

FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD

FOR

Hilcorp Energy Company

Tisdale North Project

ENVIRONMENTAL ASSESSMENT –WY-070-EA09-016

DECISION: Is to approve as described in the attached Environmental Assessment (EA) and authorize Hilcorp Energy Company’s Tisdale North Project comprised of the following 5 Applications for Permit to Drill (APDs):

WELL NAME/#/LEASE/LOCATION:

Well Name & Number	QTR	Sec.	T	R	Lease #
Tisdale North Unit 78	SWSW	4	41N	81W	WYW07040A
Tisdale North Unit 40	SEnw	9	41N	81W	WYW07040A
Tisdale North Unit 55	NENw	9	41N	81W	WYW07040A
Tisdale North Unit 69	SESW	9	41N	81W	WYW118253
Tisdale North Unit 79	SWNW	9	41N	81W	WYW07040A

This approval is subject to adherence with all of the operating plans and mitigation measures contained in the Master Surface Use Plan of Operations, Drilling Plan, and information in individual APDs. This approval is also subject to operator compliance with all mitigation and monitoring requirements contained within the Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

RATIONALE: The decision to authorize as described in the attached Environmental Assessment (EA), is based on the following:

1. The Operator, in their proposed action has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - Consolidate activities using existing roads and infrastructure.
 - Use flow lines to bring product to a central facility to reduce traffic and minimize perch sites for predators.
 - Technologies will be used that would reduce total surface disturbance within occupied sage-grouse habitat such as reinjection of produced water (injection water wells as opposed to reservoir containment).
 - Noise will be limited from industrial development or traffic to 10dBA above natural, ambient noise (~39 dBA) measured at the perimeter of the nearest Sage-grouse lek.
 - Utility corridors and flow lines will be co-located parallel and adjacent to existing access roads where feasible; previous disturbance corridors will be utilized where practical.
 - Employ 30 day site-stabilization and erosion mitigation techniques such as silt fencing, water bars, matting, erosion logs, rip-rap, to ensure re-vegetation, reduce topsoil loss, and minimize growth of noxious and invasive weeds.
 - Implement strategies to assist in prevention of the spread of noxious weeds or invasive plants detrimental to sage-grouse.

- Above ground power lines will be constructed to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
 - Locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
2. Disturbance to sage grouse will be minimal as the proposed actions are either in, or within close proximity to conifer woodland.
 3. The Operator has certified that a Surface Use Agreement has been reached with the Landowners.
 4. The proposed action will not result in any undue or unnecessary environmental degradation.
 5. It is in the public interest to approve this development to help meet the nation's future needs for energy reserves. It also helps to stimulate local economies by maintaining stability for the workforce.
 6. Mitigation measures applied by the BLM will lessen environmental impacts.
 7. Approval of this alternative is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.
 8. The proposed action incorporates appropriate local sage-grouse research and the best available science from across the species' range in development of Conditions of Approval attached.

FINDING OF NO SIGNIFICANT IMPACT: Based on the analysis of the potential environmental impacts, I have determined that NO significant impacts are expected from the implementation of the proposed action and, therefore, an environmental impact statement is not required.

In conformance with Appendix E, *Record of Decision, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment* (PRB FEIS), BLM Buffalo Field Office has initiated management actions within the PRB FEIS analysis area in response to additional information regarding impacts to sage-grouse. These measures include:

1. Early initiation of a Land Use Plan (LUP) revision, based upon the evaluation of monitoring data generated under the "Mitigation Monitoring and Reporting Plan (MMRP)" in the PRB FEIS Record of Decision
2. Establishment of sage-grouse "focus" areas, encompassing approximately 1 million acres of sage-grouse habitat. These areas are managed under strict guidelines designed to preserve sage-grouse habitat for development of Alternatives during the LUP process (Appendix 1).
3. Initiation of a Population Viability Analysis in the Powder River Basin. This is a 24 month project involving the USGS, BLM Miles City Field Office, BLM Buffalo Field Office and the University of Montana. This work is scheduled to begin in the summer of 2009.
4. Development of Alternatives that modify the Proposed Action to reflect the best available science in sage-grouse management.
5. Development of Conditions of Approval, specific to sage-grouse management, that incorporate recommendations from recent research, the NE Local Sage-grouse Working Group, and the Petroleum Association of Wyoming.

The implementation meets the stated Purpose and Need for the Proposed Action. With the application of mitigation measures in the preferred alternative, sage-grouse population viability in the project area will not be compromised due to the larger scope of planning actions and research initiated by the BLM, Buffalo Field Office.

ADMINISTRATIVE REVIEW AND APPEAL: Under BLM regulations, this decision is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received.

Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: _____

Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT
EA # WY-07-EA09-016**

PROJECT NAME: Tisdale North Unit Project

WELL NAME/#/LEASE/LOCATION:

Well Name & Number	QTR	Sec.	T	R	Lease #
Tisdale North Unit 78 Exception	SWSW	4	41N	81W	WYW07040A
Tisdale North Unit 40 Re-enter	SEnw	9	41N	81W	WYW07040A
Tisdale North Unit 55 Re-enter	NENw	9	41N	81W	WYW07040A
Tisdale North Unit 69 Re-enter	SEsW	9	41N	81W	WYW118253
Tisdale North Unit 79	SWNw	9	41N	81W	WYW07040A

OPERATOR/APPLICANT: Hilcorp Energy Company

AFFECTED SURFACE OWNERS: TTT Ranch, BLM

COUNTY: Johnson

LAND USE PLAN CONFORMANCE: This proposed action is in conformance with the terms and conditions of the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office, April 2001 and the Powder River Oil and Gas Project EIS and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003. This proposed action falls inside the BLM designated Sage Grouse Focus Area and Wyoming Game & Fish Department Sage Grouse Core Population Area and is in conformance with guidance issued August 13, 2008, by the BLM Buffalo Field Office (*Guidance for general management actions during BFO Resource Management Plan Revision*). These additional management actions were designed in accordance with the 2003 Record of Decision which states, in part, “Land use plan monitoring will be conducted by BLM...Information gathered from this monitoring will guide mid-course corrections in adapting to the inevitable changes that will occur because of new information.”

NEED FOR THE PROPOSED ACTION: The actions as described in the above-referenced Application for Permit to Drill (APD) are needed to further develop oil and gas reserves in the United States. The APD was submitted by private industry for development of oil/gas on a valid federal oil and gas lease.

Development of the Tisdale North Unit Project wells would return royalties to the federal Treasury as well as stimulate local economies.

The BLM recognizes the extraction of natural gas is essential to meeting the nation’s future needs for energy. As a result, private exploration and development of federal gas reserves are integral to the agencies’ oil and gas leasing programs under the authority of the Mineral Leasing Act of 1920, as amended, and the Federal Land Policy Management Act (FLPMA) of 1976. The oil and gas leasing program managed by BLM encourages the development of domestic oil and gas reserves and reduction of the U.S. dependence on foreign sources of energy.

This action responds to the goals and objectives outlined in the Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001 and

the Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003. This action helps move the Project Area towards desired conditions for mineral development with appropriate mitigation consistent with the goals, objectives and decisions outlined in these two documents.

Information contained in the APD is considered an integral part of this environmental assessment and is, therefore, incorporated by reference (CFR 1502.21).

