of which an estimated $100,000 is distributed to the state/local governments.

Production

In 2009, production from federal minerals in the South Dakota Field Office equaled 210,720 barrels of oil and 437,514 MCF of natural gas (MMS, 2010). 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 average federal royalty revenues were about $2.0 million, of which about $1.0 million were distributed to the state and counties.

Local Economic Contribution

The economic contribution to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing, rent, and production of federal minerals, 2) local royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in other sectors. Extraction of oil and natural gas (NAICS sector 20), drilling oil and gas wells (NAICS sector 28), and support activities for oil and gas operations (NAICS sector 29) supported an estimated 151 total full and part-time jobs and $8.0 million in total employee compensation and proprietor's income in the local economy (IMPLAN, 2007).

Average total federal revenues from federal oil and gas leasing, rents, and royalty payments are an estimated $2.247 million annually. Federal revenues distributed to the state of South Dakota average an estimated $1.1 million 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 average annual local economic contribution associated with federal leases, rents, drilling, production, and royalty payments combined to support about 150 total (full and part-time) local jobs and $6.7 million in local labor income, respectively (IMPLAN, 2007). This amounts to about one-tenth of one percent of the local employment and about two-tenths of one percent of the local income. The NAICS aggregated sectors that experience the most influence from oil and gas related leasing, exploration, development, and production are mining, construction, professional, scientific and technical services, and retail trade. Table 3.15.1 shows the current contributions of leasing federal oil and gas minerals and the associated exploration, development, and production of federal oil and gas minerals to the local economy.

Table 3.15.1 Current Average Annual Contributions of Federal Oil and Gas Leasing, Exploration, Development, and Production to the Local Economy

Industry	Employment (full and part-time jobs)		Labor Income (Thousands of 2009 dollars)	
	Area Totals	Federal O&G - Related	Area Totals	Federal O&G-Related
Agriculture	5,236	1	$63,327.3	$19
Mining	595	55	$43,081.7	$3,042
Utilities	643	1	$74,657.1	$134
Construction	9,175	26	$341,775.1	$933
Manufacturing	5,771	1	$298,292.5	$66
Wholesale Trade	2,953	5	$154,727.3	$236
Transportation & Warehousing	14,579	4	$364,427.0	$162
Retail Trade	2,976	11	$132,551.4	$259
Information	1,749	1	$72,598.6	$44
Finance & Insurance	5,045	5	$199,685.0	$214
Real Estate & Rental & Leasing	1,870	3	$57,189.7	$90
Prof, Scientific, & Tech Services	4,320	11	$173,407.9	$512
Mngt of Companies	407	4	$25,354.3	$252
Admin, Waste Mngt & Rem Serv	3,783	3	$88,959.5	$67
Educational Services	1,276	1	$31,441.2	$23
Health Care & Social Assistance	10,902	6	$571,528.0	$324
Arts, Entertainment, and Rec	4,016	1	$92,982.8	$20
Accommodation & Food Services	11,369	6	$188,982.6	$94
Other Services	8,168	6	$149,675.9	$100
Government	19,194	1	$1,150,491.0	$88
Total	114,028	152	4,275,136	6,679
Federal O&G as Percent of Total	---	0.13%	---	0.16%

Source: IMPLAN, 2007 IMPLAN is an economic model used in the Input-Output analysis that allows the assessment of change in overall economic activity as a result of some corresponding change in one or several activities.

Social and Environmental Justice

The social section focuses on the area in the immediate vicinity of the leases being examined. No alternative would affect the demographics, social trends, or social organization in the area.

The leases being examined in this EA are located in Butte and Harding Counties in northwestern South Dakota. The incorporated communities closest to the areas of interest are Belle Fourche (the county seat of Butte County) and Buffalo (the county seat of Harding County) with 2008 populations of 4,979 and 320 respectively. The population density (persons per square mile) in Butte County is 4.2 and in Harding County is 0.4. These figures compare to a statewide figure of 10.7 and a national figure of 90. The area in the vicinity of these leases is home to small communities and ranches.

Oil and gas production is already occurring in some locations near these leases; in other cases there are existing leases but no current production. Approximately one-third of the acreage being considered is split estate (private surface with federal mineral estate).

In 2008, the percent of American Indians ranged from 1.8% in Harding County to 2.0% in Butte County. The percent of the population living below the poverty level in 2008 was 12.3% in Harding County and 14.5% in Butte County. There are no Indian reservations in the vicinity of these proposed leases. The social environment of the South Dakota Field Office is described in detail in the South Dakota RMP AMS (2010).

4.0 ENVIRONMENTAL IMPACTS

4.0.1 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 parcels are leased, it remains unknown whether development would actually occur, and if so, where specific facilities would be placed. This would not be determined until the BLM receives an application for permit to drill (APD) in which more detailed information about proposed activities and facilities would be clarified for particular lease parcels. Therefore, this EA discusses potential effects that could occur in the event of development.

Upon receipt of an APD, the BLM would initiate a more site-specific NEPA analysis to more fully analyze and disclose site-specific effects of specifically identified activities. In all potential exploration and development scenarios, the BLM would require the use of best management practices 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 Conditions of Approval, based on site-specific analysis, that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

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

Greater sage-grouse priority habitat is an issue being considered as part of the South Dakota RMP revision; therefore, one lease parcel (1,923.46 acres) would be deferred, pending further review and analysis.

The following assumptions are from the Reasonably Foreseeable Development (RFD) scenario developed for the South Dakota FO RMP revision. The BLM administers approximately 1,471,000 acres of federal minerals (for fluid minerals) within the South Dakota Field Office. The RFD forecasts the following level of development in the South Dakota planning area.

The South Dakota RFD scenario analyzes the potential for oil and gas development in the field office including both conventional oil and gas and coal bed natural gas (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 20 years. Disturbance projections from the RFD scenario follow (Tables 4.0.1 and 4.0.2).

Table 4.0.1 Total RFD Projected Disturbance Associated with New Drilled Wells and Existing Active Wells (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 4.0.2 Total RFD Projected 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

New oil and gas wells projected to be drilled in the South Dakota FO RFD from 2010 through 2029 total as many as 524 in the Study Area. Up to 75 of these wells could be coal bed natural gas wells. Of the 449 remaining wells, 359 wells are projected in and around established fields in the southern Williston Basin (Harding and Butte counties); 40 in and around established fields in Fall River County in the eastern Powder River Basin; and 50 scattered across the remainder of the Study Area. In the RFD, the BLM component of projected new oil and gas wells is 98, out of a total of 524 projected new wells.

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

4.0.2 Alternative A (No Action Alternative)

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

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

4.0.3 Alternative B Assumptions

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

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

Seven parcels are considered in this EA. One parcel is located in T. 21 N. R. 1 E. Three parcels are located in T. 13 N., 4 E. Another single parcel is located in T. 12 N. 6 E. and the remaining two parcels are located in T. 14 N., R. 6 E.

The parcel located in T. 21 N. R. 1 E. , which consists of 76.76 acres, is located in Harding County in a township classified as having low development potential for conventional oil and gas and no potential for CBNG. This classification forecasts that drilling of one to two wells may occur in the township during the life of the RMP. Based on the location in Harding County, the RFD assumes that any activity on the lease parcel would be exploration for oil. Short-term disturbance (two years) for oil wells would be 2.9 acres for access roads and flow lines and four acres per well pad. Long-term disturbance for a producing well would be 1.5 acres for access roads and flow lines and 1.75 acres per well pad.

Three parcels are located in a township T. 13 N., 4 E. in Butte County classified as having low potential. Again, the RFD forecasts one to two wells in the township over the life of the plan. Based on the location, the RFD assumes that activity would be exploration for natural gas. Short-term disturbance for producing wells would be 0.6 acres for access roads and flow lines and 0.5 acres per well pad. Long-term disturbance would be 0.3 acres for access roads and flow lines and 0.25 acres per well pad.

The four parcels under consideration in low development potential areas are located in two different townships. Active (not currently suspended) federal oil and gas leases occur on

approximately 35.8 percent of these two townships. The parcels total about 6,877 acres, approximately 15 percent of the two-township area.

The remaining parcels are located in two different townships (T. 12 N. 6 E. and T. 14 N., R. 6 E.) classified as having very low development potential. The South Dakota RFD assumes that very low development potential areas would see less than one well drilled per township for the life of the plan. This would indicate that very little activity would be likely on those parcels during the life of the plan. No active federal oil and gas leases occur in these two townships. The parcels total about 5,486 acres, approximately 12 percent of the two-township area.

4.1 Air Resources

4.1.1 Direct and Indirect Effects Air Quality

Leasing the subject parcels would have no direct impacts on air quality. Any potential effects on air quality from sale of lease parcels would occur at such time that the leases were developed. Current monitoring data show that the criteria pollutants fall well below applicable air quality standards indicating very good air quality. The potential level of development and mitigation (section 4.1.2.) is expected to maintain this level of air quality by limiting emissions. In addition to the limited level of development, pollutants would be regulated through the use of state-issued air quality permits or air quality registration processes developed to maintain air quality below applicable standards.

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

Greenhouse Gas Emissions at the South Dakota FO and Project Scales

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

Anticipated GHG emission estimates presented in this section are taken from the Climate Change Supplementary Report for Montana, North Dakota, and South Dakota, Bureau of Land Management (Climate Change SIR, 2010). Data are derived from GHG emissions calculators developed by air resource specialists at the BLM National Operations Center in Denver, CO,

based on methods described in the Climate Change SIR. Based on the RFD assumptions summarized above for the South Dakota FO, Table 4.1.1 discloses projected annual GHG source emissions, from BLM-permitted activities associated with the RFD (note: the source year selected to disclosed the estimated GHG emissions was the year with the highest expected combined construction and production emissions for oil and gas sources in the planning area).

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

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

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

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

1. The proportion of each project level action alternative relative to the total RFD was calculated based on total acreage of parcels under consideration for leasing (and/or lifting of lease suspensions) relative to the total acreage of federal mineral acreage available for leasing in the RFD.
2. This ratio was then used as a multiplier with the total estimated GHG emissions for the entire RFD (with highest year emission output used) to estimate GHG emissions for that particular alternative.

Under Alternative B, approximately 12,362 acres of lease parcels with federal minerals would be leased. These acres constitute 0.84 percent of the total federal mineral estate of 1,471,000 acres identified for the South Dakota RFD. Therefore, based on the approach described above to estimate GHG emissions, 0.84 percent of the total estimated BLM emissions of 660,973.8 metric tons/year would be approximately 5,552.2 metric tons/year of CO_2e if the parcels within Alternative B were to be developed.

Climate Change

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

and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (Climate Change SIR, 2010).

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

While it is not possible to predict effects on climate change from potential GHG emissions, discussed above, in the event lease parcels would be developed, the act of leasing does not produce any GHG emissions in and of itself. Releases of GHGs would occur at the exploration/development stage.

4.1.2 Mitigation

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

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

- flare or incinerate hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- install emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- install emission control equipment of a minimum 95 percent efficiency on dehydration units, pneumatic pumps, produced water tanks;
- vapor recovery systems where petroleum liquids are stored;
- tier II or greater, natural gas or electric drill rig engines;
- secondary controls on drill rig engines;
- no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing volatile organic compounds (VOCs));
- gas or electric turbines rather than internal combustions engines for compressors;
- nitrogen oxides (NOx) emission controls for all new and replaced internal combustion oil and gas field engines;
- water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;

- interim reclamation to revegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads;
- co-locate wells and production facilities to reduce new surface disturbance;
- directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- gas-fired or electrified pump jack engines;
- install velocity tubing strings;
- cleaner technologies on completion activities (i.e., green completions) and other ancillary sources;
- centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- forward looking infrared (FLIR) technology to detect fugitive emissions; and
- air monitoring for NOx and ozone (O3).

More specific to reducing greenhouse gas emissions, Section 6 of the Climate Change SIR identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas, coal bed natural gas, and oil production operations. Technologies discussed in the Climate Change SIR are summarized below in Table 4.1.2 (reproduced from Table 6-2 in the Climate Change SIR, 2010). The table displays common methane emission technologies reported under the USEPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

Table 4.1.2 Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program [1]

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Wells					
Reduced emission (green) completion	7,000 [2]	$1K – $10K	>$1,000	1 – 3 yr	$3
Plunger lift systems	630	$2.6K – $10K	NR	2 – 14 mo	$7
Gas well smart automation system	1,000	$1.2K	$0.1K – $1K	1 – 3 yr	$3
Gas well foaming	2,520	>$10K	$0.1K – $1K	3 – 10 yr	NR
Tanks					
Vapor recovery units on crude oil tanks	4,900 – 96,000	$35K – $104K	$7K – $17K	3 – 19 mo	$7
Consolidate crude oil production and water storage tanks	4,200	>$10K	<$0.1K	1 – 3 yr	NR
Glycol Dehydrators					
Flash tank separators	237 – 10,643	$5K – $9.8K	Negligible	4 – 51 mo	$7
Reducing glycol circulation rate	394 – 39,420	Negligible	Negligible	Immediate	$7
Zero-emission dehydrators	31,400	>$10K	>$1K	0 – 1 yr	NR

Table 4.1.2 Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program [1]

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Pneumatic Devices and Controls					
Replace high-bleed devices with low-bleed devices					
End-of-life replacement	50 – 200	$0.2K – $0.3K	Negligible	3 – 8 mo	$7
Early replacement	260	$1.9K	Negligible	13 mo	$7
Retrofit	230	$0.7K	Negligible	6 mo	$7
Maintenance	45 – 260	Negl. to $0.5K	Negligible	0 – 4 mo	$7
Convert to instrument air	20,000 (per facility)	$60K	Negligible	6 mo	$7
Convert to mechanical control systems	500	<$1K	<$0.1K	0 – 1 yr	NR
Valves					
Test and repair pressure safety valves	170	NR	$0.1K – $1K	3 – 10 yr	NR
Inspect and repair compressor station blowdown valves	2,000	<$1K	$0.1K – $1K	0 – 1 yr	NR
Compressors					
Install electric compressors	40 – 16,000	>$10K	>$1K	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	$324K	Negligible	10 mo	$7
Flare Installation	2,000	>$10K	>$1K	None	NR

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

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

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

4.2 Soil Resources

4.2.1 Direct and Indirect Effects

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

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

4.2.2 Mitigation

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

Reserve pits would be dewatered, filled in with spoil material, recontoured, topsoil added, and reseeded as described in conditions of approval (COA). Upon abandonment of wells and/or when access roads are no longer in service, the authorized officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas as described in the COAs.