DESCRIPTION OF THE PROPOSED ACTION & ALTERNATIVES

No Action

A No Action Alternative was considered in the PRB FEIS, Volume 1, pages 2-54 through 2-62. This alternative would consist of no new federal wells. An oil and gas lease grants the lessee the “right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits” in the lease lands, “subject to the terms and conditions incorporated in the lease.” Thus, under this alternative, the operator’s proposal would be denied.

Proposed Action

The proposed action is to drill and develop five conventional oil wells and related infrastructure. The proposed locations are approximately 19 miles southwest of Kaycee, Wyoming, located in south Johnson County. The proposed action is within the heavily developed Tisdale North Oil Field in the Tisdale Mountain area. The project is located within Sections 4 and 9, T.41N, R.81W, and encompasses an area of 998 acres. The proposed locations, target formations and total depth are in Table 1 below as follows:

Table 1

Well Name & Number	QTR	Sec	T	R	Target Formation & Total Depth	
Tisdale North Unit 78Exception	SWSW	4	41N	81W	Curtis	1,140 ft
Tisdale North Unit 40 Re-enter	SESW	9	41N	81W	Morrison	488 ft
Tisdale North Unit 55 Re-enter	NENW	9	41N	81W	Morrison	544 ft
Tisdale North Unit 69 Re-enter	SESW	9	41N	81W	Morrison	488 ft
Tisdale North Unit 79	SWNW	9	41N	81W	Curtis	1,010 ft

The proposed action falls inside the designated Sage Grouse Focus Area where BLM’s stated objective is to maintain a viable population of sage grouse and to maintain habitat connectivity by addressing habitat loss, degradation, and fragmentation, while conserving any sage-grouse habitat affected by the proposal. The BLM, in accordance with 40 CFR, 1506.1, is required to refrain from actions that would limit the choices of reasonable alternatives in the preparation of an EIS. The pace of oil and gas development in areas of high quality sage-grouse habitat in the Powder River Basin is likely to compromise alternatives to be considered (e.g. phased development, deferred development, more restrictive mitigation measures) in light of the current science and information about this population and its relation to oil and gas development.

The Tisdale North Unit project area is in the Tisdale North Oil Field, a developed oil field discovered in 1952. The Tisdale North Unit Project is characterized by ridgelines, steep draws, and ponderosa pine. Elevations within the project range from 5,128 to 5,638 feet above sea level. The topography throughout the project and adjacent areas consist of rugged and steep forested ridges and draws with many areas containing slopes greater than 40%. Remaining areas consist of limited sagebrush and grassy areas interspersed within the forested areas. Flat, grassy areas within the project area have previously been

developed and currently have oil wells, pump stations, staging areas, flow lines, overhead power lines and roads. The existing, extensive oil and gas development in conjunction with the rugged, forested terrain contributes to the limited amount of contiguous sagebrush patches throughout the project area. The climate is semi-arid, averaging 12.40 inches of precipitation annually. The mean annual air temperature is 43.2 degrees Fahrenheit. Major land uses in the area consist of oil development in the North Tisdale Oil Field and cattle grazing both in and around the project area. Land ownership within the project area is predominately federal lands (70%) with the remaining land (30%) owned by TTT Ranch.

There are 90 existing wells within the Tisdale North Unit project area. Of those 90 existing wells, 61 are oil wells, 24 are injection wells, and 5 are monitor wells. The proposed locations are within the Tisdale North Oil Field in operation since 1952, currently in operation by Hilcorp Energy Corporation, Westport Oil & Gas Company, RDG Oil & Gas LLC, and Pat Simon. There are 11.8 miles of existing improved roads within the Tisdale North Unit Project boundary. There are 3.8 miles of existing pipeline not within a corridor and 4.3 miles of existing overhead power lines within the Tisdale North Unit Project boundary. There are also 3 existing central gathering/metering facilities and 3 existing discharge points. The sum total of existing acres of disturbance within the Tisdale North Unit Project boundary is 56.4 acres. This figure does not include the existing acres of disturbance which occurs outside the Project boundary in the entire Tisdale North Oil Field in the Tisdale Mountain area. Please see *Project Surface Use Date Summary Form, Description of Affected Environment (within project boundary)* contained in the Master Surface Use Plan. Figure #1 below shows the locations of the five proposed Tisdale North Unit wells. Figure #2 below shows the density of existing development, including wells and roads, within the Tisdale North Unit Project boundary.

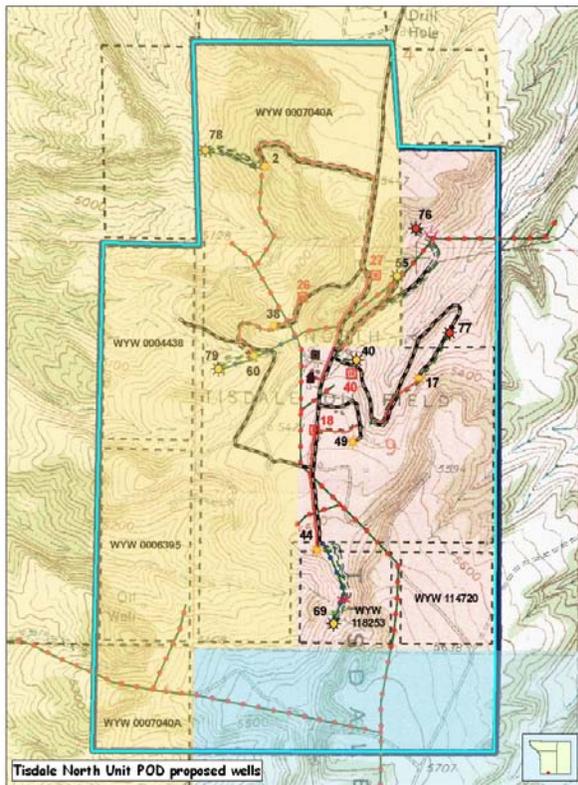


Figure 1: Proposed wells Tisdale Unit Project

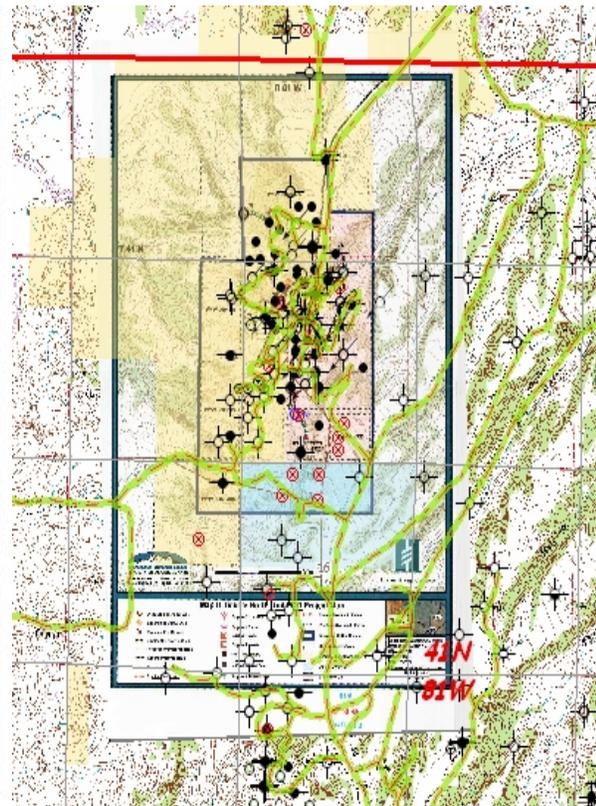


Figure 2: Density of existing O&G wells & infrastructure

The proposed action involves:

Table 2: Disturbance for wells, cut and fill slopes, and access roads

Well Name & Number	Well Pad - acres	Cut/Fill Slopes -acres	Access road - acres	Total Disturbance acres
Tisdale North #78	(120' x 190') 0.52	0.67	(1252' x 55') 1.6	2.79
Tisdale North # 40	(150' x 150') 0.52	0	existing, 0	0.52
Tisdale North #55	existing, 0	0	existing, 0	0
Tisdale North #69	(150' X 150') 0.52	0	(770' x 90') 1.59	2.11
Tisdale North #79	(120' x 190') 0.52	0.79	(351' x 55') 0.44	1.75
Total	2.08	1.46	3.63	7.17

Two proposed locations, wells #78 and #79, require engineered (cut & fill) pads. Two proposed locations, wells # 40 and # 69, are Plugged & Abandoned (P&A) sites that require clearing and minor leveling. One proposed location, well #55, is an existing cut and fill well pad with an operating pump jack, which requires no additional surface disturbance. Physical disturbance for well locations, including cut and fill slopes, is approximately 3.54 acres. Engineered access roads are required for three wells, #78, #69, and #79. Access roads for two proposed locations, wells # 40 and # 55, are existing improved roads. Existing infrastructure has been incorporated in the design to conserve sage grouse habitat. This is a Recommended Management Practice for Sage Grouse Conservation, *Road Building Maintenance and Usage #4) Consolidate activities using existing roads and other facilities where possible*, Northeast Wyoming Sage-Grouse Conservation Plan August 15, 2006. Physical disturbance for access roads, including cut and fill slopes, is approximately 3.63 acres. Total disturbance for well sites and access roads is approximately 7.17 acres. The access roads and associated drainage structures will be constructed and maintained in accordance with road guidelines contained in the joint BLM/USFS publication: *Surface Operating Standards for Oil and Gas Exploration and Development*, Fourth Edition (2007), and/or BLM Manual Section 9113 concerning road construction standards on projects subject to federal jurisdiction. During the drilling and production phase of operations, the road surface and shoulders will be kept in a safe and useable condition, and drainage ditches and culverts will be kept clear and free flowing. Because soils in the project area have been identified as having poor reclamation potential, proposed access roads will have 30 day soil stabilization and erosion mitigation requirements. Roads must be completed before drilling begins.

If production is established on these locations, production facilities will be installed on each well pad. These facilities will include Jensen 57 pumping units or equivalent; overhead electric power lines along the access road to wells # 69, 78, 79; and flow lines, both oil and water, buried along access roads which will tie into existing oil and water flow lines. Until power lines and flow lines are established, a 15-20KW generator and a 500 bbl capacity tank will be temporarily placed on each well pad. The generator is anticipated to be in use for 20-25 days, at which time flow lines will be established. The noise level from the generator would be approximately 20dBA at 50'. This value could change due to varying load levels on the generator. The noise level from the generator would be reduced with increasing distance from the source, and the noise level at 4.6 miles from the source (location of nearest sage-grouse lek) would not be noticeable above background levels. This is a Project Recommended Management Practice for Sage-Grouse Conservation identified by the Northeast Wyoming Sage-Grouse Working Group, *General Mineral Development #6) Reduce noise from industrial development or traffic, especially in breeding and brood rearing habitat. (15August 2006)*; Wyoming Game & Fish Stipulation for Development in Core Sage-Grouse Population Areas, A. *Oil and Gas Lease Stipulation #7) Limit noise sources to 10dBA above natural, ambient noise (-39dBA) measured at the perimeter of a lek from March 1 to ay 15 (Inglefinger 2001, Nicholoff 2003)*. Once production is established, oil flow lines will be installed to central gathering tanks at existing locations. The small tank temporarily placed on each well pad will be removed once

these flow lines are established. The elimination of holding tanks at each well site will minimize potential perch sites for raptors as well as eliminating visitation to pump out holding tanks. Produced water will be injected into water injection wells once flow lines are established. Once the oil wells are on production, a pumper will be on location daily to monitor the production facilities and to ensure the equipment is functioning properly.

Approximately 2,376 feet (0.45 miles) of overhead power is proposed with additional surface disturbance of approximately 0.81 acres. Buried power lines were considered but determined to be unfeasible due to shallow soils, rocky topography, and steep slopes. Overhead power lines will have minimal effect on wildlife because of the abundance of alternative perches of the surrounding forest. Rocky Mountain Power and/or their contractors will be constructing the power lines. If production is established on these locations, flow lines for oil and produced water will be co-located along access roads or within existing flow lines. Approximately 3,540 feet (0.67 miles) of proposed flow lines will be placed in corridors adjacent to existing improved roads within the project area, accounting for surface disturbance of approximately 3.41 acres. Approximately 4,314 feet (0.81 mile) of proposed flow lines for oil and produced water will be co-located within existing flow lines. The width of disturbance for co-locating proposed flow lines with existing flow lines is 30 feet, accounting for additional surface disturbance of approximately 2.97 acres.

Drilling and construction activities are anticipated to be completed within two years, the term of an APD. The estimated duration of drilling is 10 days. During drilling on wells #78 and #79, operations will be on a 24 hour basis. Only daylight activities will be involved in the re-enter of wells # 40, 55, and 69. Daylight operations are planned for all completion activities. The wells will be completed within 30 days after drilling operations. Drilling and construction occurs year-round in the Powder River Basin. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitation in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this project.

Existing infrastructure has been incorporated in the Tisdale North Unit Project design to conserve sage grouse habitat.

Mitigation measures and Recommended Management Practices (RMPs) utilized within the Tisdale North Unit Project which will effectively conserve sage-grouse habitats affected by the proposal include but are not limited to the following:

1. Consolidate activities using existing roads and infrastructure.
2. Use flow lines to bring product to a central facility to reduce traffic and minimize perch sites for predators.
3. Technologies will be used that would reduce total surface disturbance within occupied sage-grouse habitat such as reinjection of produced water (injection water wells as opposed to reservoir containment).
4. Noise will be limited from industrial development or traffic to 10dBA above natural, ambient noise (~39 dBA) measured at the perimeter of the nearest Sage-grouse lek.
5. Utility corridors and flow lines will be co-located parallel and adjacent to existing access roads where feasible; previous disturbance corridors will be utilized where practical.
6. Employ 30 day site-stabilization and erosion mitigation techniques such as silt fencing, water bars, matting, erosion logs, rip-rap, to ensure re-vegetation, reduce topsoil loss, and minimize growth of noxious and invasive weeds.
7. Implement strategies to assist in prevention of the spread of noxious weeds or invasive plants detrimental to sage-grouse.

8. Above ground power lines will be constructed to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
9. Locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.

The action would be subject to the attached Conditions-of-Approval (COAs), for drilling of an oil/gas well on private surface/federal mineral lands within the Buffalo Field Office jurisdiction. For more details on design features and construction practices of the proposed action, refer to the Master Surface Use Plan of Operations and Drilling Plans in each APD. These plans have been written and reviewed to ensure that environmental impacts to both surface and subsurface resources are eliminated or minimized.

Alternatives Considered but Eliminated from Detailed Study

One alternative considered was to drop the Tisdale Unit #78 well because the engineered access road did not meet BLM standards with slopes in excess of 16%. Hilcorp Energy Corp. chose to redesign the engineered road in accordance with road guidelines contained in the joint BLM/USFS publication: *Surface Operating Standards for Oil and Gas Exploration and Development*, Fourth Edition (2007), and/or BLM Manual Section 9113 concerning road construction standards on projects subject to federal jurisdiction.