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

Additional mitigation measures and/or BMPs would be assigned once a site-specific plan of development is proposed. Through the application of stipulations and mitigation measures applied at the leasing stage through site-specific analysis, impacts to soil resources would be low.

4.3 Water Resources

4.3.1 Direct and Indirect Effects

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

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

4.3.2 Mitigation

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

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

Reserve pits would be recontoured and reseeded as described in COAs. Upon abandonment of wells and/or when access roads are no longer in service, the authorized officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas as described in the COAs.

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

The floodplain stipulation will need to be applied to a portion of lease parcel AX along Fourmile Creek within the following legal locations:

T. 13 N., R. 4 E., BHM SD
Section 13 NESW and S2SE
Section 14 SWNE
Section 15 NW and W2N

The floodplain stipulation states: "Surface occupancy and use is prohibited within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams." The stated purpose of the stipulation is "to protect the unique biological and hydrological features associated with riparian areas, 100-year flood plains of major rivers, and water bodies and streams."

Additional mitigation measures and/or best management practices would be assigned once a site-specific plan of development is proposed. Through the application of stipulations and mitigation measures applied at the leasing stage through site-specific analysis, impacts to water resources would be low.

4.4 Vegetation Resources

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

4.4.1 Direct and Indirect Effects

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

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

Potential impacts to plants include direct mortality from earth excavation or crushing by vehicles. Adverse impacts could also result from soil erosion resulting in loss of the supporting substrate for plants or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed-set could be particularly harmful because both current and future generations would be adversely affected. Weeds which are introduced and/or promoted by soil-disturbing activities compete against and displace native vegetation.

Rare plants are not known to be present within the affected area. Dust generated by construction activities and travel along dirt roads can affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil or other chemical spills could contaminate soils as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less than successful, longer term impacts could be expected.

4.4.2 Mitigation

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

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

Through the application of stipulations and mitigation measures applied at the leasing stage through site-specific analysis, impacts to vegetation resources would be low.

4.5 Special Status Species

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

4.5.1 Threatened and Endangered Species

Birds

Greater sage-grouse habitat occurs within all of these lease parcels. Portions of two proposed lease parcels are within priority habitat areas in South Dakota (See Map 3). Parcel AV is entirely within greater sage-grouse priority habitat and will be deferred pending the completion of the RMP revision.

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

Impacts from surface-disturbing activities, disruptive activities, and management actions are anticipated for greater sage-grouse across all activities. Without the stipulations in the proposed action, estimated short- and long-term surface disturbance from BLM actions in the lease parcels would be anticipated to result in loss, degradation, and fragmentation of sagebrush habitat. When lease parcels are developed, the oil and gas actions are a major source of surface disturbance in the lease parcels, and oil and gas development has been identified as a cause of declining greater sage-grouse populations (Doherty, et al. 2008, Walker, et al. 2007, Naugle, et al 2009, Harju 2009). Surface disturbance can have adverse impacts to sagebrush habitat including temporary and permanent loss of habitat in lease units. Fragmentation and degradation of habitat for greater sage-grouse also would be anticipated from surface-disturbing activities and associated development of these leases without the stipulations. Findings suggest that impacts to greater sage-grouse populations are determined by the level of disturbances in nesting habitat within four miles of the lek. Well densities of two wells per square mile in sagebrush habitat have a direct correlation to decreases in population trends, measured by the number of males at nearby leks.

Through the application of stipulations and mitigation measures applied at the leasing stage through site-specific analysis, impacts to greater sage-grouse would be low.

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.

In the context of leasing the parcels considered in this EA, appropriate stipulations have been applied, consistent with the South Dakota RMP/FEIS and consistent with the Biological Opinion from the USFWS for the backlog review. While the act of leasing in and of itself does not authorize any ground disturbance or activity that could impact federally listed species, should future, site-specific proposals for development be received in an Application for Permit to Drill on any parcels addressed in this EA, additional review, NEPA analysis, and ESA Section 7 consultation (as needed) would occur.

4.5.2 Sensitive Species
Grassland birds
The degree of impacts to grassland birds will depend on the time of year it occurs and amount of disturbance permitted in the lease units. The potential impacts include loss of habitat both temporary and permanent, disturbance during the breeding, nesting, and young-raising stages, and collision with vehicles. The habitat disturbance that may result from leasing these parcels and the avoidance measures would result in negligible to minor impacts to grassland birds at the site-specific scale and negligible at the population and landscape scales. For some wildlife species, disturbances are related to timing of the impacts. Raptors are more vulnerable to disturbances during the early stages of nesting.

Migratory Birds
The proposed action would be in conformance with the MBTA should subsequent development occur on the proposed lease parcels. Effects to migratory birds from oil and gas development 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 such as (e.g., the brown-headed cowbird). Field surveys for nesting birds at proposed development sites would be conducted for activities planned between May 1 and August 30. Mitigation measures would be assigned at the development stage to ensure there would be no measurable negative effect on migratory bird populations. These mitigation measures would be required as Conditions of Approval.

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

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

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

4.5.3 Mitigation
No new mitigation is applied but stipulations in the Proposed Action decrease the potential effect to special status species. To lower disturbance and disruption levels for greater sage-grouse, lek, nesting, and brood-rearing buffers may be applied in greater sage-grouse habitat. Portions of three of the proposed lease parcels (B1, CI and D9) will have lease notices applied (refer to Appendix A) to protect the integrity of the priority habitat areas for greater sage-grouse should subsequent development occur.

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

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

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

Stipulations and mitigation measures applied at the leasing stage through site-specific analysis would result in low impacts to fish and wildlife resources.

4.6.2 Mitigation

To lower disturbance and disruption levels for big game species, all identified big game winter range would be closed to exploration activities from December 1 to March 30.

Surface disturbances from pads and roads should be kept to a minimum. Any utility poles should be equipped with anti-perch devices for lower electrocution rates of the raptors and lower predation rates on other species such as greater sage-grouse.

4.7 Cultural Resources

4.7.1 Direct and Indirect Effects

Leasing a nominated parcel gives a basic right to the operator to develop the lease. Leasing would not, however, result in effects to cultural resources. It is only when the lease is developed that there is a potential for cultural resources to be affected by the proposed action. That is when the drilling location is known, and cultural resource investigations can be centered on that location and other related developments such as roads, transmission lines, and pipelines.
A preliminary records review at the South Dakota State Archaeological Research Center conducted for the sections containing the nominated lease locations and a one-mile radius determined there has been little or no cultural resource survey coverage previously in these areas. One site has been previously recorded in an area proposed for lease. It is a large lithic procurement site on the south edge of a lease parcel that continues outside the parcel into an adjacent section. The site is presently unevaluated for the National Register.

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

4.7.2 Mitigation

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

Based on existing information there is one cultural resource located on the nominated parcels. If development occurs, this property could be potentially impacted. Since this site has not been evaluated for consideration to the National Register of Historic Places, specific mitigation measures, including, but not limited to, possible site avoidance or excavation and data recovery would be determined when site-specific development proposals are received.

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

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

4.8 Paleontology

4.8.1 Direct and Indirect Effects

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

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

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

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

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

4.8.2 Mitigation

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

Each nominated lease parcel would have the standard lease notice attached and the special paleontological resource stipulation (provided below per IM 2008-009, 10/15/2007, and IM 2009-011, 10/10/2008). Refer to Appendix A of this document for pertinent parcel-specific lease stipulations as needed.

LEASE NOTICE 14-12

PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT

Surface occupancy or use is subject to the following special operating constraints: The lessee/operator is given notice that this lease has been identified as being located within geologic units rated as being moderate to very high potential for containing significant paleontological resources. The locations identified meet the conditions 1 and/or 2 as set forth in the Potential Fossil Yield Classification System, IM 2008-009, Attachment 2-2. The BLM is responsible for assuring that the leased lands are examined to determine if paleontological resources are present and to specify mitigation measures. Guidance for application of this requirement can be found in IM 2008-009, 10/15/2007 and IM 2009-011, 10/10/2008. The project proponent may be required to conduct a paleontological inventory prior to any surface disturbance. If inventory is required, the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory. An acceptable inventory report is to be submitted to the BLM for review and approval at the time a surface-disturbing plan of operations is submitted. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or project proponent shall contact the B LM to determine if a paleontological resource inventory is required. If an inventory is required then:

1) The lessee or project proponent will complete the required inventory. The lessee or project proponent may engage the services of a paleontological resource consultant acceptable to the BLM to conduct a paleontological resource inventory of the area of proposed surface disturbance. The project proponent will, at a minimum, inventory a 10-acre area or larger to incorporate possible project relocation which may result from environmental or other resource considerations.

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

4.9 Native American Religious Concerns

4.9.1 Direct and Indirect Effects

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

There are no known or identified TCPs and/or properties of religious and cultural importance to tribes in the proposed lease parcels.

4.9.2 Mitigation
The stipulation contained in IM-2005-003 would be attached to all nominated lease parcels. Additional consultation may also be necessary at the APD stage. Refer to Appendix A of this document for pertinent parcel-specific lease stipulations as needed.

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

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

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

Impacts possible at the APD stage of development would include a loss of forage as a result of drill-site development which includes pad, reserve pit, earthen pit, roads, surface facilities, pipelines, powerlines, and herbicide use. In some cases, there may be a temporary loss of AUMs. Short-term shifts in grazing intensities, cattle distribution, and utilization levels could occur as a worst case scenario.

The small number of wells that the RFD forecasts indicates that there would be very little if any foreseeable changes in livestock grazing use levels.

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

Fencing of facilities would be considered as needed to minimize conflicts between oil and gas exploration/development and livestock grazing. The carrying capacity, stocking rates, and utilization objectives for an allotment would have to be analyzed with the removal of acreage from the allotment. Well locations should not be placed in a location that will impair range

improvement usefulness and maintenance. Any linear features (e.g., roads and pipelines) that disturb range improvements should be mitigated by repairing the range improvement to the prior condition or better.

4.12 Recreation and Travel Management

4.12.1 Direct and Indirect Effects

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

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

4.13 Lands and Realty

4.13.1 Direct and Indirect Effects

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

Leasing can sometimes cause conflicts with other surface. This is especially possible if the leased lands are split estate. Surface owners are often not aware of the federal ownership of the mineral estate or are not aware of the implications of the federal ownership.

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

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

Any surface-disturbing activity requires BLM approval. For those parcels that are split estate, the BLM requires the lessee/operator to make a good faith effort to obtain an agreement with the private surface owner prior to access on the leased land.

4.14 Fluid Minerals

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use would have the greatest effects on oil and gas exploration and development. Leases issued with major constraints (no surface occupancy stipulations) may decrease some lease values, increase operating costs, and to a lesser extent require relocation of well sites and modification of field development. Leases issued with moderate constraints (timing limitation

and controlled surface use stipulations) may result in similar but reduced impacts in addition to delays in operations and uncertainty on the part of operators regarding restrictions.

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

4.14.1 Direct and Indirect Effects

Under Alternative B, approximately 1,924 acres, or 13 percent of the lease parcel areas, would not be recommended for oil and gas leasing at this time. Approximately 400 acres, or 3 percent of the areas, would be offered for lease subject to major constraints (no surface occupancy). Approximately1,840 acres, or 13 percent, would be offered for lease subject to moderate constraints. Approximately10,122 acres, or 72 percent, would be offered for lease subject to standard terms and conditions and lease notices only.

4.15 Social and Economic Conditions Economics

Alternative A

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

Alternative B

Public Revenues related to leasing, rent, and production

Leasing an additional 12,362 acres of federal minerals (Alternative B) would increase estimated average annual oil and gas leasing and rent revenues to the federal government by a minimum of $24,000 (Table 4.15.1). Estimated annual leasing and rent revenues that would be distributed to state/local governments would increase by a minimum of about $11,800. Average annual federal oil and gas royalties would increase by an estimated $181,000. Average royalties distributed to the state/counties would increase by an estimated $88,000 annually.

Total average annual federal revenues related to leasing 152,621 acres of federal minerals and associated annual rent and royalty revenues related to annual production of federal minerals would amount to an estimated $2.45 million. This would be an estimated average annual increase of about $205,000 compared to Alternative A. Total annual revenues distributed to the state and counties would be an estimated $1.2 million, an estimated $100,000 more than with Alternative A.

Table 4.15.1 Summary of Estimated Average Annual Economic Impacts by Alternative

Activity	Alternative		
	A	B	Alt. B-Alt. A
Existing Acres leased*	140,259	140,259	0
Acres that would be leased based on this EA **	0	12,362	12,362
Total acres leased	140,259	152,621	12,362
Acres held by production*	42,591	42,591	0
Total acres leased for which lease rents would be paid	97,668	110,030	12,362
Lease rental first 5 years ($1.50/acre)	73,251	82,523	9,272

Lease rental second 5 years ($2.00/acre)	97,668	110,030	12,362
Minimum lease bid ($2.00/ac.)	28,052	30,524	2,472
Total annual federal lease and rental revenue	198,971	223,077	24,106
Distribution to State/local government	97,496	109,308	11,812
Annual oil production (bbl)***	210,720	229,292	18,572
Annual gas production (MCF)	437,514	476,075	38,561
Federal oil royalty (bblx$62.78x0.125)	1,653,625	1,799,371	145,745
Federal gas royalty (MCFx$7.22x0.125)	394,856	429,658	34,801
Total annual Federal O&G royalties	2,048,482	2,229,028	180,547
Distribution to State/local government	1,003,756	1,092,224	88,468
Total annual Federal revenues	2,247,452	2,452,105	204,653
Total annual State/local revenues	1,101,252	1,201,532	100,280
Total annual revenue distributed to counties	1,101,252	1,201,532	100,280
*LR2000, BLM, May 21, 2010 **RFD, May 28, 2010 ***Estimated 2009 federal production level			

Local Economic Contribution

The estimated combined average 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 165 total (full and part-time) jobs and $7.265 million within the local economy (IMPLAN, 2007). Table 4.15.2 shows that this would be an average annual increase of about 10 total jobs and $586,000 in labor income over levels anticipated with Alternative A.