BLM proposed another alternative to consider directionally drilling the #78 well from existing well #2 pad located uphill to the west in SWSW of Sec. 4. Hilcorp Energy Corporation determined that the well pad at well #2 was insufficient size for rigs required for directional drilling. Also, shallow soils, amount of rock, and depth of target formation made this alternative prohibitive.

A third alternative suggested by BLM at the onsite was to bury power and avoid additional overhead power lines. Buried power lines were considered, but determined to be unfeasible due to shallow soils, rocky topography, and steep slopes. . While there is a potential that the addition of overhead power lines in the project area may increase perches for raptors, it unlikely that sage grouse will be affected as the surrounding forest habitat reduces the attractiveness of power poles as perches for raptors, and reduces the likelihood that grouse will use the area. Table 3 provides a summary of observations and changes made at the pre-approval onsite.

Table 3: Summary of observations and changes made at onsite.

	Well Name & #	QTR	Sec	T	R	Comments
1	#69 Re-entry	SESW	9	41	81	Location is reclaimed P&A oil well pad. Engineered access road will require 30 day stabilization and erosion control methods such as riprap, silt fence, matting, erosion logs. Energy dissipation required at all culvert outlets and erosion control at all culvert inlets. Surfacing on all grades over 8% required before drilling starts.
2	#79	SWNW	9	41	81	Engineered pad location and engineered access road have poor reclamation suitability and will require 30-day stabilization and additional interim reclamation

	Well Name & #	QTR	Sec	T	R	Comments
						efforts to ensure re-vegetation, reduce topsoil loss, and minimize growth of noxious weeds. Silt fence or water bars will be required along N/NW perimeter to minimize surface run-off. Upgrade culvert at beginning road access with stabilization measures applied at the time of construction; extend culvert down channel, install silt fence below toe of fill. Energy dissipation at all culvert outlets and erosion control at all culvert inlets. Surfacing on all grades over 8% required before drilling starts. BLM surface.
3	#78 Exception	SWSW	4	41	81	Reposition pad and road access onto pad to avoid encroachment (toe of fill) into minor drainage to north, which could lead to potential sedimentation into the drainage. Surface runoff control methods such as silt fencing and erosion logs will be required. Redesign engineered road to BLM standards, or consider dropping well. Alternate access route staked at onsite is unsuitable because of numerous drainages crossed and large amount of cut and fill required.
4	#55 Re-entry	NENW	9	41	81	Location has existing pump jack on a narrow constructed pad at the end of access road; hillside to the east; downhill slope facing west. As per operator, pad is large enough for work-ever rig to back in; no modifications to existing pad will be necessary. Any modifications to existing pad will require an approved sundry
5	#40 Re-entry	SENW	9	41	81	Location is flat, grassy P&A location surrounded by high density oilfield development.

AFFECTED ENVIRONMENT:

The APD was received on 06/08/08. A field inspection of the proposed wells was conducted on 10/30/08 by the following personnel:

NAME	TITLE	AGENCY
Don Spicer	Division Landman	Hilcorp Energy Co.
Josh Johnson	Surveyor	Bighorn Surveying & Eng.
Jenna Foss	Project Manager	Grouse Mtn. Env. Consultant
Zach Byram	Wildlife Biologist	Grouse Mtn. Env. Consultant
Gregg Fillpot	Production Foreman	Hilcorp Energy Co.
Doran Pruece	Consultant	Hilcorp Energy Co.
Ted Hamersma	Civil Engineering Tech	BLM
Seth Lambert	Archaeologist	BLM
Don Brewer	Wildlife Biologist	BLM

NAME	TITLE	AGENCY
Debby Green	Natural Resource Specialist	BLM

An additional field inspection was conducted on 11/17/08 of redesigned access road to well #78 by the following BLM personnel: Stacy Gunderson, Civil Engineer; Ted Hamersma, Civil Engineer Tech; Debby Green, NRS. Mandatory NEPA items evaluated for the proposed project are presented in Table 4 below:

Table 4

MANDATORY ITEMS	POTENTIALLY IMPACTED	NO IMPACT	NOT PRESENT ON SITE	EVALUATOR
Threatened or Endangered Species		X		Donald Brewer
Floodplains			X	Debby Green
Wilderness Values			X	Debby Green
ACECs			X	Debby Green
Water Resources		X		Debby Green
Air Quality	X			Debby Green
Cultural or Historical Values			X	Seth Lambert
Prime or Unique Farmlands			X	Debby Green
Wild & Scenic Rivers			X	Debby Green
Wetland/Riparian			X	Debby Green
Invasive, Non-native Species	X			Debby Green
Environmental Justice		X		Debby Green
Native American Religious Concern			X	Seth Lambert
Hazardous Wastes or Solids		X		Debby Green

Topographic Characteristics

The Tisdale North Unit project area is in the Tisdale North Oil Field, a developed oil field discovered in 1952. The Tisdale North Unit Project is characterized by ridgelines, steep draws, and ponderosa pine. Elevations within the project range from 5,128 to 5,638 feet above sea level. The topography throughout the project and adjacent areas consist of rugged and steep forested ridges and draws with many areas containing slopes greater than 40%. Remaining areas consist of ~~limited~~ sagebrush and grassy areas interspersed within the forested areas.

Flat, grassy areas within the project area have previously been developed and currently have oil wells, pump stations, staging areas, flow lines, overhead power lines and roads. The existing, extensive oil and gas development in conjunction with the rugged, forested terrain limits the amount of contiguous sagebrush patches throughout the project area. The #78 and #79 are new wells proposed in flat grassy areas with sparse sagebrush surrounded by dense juniper and ponderosa pine forest. The # 40, #55, and #69 wells are re-entry wells that have existing infrastructure in place, and are located in flat areas which are densely developed with oil wells, pump stations, staging areas, flow lines, overhead power, and improved roads. The proposed wells are unitized under WYW109627X, and therefore have no set spacing requirements. Existing infrastructure has been incorporated in the design to conserve sage grouse habitat.

The climate is semi-arid, averaging 12.40 inches of precipitation annually. The mean annual air temperature is 43.2 degrees Fahrenheit. Major land uses in the area consist of oil development in the North Tisdale Oil Field and cattle grazing both in and around the project area.

Land ownership within the project area is predominately federal lands (70%) with the remaining land (30%) owned by TTT Ranch. There is a bentonite clay mine located near Tisdale Mountain, and the gray shale material associated with it is evident throughout the area. Several unnamed draws and tributaries of Wall Creek and South Fork Powder River drain the project area. The Tisdale North Unit project area is approximately 2.7 miles from the South Fork of the Powder River.