There would also be a corresponding increase in local population of about 10-20 people.

Conclusion

The total federal contribution of Alternative B (leasing an additional 12,362 acres of federal minerals and anticipated related exploration, development, and production of oil and gas) would have negligible effects on local population, total local employment, number of households, average income per household, and total personal income, i.e., the effects would be less than 0.1percent of current levels. The economic effects would continue to be spread unevenly among the counties. Leasing the additional 12,362 acres and anticipated exploration, development, and production under Alternative B would provide a minimum of about $88,000 per year of additional funds for education in counties with federal leases and production. Leasing the additional 12,362 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).

Table 4.15.2 Average Annual Employment and Income by Major Industry by Alternative

Industry	Total Full and Part-time Jobs Contributed		Total Income Contributed ($1000)	
	Alt. A	Alt. B	Alt. A	Alt. B
Agriculture	1	1	$19.2	$20.8
Mining	55	60	$3,041.8	$3,308.4
Utilities	1	1	$134.0	$145.7
Construction	26	28	$932.7	$1,014.9
Manufacturing	1	2	$65.7	$71.4
Wholesale Trade	5	5	$236.4	$257.1
Transportation & Warehousing	4	4	$162.1	$176.3
Retail Trade	11	12	$259.3	$282.1
Information	1	1	$43.8	$47.6
Finance & Insurance	5	6	$213.5	$232.2
Real Estate & Rental & Leasing	3	3	$89.6	$97.5
Prof, Scientific, & Tech Services	11	12	$512.3	$557.3
Mngt of Companies	4	4	$252.4	$274.5
Admin, Waste Mngt & Rem Serv	3	3	$67.3	$73.2
Educational Services	1	1	$22.5	$24.5
Health Care & Social Assistance	6	7	$324.4	$352.8
Arts, Entertainment, and Rec	1	1	$20.4	$22.2
Accommodation & Food Services	6	6	$93.9	$102.1
Other Services	6	6	$100.3	$109.1
Government	1	1	$87.8	$95.5
Total Federal Contribution	152	165	$6,679.2	$7,265.3
Percent Change from Current	---	8.8%	---	8.8%

IMPLAN, 2007

4.15.1 Direct and Indirect Effects

This alternative would have a beneficial effect on mineral exploration and development, since the land would be offered for competitive auction. The practical utilization of the lands would have a positive local effect in the generation of long-term jobs and revenues to the state and county. The royalties and rentals from competitive auctions are also a dependable source of long term income for the federal government. The impacts of this particular auction may be small, including an unknown (but probably relatively small) amount of new reserves, due to the small amount of acreage offered. However, the positive action of the auction would provide the industry with increased opportunity for exploration, potentially resulting in increased stability and profitability of domestic companies.

Social and Environmental Justice

Alternative B

While the act of leasing federal minerals in and of itself would result in no social impacts, subsequent development of a lease may generate impacts to people living near or using the area in the vicinity of the lease. Oil and gas exploration, drilling, or production could create an inconvenience to these people due to increased traffic and traffic delays, noise, and visual impacts. This could be especially noticeable in rural areas where oil and gas production has not occurred previously. 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 expose private

property to vandalism. For leases where the surface is privately owned and the mineral estate is federally owned, surface owner agreements, standard lease stipulations, and best management practices could address many of the concerns of private surface owners.

There are prominent buttes that are of cultural interest in the vicinity of all leases in Butte and Harding Counties, but they are far enough away from the leases that there would be no disproportionate effects to American Indian populations. There are low income people in the county, but they do not appear to be associated with any specific BLM resources or activities.

4.16 Cumulative Impacts

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

Cumulative effects associated with all BLM programs in the South Dakota Field Office, including implementation of the RFD scenario described above, are described in the Miles City District Oil and Gas RMP/EIS Amendment (1994) on pages 55-60 and 75-77. Anticipated exploration and development activity associated with the lease parcels considered in this EA are within the range of assumptions used and effects described in this cumulative effects analysis for all resources and programs other than air resources. This previous analysis is hereby incorporated by reference for resources and programs other than air resources.

4.16.1 Past, Present and Reasonably Foreseeable Future Actions

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

4.16.2 Cumulative Impacts by Resource

4.16.2.1 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change

The cumulative effects analysis area is the South Dakota Field Office, with additional discussion at state-wide, national, and global scales for greenhouse gas emissions and climate change. This section incorporates an analysis of the contributions of the proposed action to GHG emissions, followed by a general discussion of potential impacts to climate change. Potential emissions relate to those derived from potential exploration and development of fluid minerals. Additional emissions beyond the control of the BLM and outside the scope of this analysis would also occur during any needed refining processes, as well as end uses of final products.

Projected GHG emissions for this project and the South Dakota FO RFD are compared below with recent available inventory data at the state, national, and global scales. Greenhouse gas

emissions inventories can vary greatly in their scope and comprehensiveness. State, national, and global inventories are not necessarily consistent in their methods or in the variety of GHG sources that are inventoried (Climate Change SIR, 2010). However, comparisons of emissions projected by the BLM for its oil and gas production activities are made with those from inventories at other scales to provide a context for the potential contributions of GHGs associated with this project.

As discussed in the Air Quality section of Chapter 4, total long-term projected BLM GHG emissions from the RFD are 660,973.8 metric tons/year CO_2e. Potential emissions under Alternative B would be approximately 0.8 percent of this total. **Table 4.16.1** displays projected GHG emissions from non-BLM activities included in the South Dakota FO RFD. Total projected emissions of non-BLM activities in the RFD are 194,111.4 metric tons/year of CO_2e. When combined with projected annual BLM emissions, this totals 855,085.2 metric tons/year CO_2e. Potential GHG emissions under Alternative B would be 0.65 percent of the estimated emissions for the entire RFD. Potential incremental emissions of GHGs from exploration and development of fluid minerals under Alternative B would be minor in the context of projected GHG contributions from the entire RFD for the South Dakota Field Office.

Table 4.16.1. Projected non-BLM GHG emissions associated with the South Dakota FO Reasonable Foreseeable Development Scenario for fluid mineral exploration and development.

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

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

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

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

The EPA (Climate Change SIR, 2010) published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,957 million metric tons, and net emissions of 6,016 million metric tons (when CO_2 sinks were considered) of CO_2e in 2008. Potential annual emissions under Alternative B would amount to approximately 0.0001 percent of gross U.S. total emissions. Global GHG emissions for 2004 (Climate Change SIR, 2010) indicated approximately 49 gigatonnes (10^9 metric tons) of CO_2e emitted. Potential annual emissions under Alternative B would amount to approximately 0.00001 percent of this global total.
As indicated in the Air Quality section of Chapter 4 above, although the effects of greenhouse gas emissions in the global aggregate are well-documented, it is currently not credibly possible to determine what specific effect greenhouse gas emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under Alternative B, potential GHG emissions described above would incrementally contribute to the total volume of GHGs emitted to the atmosphere, and ultimately to climate change.

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

4.16.2.2 Cumulative Impacts of Climate Change

As previously discussed in the Chapter 4 Air Quality section, it is difficult to impossible to identify specific impacts of climate change on specific resources within the project area. Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the Climate Change SIR describes impacts of climate change in detail at various scales, including the state-scale when appropriate. Effects of climate change on resources are described in Chapter 3 of this EA and in the Climate Change SIR.

4.16.2.3 Cumulative Impacts on Other Resources

Soil Resources

Contamination of soil from drilling and production wastes and/or spills could cause a long-term reduction in site productivity. Some of these impacts can be reduced or avoided through proper design, construction and maintenance, and implementation of best management practices. Given the need for site-specific locations, development techniques, and mitigation, a specific description of effects is not possible at this time.

Water Resources

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

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

Economics

The cumulative effects of federal mineral leasing within the local economy as well as the specific effects of leasing an additional 12,362 acres under Alternative B are presented in the previous analysis. These effects are summarized in Table Econ.2 and 3. The oil and gas industry would continue to be an influence on the local economy; however, the total demographic and economic characteristics of the local economy would change very little with the economic activity associated with leasing an additional 12,362 acres of federal minerals.

5.0 CONSULTATION AND COORDINATION

5.1 Persons, Agencies, and Organizations Consulted

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

Table 5-1:
List of all Persons, Agencies and Organizations Consulted for Purposes of this EA

Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
Waste' Win Young	Acting Tribal Historic Preservation Officer – Standing Rock Sioux Tribe	None received
Joyce Whiting	Tribal Historic Preservation Officer – Oglala Sioux Tribe	None received
Conrad Fisher	Tribal Historic Preservation Officer Northern Cheyenne Tribe	None received
Donna Rae Petersen	Tribal Historic Preservation Officer – Cheyenne River Sioux Tribe	None received
Perry Brady	Tribal Historic Preservation Officer – Fort Berthold	None received
Russell Eagle Bear	Tribal Historic Preservation Officer – Rosebud Sioux Tribe	None received
Susan Woodmansey, South Dakota Department of Education	Distribution of revenues related to lease, rent, and royalties from federal minerals under the Federal Mineral Leasing Act	The State of South Dakota distributes all of the revenues received under the Federal Mineral Leasing Act to public education in the counties with leases and production.

5.2 Summary of Public Participation

Scoping

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posting on the field office website NEPA notification log. Scoping was initiated May 25, 2010; however, scoping comments were received through June 21, 2010. Surface owner notification letters were also distributed which briefly explained 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 325 surface owner notification letters were distributed for the oil and gas leasing analysis process in the entire Montana/Dakotas BLM, with 15 of those surface owner letters (about 5 percent) geographically specific to the South Dakota Field Office.

A total of 14 written comment letters and 23 phone/verbal comments were received. The written and verbal communication resulted in a total of 108 individual scoping comments pertaining to oil and gas leasing in the Montana/Dakotas. Of the 108 scoping comments, one comment was specific to the South Dakota Field Office.

Of the 108 comments, about 20 were comments/requests for additional information (e.g., split estate brochure) regarding the general process of oil and gas leasing, split estate, questions about the planning process, and questions regarding the verification of mineral ownership. Other comments ranged from the need to address GHG emissions and cumulative impacts to climate change; concerns about impacts to wildlife and fisheries habitat and the fragmentation of wildlife corridors; and concerns related to wilderness, pristine landscapes, and scenic viewsheds/quality. Other comments provided specific information pertaining to cultural areas, suggestions for mitigation measures from surface disturbance and compliance with the NEPA process, including allowing for public comment, addressing a no leasing alternative, and addressing direct, indirect and cumulative impacts.

The comment specific to the South Dakota Field Office pertained to impacts to the surface (e.g., roads, surface disturbance).

30-day Public Comment Period
On August 12, 2010, eight EAs along with an unsigned finding of no significant impact, were made available for a 30-day public comment period. A total of 131 written submissions were received after the 30-day comment period, which resulted in 79 individually-coded substantive comments. With the exception of some parcel-specific and/or EA-specific comments and issues, most of the comments applied to all eight EAs. After review and consideration of the comments, some modifications have been made to the EAs. Changes made to the analysis are noted with gray-scale shading and/or strikeout so the modifications to the EA can easily be identified.

The following is a summary of some of the changes that were made to the EAs as a result of the 30-day public comment period:

- Some stipulations identified for the proposed action were changed based on updated information submitted by individual commentors;
- Updates to the economic analysis;
- Updates to the Climate Change SIR, including an analysis of the effectiveness of some mitigation practices and techniques;
- Clarifications to the affected environment chapter (Chapter 3) and environmental impacts section (Chapter 4) were made to include habitat and/or species-specific comments.
- Information was added to Chapter 4 – GHG emissions (direct and indirect impacts) section to clarify that the source year selected to disclose estimated GHG emissions was the year with the highest expected combined construction and production emissions for oil and gas sources in the planning area.

After the 30-day protest period and competitive oil and gas lease sale, but before lease issuance, the BLM will issue the Decision Record and signed Finding of No Significant Impact for this EA. This information, along with other updates and Lease Sale Notice information can be found on the Montana/Dakotas BLM website at www.blm.gov/mt. From this home page, go to the heading titled "Frequently Requested," where you will find a number of links to information about our oil and gas program. Current and updated information about our environmental assessments and lease sale notices can be found on the link titled "Oil and Gas Lease Sale Information."

5.3 List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
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APPENDIX A: Lease Parcel Summary Table – Sale List