Vegetation & Soils

Species typical of a juniper/cheatgrass plant community comprise the project area flora. This is a vegetation state found under heavy, season-long grazing by livestock. Wyoming big sagebrush, junipers, and conifers are significant components of this plant community. Cool season grasses have been reduced. Bare ground and cool season annual plants dominate the understory. Perennial grasses are sparse; cheat grass and Japanese brome are evident. Specific species observed throughout the project area include Wyoming big sagebrush (*Artemisia tridentate wyomingensis*), western wheatgrass (*Agropyron smithii*), rabbitbrush, prickly pear, ponderosa pine, juniper, cheatgrass or Downy brome (*Bromus tectorum*), and Japanese brome (*Bromus Japonicus*). Differences in dominant species within the project area vary with soil type, aspect and topography. The Tisdale North Unit Project contains areas of sagebrush with canopy cover up to 15%, however the majority of this habitat type is interspersed among encroaching ponderosa pine forests. The #78 and #79 wells are new wells in flat grassy areas with sparse sagebrush surrounded by dense juniper and ponderosa pine forest. The #69 well is a re-entry of a plugged and abandoned site and is situated on a flat grassy knoll with sparse sagebrush surrounded by dense juniper and ponderosa pine. The # 55 well is a re-entry on an existing constructed pad surrounded by dense juniper and ponderosa pine. The #40 well is a re-entry of a plugged and abandoned site and is situated on flat, bare ground surrounded by dense oil field development.

Approximately 70% of the Tisdale North Unit Project falls under the USDA NRCS Ecological Site Description of Clayey, 10-14 Precipitation Zone, Northern Plains. Approximately 30% of the Tisdale North Unit Project falls under the USDA NRCS Ecological Site Description of Shallow Clayey, 10-14 Precipitation Zone, Northern Plains. The soils in the area of the proposed wells and roads are primarily clayey. Topsoil depths to be salvaged for reclamation are less than 6 to 8 inches. Tisdale North Unit soils are classified as follows in Table 5:

Table 5

Map Unit Symbol	Map Unit Name	Acres	Percent
MTD	MORET-ROCK LAND COMPLEX, HILLY	405.6	41%
SK	SHALE ROCK LAND	256.2	26%
WM	WORMSER-SHIRK ASSOCIATION	190.0	19%
MSD	MORET-RENCALSON COMPLEX, HILLY	144.9	15%
RND	RHOAME-MORET COMPLEX, HILLY	1.4	0%
MV	MORET-SHIRK ASSOCIATION	0.0	0%
		998.1	

The proposed wells #55, #69, #79 are located in the MORET-ROCK LAND COMPLEX, HILLY soil series with slopes from 10-30%. Proposed well #78 is located in the SHALE ROCK LAND soil series. Proposed well #40 is located in the MORET-RENCALSON COMPLEX, HILLY soil series with slopes

from 10-30%. A search of the BLM database indicates that the reclamation potential throughout the project area is rated as “poor”. Proposed wells #55, #69, #78, #79 and proposed access roads are located in soils with poor reclamation potential. Additional interim reclamation efforts will be required to ensure site stabilization and re-vegetation, as well as to reduce topsoil loss, and minimize the growth of noxious or invasive weeds. Included in the surface use plans are operator committed mitigation measures and Conditions of Approval (COAs) to control the effects of erosion and sedimentation during the construction and production phases of the project.

Cultural

Class III cultural resource inventory was performed for the Tisdale North Project prior to on-the-ground project work (BFO project no. 70080144, 70080151, 70080143). Archaeological Energy Consulting conducted block and linear class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports*. Seth Lambert, BLM Archaeologist, reviewed the reports for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined them to be adequate. Previously reviewed and accepted Class III cultural resource inventories (BFO project no. 61810022, 61810023, 61810024, 65960069) adequately covered the remainder of the proposed project area. The following resources are located in or near the project area.

Table 6

Site Number	Site Type	Eligibility
48JO1502	Prehistoric	NE

Water Resources

Watershed values, including natural drainages, would not be adversely impacted by the proposal with properly applied mitigation. A search of Wyoming State Engineer’s Office database reveals no registered springs or stock wells within ½ mile of the proposed action. Other water resources will not be adversely impacted by the proposal. Possible contamination effects of fresh water aquifers will be reduced through the use of tested casing, by setting casing at appropriate depths and by following safe repair procedures in the event of casing failure. Any fresh water bearing sands will be protected and isolated with surface casing and/or cement. All hydrocarbon bearing zone(s) will be protected and isolated by casing and cement. Other downhole well operations are expected to cause minimal impacts using standard engineering practices. The proposed wells are conventional oil wells, and any produced water will be injected into existing water injection wells within the Tisdale North Unit Project boundary once flow lines have been established.

Invasive Species

No state-listed noxious weeds were discovered by a search of inventory maps and/or databases or during subsequent field investigation by the proposed project proponent. Downy brome (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*), invasive, exotic weeds, were discovered at the onsite. The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (p. 3-104) and the Weed Species of Concern are listed in Table 3-22 (p. 3-105). The operator has an Integrated Weed Management Plan (IWMP) in place which implements best management practices (BMPs) that minimize the negative effects of noxious weed infestations during the construction, operation, and reclamation phases.

Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air

quality standards. Although specific air quality monitoring is not conducted throughout most of the Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include following:

- Exhaust emissions (primarily CO and nitrogen oxides [NO_x]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months; The operator has best management practices (BMPs) in place to control dust during all phases of development and operation.
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NO_x, particulate matter, and other emissions from diesel trains and,
- SO₂ and NO_x from power plants.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

Wildlife

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the wildlife database compiled and managed by the BLM Buffalo Field Office (BFO) wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD).

A habitat assessment and wildlife inventory surveys were performed by Grouse Mountain Environmental Consultants (2008). Grouse Mountain performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol 2008. Surveys were conducted for Ute ladies'-tresses orchid suitable habitat on March 25, 2008 by Grouse Mountain using U.S. Fish and Wildlife Service guidelines (USFWS 1995). PRB IWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

A BLM biologist conducted field visits on October 30, 2008. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species that have been identified in the project area or that have been noted as being of special importance are described below.

Big Game

Big game species expected to be within the Tisdale North Unit project area include pronghorn antelope, mule deer, and elk. Both mule deer and elk droppings and tracks were commonly seen at the onsite inspection. The WGFD has determined that the project area contains Yearlong range for pronghorn antelope, and Winter-Yearlong range for mule deer. Although not designated by WGFD, the area is used by elk yearlong.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions.

Aquatics

The project area is drained by ephemeral tributaries of the South Fork Powder River. One small seep was observed during the onsite visit in the SE SW Section 9. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. Confluence Consulting, Inc. identified the following species present within the Clear Creek and Powder River watersheds: Woodhouse’s toad, Northern leopard frog, gopher snake, and garter snake (2004). Because sampling at the upper two sites on Clear Creek occurred late in the season, seasonality may have influenced the lack of reptiles and amphibians observed at these sites.

Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151). Species observed by Grouse Mountain during surveys and during the onsite inspection include various woodpecker species, swallows, turkey vultures and Townsend’s solitaires.

Raptors

Raptors species expected to occur in suitable habitats within the Powder River Basin include northern harrier, golden eagle, red-tailed hawk, Swainson’s hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, bald eagle, rough-legged hawk, merlin, Cooper’s hawk, northern goshawk, long-eared owl, and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities.

Four raptor nest sites were identified by Grouse Mountain (2008) and BLM within 0.5 mile of the project area, of these, three nests were active in 2008.

Table 7: Documented raptor nests within the Tisdale North Unit project area in 2008.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
6359	Red-tailed Hawk	4822448N 370544E	T41N, R81W Sec. 9 SESW	Ponderosa Pine	Fair	Active
6360	Red-tailed Hawk	4820832N 371795E	T41N, R81W Sec. 5 SWSE	Ponderosa Pine	Good	Active
6361	Red-tailed Hawk	4822364N 372373E	T41N, R81W Sec. 4 SWSE	Ponderosa Pine	Excellent	Active
6362	Unknown Raptor	4822364N 371992E	T41N, R81W Sec. 4 SWSE	Ponderosa Pine	Remnant	Inactive

Threatened and Endangered and Sensitive Species

Threatened and Endangered Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act.

Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1000 acres of black-tailed prairie dog colonies for survival (USFWS 1989).

The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn Mountains (Grenier 2003). The U.S. Fish and Wildlife Service has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

No black-tailed prairie dog colonies were identified during site visits by Grouse Mountain Environmental Consultants within the project area. The project area is located within the Kaycee complex, the nearest potential reintroduction area. Black-footed ferret habitat is not present within the Tisdale North Unit project area.

Ute Ladies'-Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties.

Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. In Wyoming, *Spiranthes diluvialis* blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

Grouse Mountain Environmental Consultants surveyed perennial streams, springs, and stock ponds in the entire Tisdale North Unit project area. No features were found with the necessary hydrological capability to support Ute ladies' tresses orchid. Suitable orchid habitat is not present within the Tisdale North Unit project area.

Sensitive Species

The USDI Bureau of Land Management (BLM) Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. Two habitat types, prairie dog colonies and sagebrush ecosystems, specifically, are the most common among habitat types within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. These are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are described in more detail. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates are animals that cannot survive without sagebrush and its associated perennial grasses and forbs; in other words, species requiring sagebrush for some part of their life cycle. Sagebrush obligates within the Powder River Basin, listed as sensitive species by BLM Wyoming include greater sage-grouse, Brewer's sparrow, sage thrasher, and sage sparrow. Sage sparrows, Brewer's sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer's sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Paige and Ritter 1999). Other sagebrush obligate species include pygmy rabbit, sagebrush vole, pronghorn antelope, and sagebrush lizard. None of these species were observed in the project area during the on-site inspection.

Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered. On August 8, 2007, the bald eagle was removed from the Endangered Species list. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) (USFWS 2007) shall continue to be complied with.

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles are often more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, carcasses of domestic sheep and big game may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

The Tisdale North Unit project area is approximately 2.7 miles from the South Fork of the Powder River. No nest structures were observed by Grouse Mountain during surveys within one mile of the survey area. The closest known nests are; BLM ID # 5257 which is 4.3 miles to the northeast and BLM ID # 6352 which is located 4.7 miles to the southwest.

A one mile winter roost habitat buffer is delineated along named streams within the BLM Buffalo Field Office area, including the South Fork Powder River. This buffer includes western portions of the project area. During the 10/30/2008 onsite inspection, one adult and one immature bald eagle were observed in a ponderosa pine tree overlooking proposed well # 78 in T41N, R81W SWSW Section 4. The Grouse Mountain winter roost survey for 2008 found no roost sites.

Black-tailed prairie dog

The black-tailed prairie dog was added to the list of Candidate species for federal listing on February 4, 2000 (USFWS 2000). On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. BLM Wyoming, considers prairie dogs as a sensitive species and continues to afford this species the protections described in the PRB FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains.

Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented, and isolated (Miller 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems, such as landowner poisoning and disease that affect long term population viability (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 Digital Ortho Quads indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001. However, aerial surveys conducted in 2003 to determine the status of known colonies indicated that a significant portion (approximately 47%) of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier 2004).

No black-tailed prairie dog colonies were identified during site visits by Grouse Mountain within the project area.

Greater sage-grouse

The Greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was "not warranted" following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. A judge in Idaho ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003).

The Tisdale North Unit project area is within a BLM designated Focus Area and Wyoming Department of Game and Fish designated Core Area. The project area does contain areas of sagebrush with canopy cover 15% and greater, however most of this area is interspersed among ponderosa pine forests on shallow rocky soils with steeply sloping terrain reducing its suitability as habitat for sage-grouse. Big Sagebrush makes up 5% of the rangeland composition. No sage-grouse or sage-grouse sign were observed during surveys by Grouse Mountain or during the onsite inspection.

The closest lek is the 3T Reservoir Lek, which is four miles from the western boundary of the Tisdale North Unit project boundary.

Sharp-tailed grouse

Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is found where grasslands are intermixed with shrublands, especially wooded draws, shrubby riparian area, and wet meadows. Field surveys and a data base search by Grouse Mountain failed to show any known sharp-tailed grouse leks or suitable breeding or nesting habitat within the project area.

Mountain plover

The mountain plover was proposed for listing in 1999 (USFWS). In 2003, the USFWS withdrew a proposal to list the Mountain Plover as a Threatened species, stating that the population was larger than had been thought and was no longer declining. Mountain plovers, which are a BLM sensitive species, are typically associated with high, dry, short grass prairies (BLM 2003). Mountain plover nesting habitat is often associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

The steep and densely vegetated terrain renders the project area unsuitable as mountain plover habitat.

ENVIRONMENTAL CONSEQUENCES

SUMMARY OF DISTURBANCE

Table 8: Summary of Disturbance

Facility	No. or Mileage	Factor	Disturbance (acres)	Duration
Well Pad(s)	5	150ft x 150ft	3.54	Long Term
Improved Roads (Engineered)	.47 mi	22ft wide w/corridor	1.26	Long Term
Cut & Fill assoc. w/ Engineered Roads	.47 mi	varies	2.37	Long Term
Pipelines	.67 mi	42 ft	3.41	Short Term
	.81 mi	30 ft	2.97	
Overhead Power	.45 mi	15 ft	.81	Long Term
Total			14.36	

Vegetation & Soils

Impacts to vegetation and soils from surface disturbance will be reduced by following the operator's plans and BLM applied mitigation. Construction of the well pads, access roads, pipelines, and overhead power would result primarily in the loss of native and non-native vegetation and increased erosion potential on approximately 14.36 acres. Physical disturbance for construction of the well pads and access road is approximately 7.17 acres. Physical disturbance for pipeline corridors and overhead power is approximately 5.21 acres. The total physical disturbance of 14.36 acres includes disturbance associated with the well pads, the spoil and topsoil storage areas, and the construction equipment and vehicle disturbance. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, erosion logs, culverts, rip-rap, etc) would ensure that land productivity/stability is regained and maximized. Included in the surface use plans are operator committed mitigation measures and Conditions of Approval (COAs) to control the effects of erosion and sedimentation during the construction and production phases of the project. These mitigation measures and COAs include but are not limited to the following:

1. Additional interim reclamation efforts to ensure re-vegetation, reduce topsoil loss, and minimize growth of noxious weeds.
2. 30 day site stabilization with erosion control methods such as riprap, silt fence, matting, erosion

- logs, and water bars.
3. Energy dissipation at all culvert outlets and erosion control at all culvert inlets applied at time of construction.
 4. Surfacing on all grades over 8% required before drilling starts.

The access roads and pads will be constructed as shown in the APDs. The entire area impacted will be reclaimed as described in the surface use plan and attached conditions of approval following plugging and abandonment of the well. If the wells are capable of production, all disturbed areas not needed for production purposes will be expediently re-contoured and reclaimed.

Cultural

No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 03/31/09 that no historic properties exist within the APE. If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the Standard COA (General)(A)(1).

Water Resources

To mitigate impacts to watershed values, including natural drainages, the well pad #78 and entry of the access road onto the well pad were repositioned at the onsite to avoid sedimentation into the minor drainage to the north. In addition, surface runoff control methods such as silt fencing and erosion logs are required on the wells pads for #78 and #79. All engineered access roads require 30 day soil stabilization, erosion control methods, and additional interim reclamation efforts including but not limited to silt fencing, matting, erosion logs, water bars, energy dissipation at all culvert outlets and erosion control at all culvert inlets.