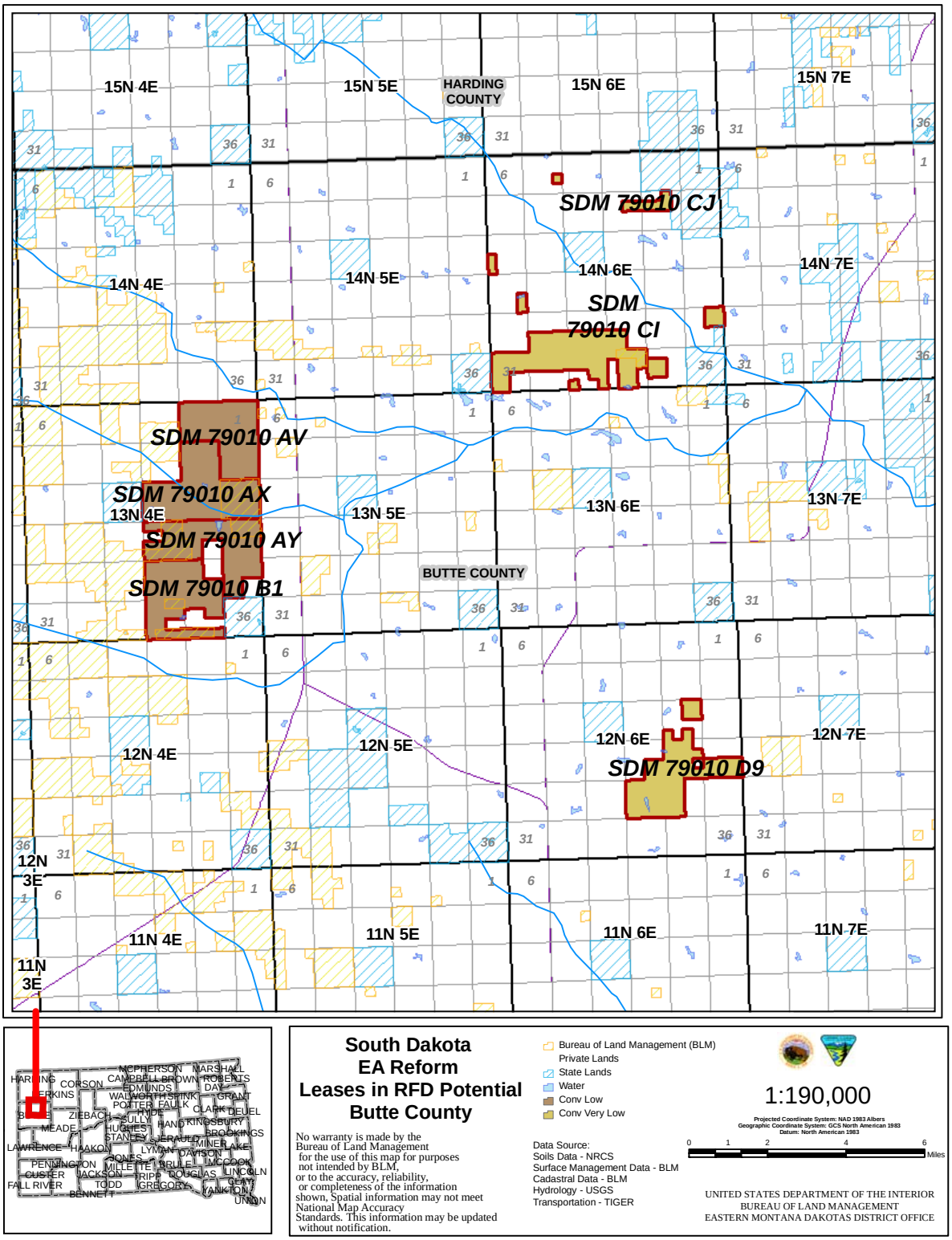
Parcel Number	Acres	Legal Description	Proposed Stipulations
SDM 79010-DB	76.76	T. 21 N, R. 1 E, BHM, SD Sec. 30 LOTS 1,2; Harding County (063) PD	Cultural Resources 16-1 (All Lands) Lease Notice 14-12 (All Lands) TES 16-2 (All Lands)
SDM 79010-AX	2560.00	T. 13 N, R. 4 E, BHM, SD Sec. 11 ALL; 13 ALL; 14 ALL; 15 ALL; Butte County (019) PD	Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 13 NESW,S2SE; 14 SWNE; 15 W2NE,NW; TES 16-2 (All Lands) TL 13-1 Sec. 11 S2; 13 ALL; 14 ALL; 15 ALL;
SDM 79010-AY	2160.00	T. 13 N, R. 4 E, BHM, SD Sec. 22 NE,N2NW,S2; 23 N2,SW; 24 ALL; 25 N2,SW; Butte County (019) PD	Cultural Resources 16-1 (All Lands) TES 16-2 (All Lands)
SDM 79010-B1	2080.00	T. 13 N, R. 4 E, BHM, SD Sec. 26 NW,S2; 27 ALL; 34 N2,SW,S2SE; 35 NE,N2NW,S2S2; Butte County (019) PD	Cultural Resources 16-1 (All Lands) Lease Notice 14-11 (All Lands) TES 16-2 (All Lands)
SDM 79010-D9	2240.00	T. 12 N, R. 6 E, BHM, SD Sec. 14 NE,SWSW,SWSE; 22 SE; 23 NWNE,S2NE,W2, NWSE,S2SE; 24 S2; 26 W2; 27 ALL; Butte County (019) PD	Cultural Resources 16-1 (All Lands) Lease Notice 14-11 (All Lands) Lease Notice 14-12 (All Lands) TES 16-2 (All Lands)
SDM 79010-CJ	747.85	T. 14 N, R. 6 E, BHM, SD Sec. 5 NESE; 10 S2NE; 11 W2NE,S2NW; 18 LOTS 3,4; 19 E2SE; 25 NE; 35 S2NW,N2SW; Butte County (019) PD	Cultural Resources 16-1 (All Lands) Lease Notice 14-12 (All Lands) TES 16-2 (All Lands)

APPENDIX A: Lease Parcel Summary Table – Proposed Deferral List

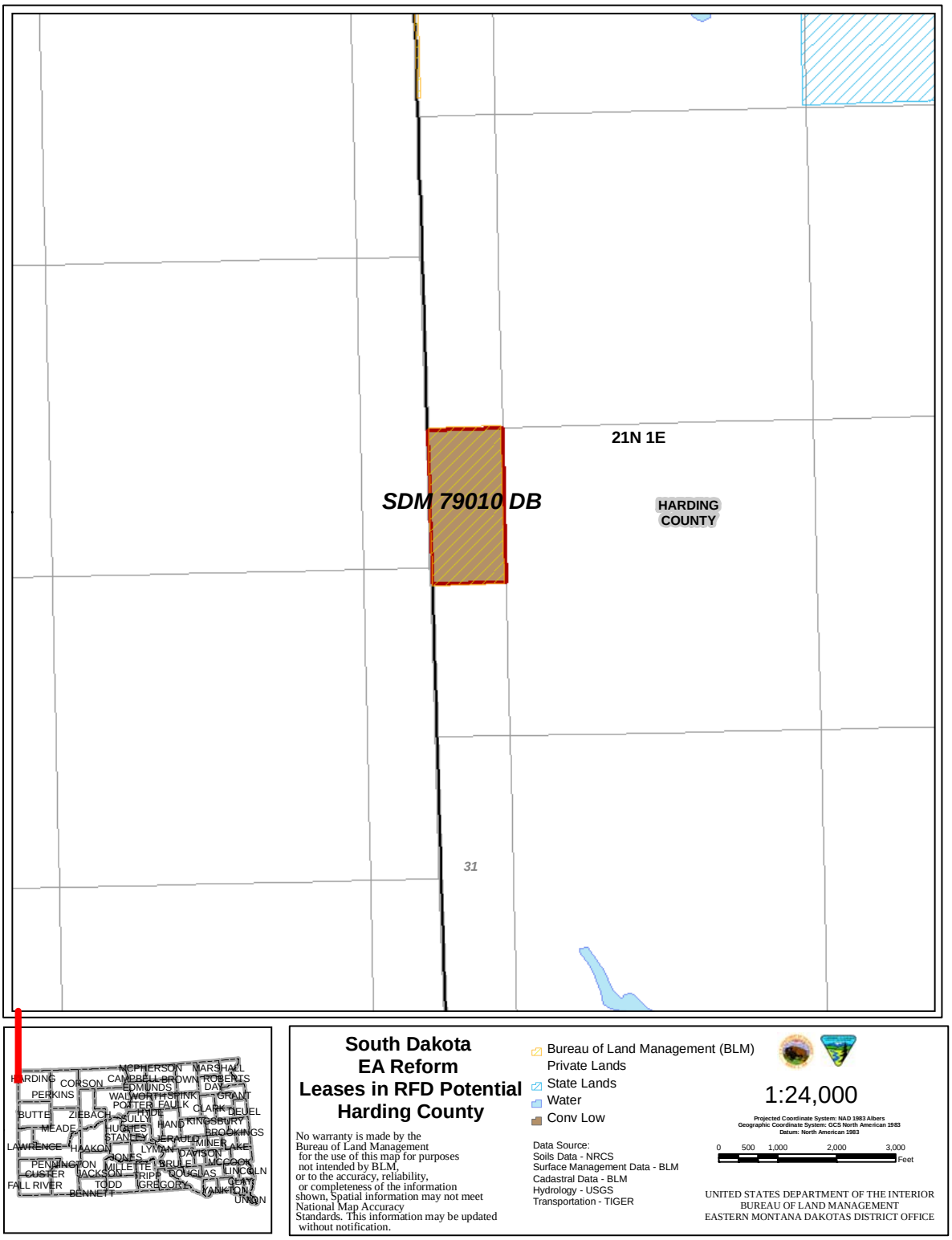
Parcel Number	Acres	Legal Description	Proposed Stipulations
SDM 79010-AV	1923.46	T. 13 N, R. 4 E, BHM, SD Sec. 1 LOTS 1,2,3,4; 1 S2N2,S2; 2 LOTS 1,2,3,4; 2 S2N2,S2; 12 ALL; Butte County (019) PD	Defer leasing Parcel AV based on sage grouse habitat within a Priority Protection Area. Stipulations within priority habitat and is currently being considered in the revision of the South Dakota RMP.