To mitigate other potential impacts to water resources, the following Conditions of Approval (COAs) are in effect. The COAs include but are not limited to the following goals and measures:

1. Excavation activities will not use frozen or saturated soils when watershed damage might occur.
2. Waterbars will be used where appropriate to minimize soil erosion.
3. No soil or overburden will be pushed into drainages or over side slopes.
4. Measures (e.g. secondary containment) will be used to keep contaminants (sewage, oils, chemicals, produced water, etc.) out of the watershed.
5. Compliance with all state water laws.

Invasive Species

Based on the investigations performed during the project planning process, the operator has committed to the control of noxious weeds and species of concern. Weeds will be controlled on disturbed areas within the exterior limits of the access road and well pad. The control methods shall be in accordance with guidelines established by the EPA, BLM, State, and local authorities. Downy brome (*Bromus tectorum*) and Japanese brome (*Bromus Japonicus*) are known to exist in the affected environment. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time. However, the proposed IPMP may provide the opportunity to decrease infestations and increase native perennial vegetation.

To mitigate impacts from invasive and noxious weeds Conditions of Approval (COAs) are in effect. The COAs include but are not limited to the following goals and measures:

1. Control noxious and invasive weeds as appropriate.
2. Implement operator's Integrated Weed Management Plan (IWMP).

Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBM well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil & gas development would not violate any local, state, tribal or federal air quality standards. The operator has best management practices (BMPs) in place to control dust during all phases of development and operation.

Wildlife

During the environmental analysis process, the BLM identified project modifications to reduce environmental impacts. At the on-sites, all areas of proposed surface disturbance were inspected to ensure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, were moved, modified, or mitigated to alleviate or minimize environmental impacts.

Big Game Direct and Indirect Effects

In the project area, Winter-Yearlong and Yearlong range for pronghorn antelope, mule deer and elk would be directly disturbed with the construction of wells, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD indicates a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not become accustomed to the disturbance (Madson 2005).

Big game animals are expected to return to the project area following construction; however, populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and, as the Pinedale Anticline study suggests, mule deer do not readily habituate. A study in North Dakota stated “Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and chronic” (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. Survival below the maintenance level requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

Reclamation activities that occur within big game habitats during the spring will likely displace does and fawns due to the human presence in the area. This may cause reduced survival rate of does and fawns that must expend increased energies to avoid such activities.

Big Game Cumulative effects

The cumulative effects associated with this action are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-211.

Aquatics Direct and Indirect Effects

No surface water will be produced from the five proposed conventional wells. No streams or wetlands will be affected by the construction proposed in the Tisdale North project.

Aquatics Cumulative effects

The cumulative effects associated with this action are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247.

Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats are being lost directly with the construction of wells, roads, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

Habitat fragmentation results in more than just a quantitative loss in the total area of habitat available; the remaining habitat area is also qualitatively altered (Temple and Wilcox 1986). Ingelfinger (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses (displacement) were much greater than the direct physical habitat losses.

Reclamation activities that occur in the spring may be detrimental to migratory bird survival. Those species that are edge-sensitive will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequence of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges (Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this will lead to a loss of interior habitat species in favor of edge habitat species. Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity and nests may be destroyed by equipment.

Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with perch sites and may increase predation on migratory birds. Power lines placed in flight corridors may result in collision mortalities. Some species may avoid suitable habitat near power lines in an effort to avoid predation.

Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same affects as sage-grouse and raptor species. Though no timing restrictions are

typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

Migratory Birds Cumulative effects

The cumulative effects associated with this action are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235. No additional mitigation measures are required.

Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to overheating or chilling of eggs or chicks. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation.

The presence of overhead power lines may impact foraging raptors. Raptors forage opportunistically throughout the Powder River Basin. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper’s hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than one-quarter mile from occupied raptor nests.

Table 9. Infrastructure within close proximity (0.5 mile) to documented raptor nests within the Tisdale North Unit project area (Timing limitations will apply to this infrastructure)

BLM ID#	AMOUNT AND TYPE OF INFRASTRUCTURE	
	<i>Within 0.25 mile</i>	<i>Within 0.25 to 0.5 mile</i>
6359	# 69 well and .23 miles of access corridor	
6360		# 78 well and .16 miles of access corridor
6361		# 55 well and .15 miles of access corridor
6362	# 55 well and .11 miles of access corridor	# 40 well

Well # 69 and its access road are in close proximity (0.08 miles) and in direct line of sight of nest 6359. The nest, discovered in 2008, is situated in a ponderosa pine tree on a slope overlooking the well and access road. The nest was used by a red-tailed hawk pair in the 2008. The well is a re-entry of an existing well and drill pad and will be used as an injection well. If gas is encountered, the well will be developed as a gas well. At the closest point, the access road will pass within 0.03 miles of the nest. As

this is a Re-entry well, moving the well is not an option. The proposed access route is located on an existing trail making the best route based on the steep terrain. To move the route would greatly increase the amount of surface disturbance. It is likely that the pair is conditioned to the amount of human activity in the area and will continue to use the nest site. It is possible; however, that they will abandoned the site and move to nest in another location. The pair will be adversely effected by the proposed action.

The # 78 well is approximately 0.4 miles from nest 6360. The nest is down a canyon out of line-of-site from the proposed well site and should not be impacted by the proposed well.

The # 55 well is in close proximity to nest number 6361 (0.12 miles), and 0.32 miles from nest 6362. The well is in place with a working pump jack. The proposed action is to re-drill and rework the existing well. No further surface disturbance is proposed. The timing limitations will provide the necessary protection to the nest site during the time it would be occupied. It is likely that activity associated with the well operation after the proposed reworking of the well will cause the abandonment of the nest. The proposed action, however will have no adverse impact.

The proposed # 40 well site is located in a grassy area just off an existing road in a highly developed portion of the oil field, approximately 0.38 from nest 6362. The well will not impact the nest site.

Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

Raptors Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-221.

Threatened and Endangered and Sensitive Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

Threatened and Endangered Species

Table 10: Summary of Threatened and Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

K Known, documented observation within project area.

S Habitat suitable and species suspected, to occur within the project area.

NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.

Project Effects

LAA Likely to adversely affect

NE No Effect.

NLAA May Affect, not likely to adversely effect individuals or habitat.

Black-Footed Ferret Direct and Indirect Effects

Although the project area is within the Kaycee Complex, there are no black-tailed prairie dog colonies within or adjacent to the Tisdale North Unit project area, implementation of the proposed development will have “*no effect*” on the black-footed ferret.

Ute Ladies’-Tresses Orchid Direct and Indirect Effects

The Ute ladies’-tresses orchid is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbance (flooding, grazing, mowing) may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007). Heavy equipment used in energy development construction could dig up plants. Invasive weeds transplanted by vehicle and foot traffic in habitat could outcompete this fragile species. Restricting work from areas of Ute ladies’-tresses orchid habitat reduces these impacts.

Suitable habitat is not present within the Tisdale North Unit project area. The project will have “*no effect*” on Ute Ladies,-Tresses orchid.

Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22A states: “The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary.”

Sagebrush obligates

Shrubland and grassland birds are declining faster than any other group of species in North America (Knick et al. 2003). In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003)

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as a remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Populations of sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in

remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of shrub-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return even after habitat reestablishment.