APPENDIX A: Lease Parcel Stipulations/Brief Description

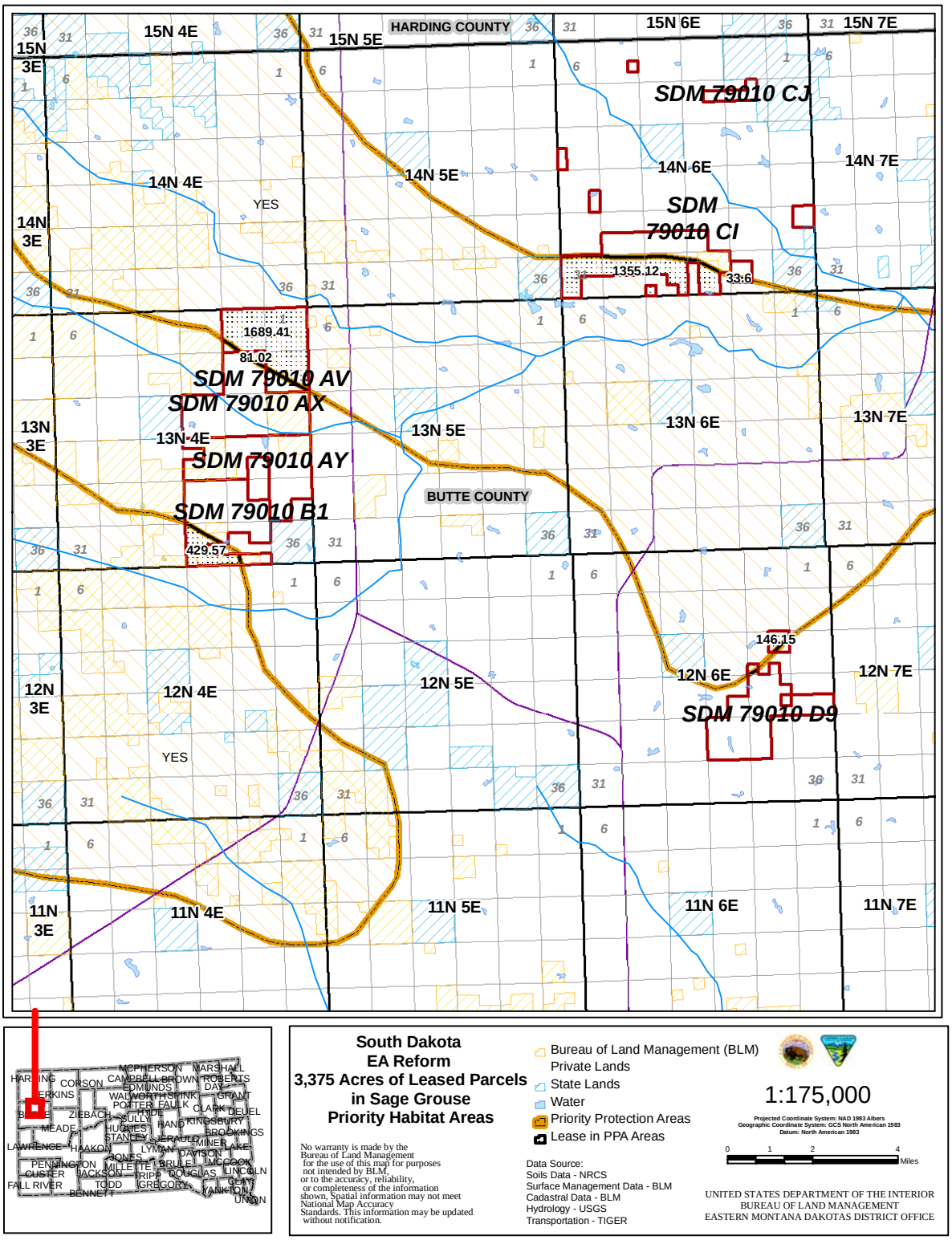
Stipulation Number	Stipulation Name/Brief Description
Cultural Resources 16-1	**CULTURAL RESOURCES LEASE STIPULATION:** This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native 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.
Sage Grouse Lease Notice 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.
Paleontological Lease Notice 14-12	**PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT LEASE NOTICE:** Surface occupancy or use is subject to the following special operating constraints: The lessee/operator is given notice that this lease has been identified as being located within geologic units rated as being moderate to very high potential for containing significant paleontological resources. The project proponent may be required to conduct a paleontological inventory prior to any surface disturbance. If inventory is required, the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory.
TES Stipulation16-2	**ENDANGERED SPECIES ACT SECTION 7 CONSULTATION STIPULATION:** The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development, and require modifications to or disapprove proposed activity that is likely to result in jeopardy to proposed or listed threatened or endangered species or designated or proposed critical habitat.
NSO 11-2	**NO SURFACE OCCUPANCY STIPULATION:** Surface occupancy and use is prohibited within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams.
TL 13-1	**TIMING LIMITATION STIPULATION:** Surface use is prohibited from December 1 to March 31 within crucial winter range for wildlife. This stipulation does not apply to the operation and maintenance of production facilities.



Map 1 Butte County Lease Parcels



Map 2 Harding County Lease Parcels



Map 3 Sage Grouse Priority Habitat Areas and Lease Parcels