Table 11: Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<i>Amphibians</i>				
Northern leopard frog (<i>Rana pipiens</i>)	Beaver ponds, permanent water in plains and foothills	NP	NI	Habitat not present.
Spotted frog (<i>Ranus pretiosa</i>)	Ponds, sloughs, small streams	NP	NI	Habitat not present.
<i>Birds</i>				
Baird's sparrow (<i>Ammodramus bairdii</i>)	Grasslands, weedy fields	S	MIH	Sagebrush cover will be affected.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	S	MIH	Project includes overhead power.
Brewer's sparrow (<i>Spizella breweri</i>)	Basin-prairie shrub	S	MIH	Sagebrush cover will be affected.
Burrowing owl (<i>Athene cunicularia</i>)	Grasslands, basin-prairie shrub	NP	NI	Habitat not present.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	S	MIH	Sagebrush cover will be affected.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Long-billed curlew (<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	NP	NI	Habitat not present.
Mountain plover (<i>Charadrius montanus</i>)	Short-grass prairie with slopes < 5%	NP	NI	Habitat not present.
Northern goshawk (<i>Accipiter gentilis</i>)	Conifer and deciduous forests	S	MIH	Forest habitat present.
Peregrine falcon (<i>Falco peregrinus</i>)	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	NP	NI	Habitat not present.
White-faced ibis (<i>Plegadis chihi</i>)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	NP	NI	Prairie dog towns not present.
Fringed myotis (<i>Myotis thysanodes</i>)	Conifer forests, woodland chaparral, caves and mines	S	MIIH	Forest habitat present.
Long-eared myotis (<i>Myotis evotis</i>)	Conifer and deciduous forest, caves and mines	S	MIIH	Forest habitat present.
Spotted bat (<i>Euderma maculatum</i>)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (<i>Vulpes velox</i>)	Grasslands	NP	NI	Habitat not present.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Caves and mines.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<i>Plants</i>				
Porter's sagebrush (<i>Artemisia porteri</i>)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (<i>Cymopterus williamsii</i>)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

Presence

- K** Known, documented observation within project area.
- S** Habitat suitable and species suspected, to occur within the project area.
- NS** Habitat suitable but species is not suspected to occur within the project area.
- NP** Habitat not present and species unlikely to occur within the project area.

Project Effects

- NI** No Impact.
- MIH** May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
- WIPV** Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
- BI** Beneficial Impact

Bald eagle Direct and Indirect Effects

Activity from construction and operation of the wells proposed in the Tisdale North Unit project could disturb bald eagles using the area for foraging. To reduce the risk of decreased productivity or nest failure, BLM BFO requires a 0.5 mile no surface occupancy radius and a one mile radius timing limitation of all activity during the breeding season around active bald eagle nests. To reduce the risk of disruption to the winter roosting activities of bald eagles, the BLM BFO requires a 0.5 mile no surface occupancy radius and a one mile radius timing limitation of all winter roosts (either communal or consistent use).

There are 4.3 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Hillcorp is proposing an additional 0.45 miles of overhead three-phase distribution lines. There are currently 11.8 miles of improved roads within the project area, with 0.47 miles proposed.

The presence of overhead power lines may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Greater sage-grouse Direct and Indirect Effects

According to BLM BFO and WGFDD databases, no sage grouse leks are known to exist within the Tisdale North Unit Project area. The nearest active lek to the project area boundary is 4.6 miles southwest. Leks have been shown to be reliable indicators of nesting habitat (The Northwest Wyoming Sage-Grouse Working Group 2006); therefore lack of suitable lek habitat makes it unlikely that sage grouse use the project area to perform breeding and nesting activities. Although the project area contains areas of sagebrush with canopy cover up to 15%, the majority of the habitat is interspersed among encroaching ponderosa pine forests and current high density oil and gas development.

In addition to the interspersed sagebrush patches, the project area consists of large areas comprised of steep slopes greater than 40%. Sage-grouse tend to nest more on flat to slightly sloping lands and areas

containing slopes greater than 40% should not be considered nesting habitat (Connelly et. al 2000). Field evaluations reveal that existing vegetative characteristics in the project area reduce its suitability to support sage grouse. In addition, no diagnostic sign (droppings, feathers, tracks, birds) was observed during the 2008 sage grouse lek survey, other wildlife surveys, or BLM onsite. All landscape characteristics that affect sage grouse habitat quantity and quality, patch size, connectivity between patches, and distance between patches, have been impacted in the project area and surrounding area by natural and unnatural events. The encroachment of conifer forests into sagebrush patches and treatment of sagebrush have decreased both patch size and connectivity of already limited patches while greatly increasing the distance between patches. Past energy development in the project and surrounding area has reduced available flat, grassy openings, and has decreased patch connectivity. Field evaluations and current research indicate that due to rough terrain, pine forests, past and current oil/gas development, and grazing in the Tisdale North Oil Field, the proposed Tisdale North Unit Project does not contain suitable seasonal habitat for sage-grouse .

Sharp-tailed grouse Direct and Indirect Effects

The proposed actions of the Tisdale North Unit project will not affect sharp-tailed grouse.

Mountain plover Direct and Indirect Effects

Suitable mountain plover habitat is not present within the project area. The project should not impact mountain plovers.

Sensitive Species Cumulative effects

The cumulative effects associated with this proposed action are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-271.

Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure (Theiele 2005, Oedekoven 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. The WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004).

The presence of overhead power lines and roads within the project area may adversely affect sage-grouse. Overhead power lines create hunting perches for raptors, thus increasing the potential for predation on sage-grouse. Increased predation from overhead power near leks may cause a decrease in lek attendance and possibly lek abandonment. Overhead power lines are also a collision hazard for sage-grouse flying through the area. Increased roads and mineral related traffic can affect grouse activity and reduce survival (Braun et al. 2002). Activity along roads may cause nearby leks to become inactive over time (WGFD 2003).

The presence of powerlines results in changes in sage-grouse dispersal patterns and fragmentation of the habitat. Leks within 0.25 mile of new powerlines constructed for coalbed natural gas development in the Powder River Basin of Wyoming had significantly lower growth rates, as measured by recruitment of new males onto the lek, compared to leks further from these lines (Braun et al. 2002). Braun (1998) reported that the presence of powerlines may limit sage-grouse use within 0.6 mile in otherwise suitable habitat. The construction of new powerline within the project area is within forested cover and will not impact sage grouse.

Although it is likely that sage grouse habitat exists within the project area, because the area is highly developed and not in good sage grouse habitat, it is unlikely that the activities associated with the project will add to any cumulative effect on sage-grouse.

The cumulative impacts of the proposed action, when considered with other existing and proposed development in the project area are not expected to be significant. The application of mitigative measures will ensure that the incremental impacts of this well, when considered with any existing development are insignificant. For more information on cumulative impacts, please refer to the PRB FEIS.

DESCRIPTION OF PROPOSED MITIGATION MEASURES:

Site Specific Conditions of Approval

Surface Use

1. All changes made at the onsite will be followed. They have all been incorporated into the operator’s plan of development. A summary of changes and observations made at the onsite can be found in Table # 1 on page 7 of this Environmental Assessment, and is also attached to the Conditions of Approval (COA) document.
2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The color selected for the Tisdale North Unit Project is **Juniper Green**, Standard Environmental Color Chart CC-001: June 2008.
3. Proposed engineered roads to wells # 69, 78, 79 must be constructed before drilling begins. Design plans are located under Engineering Tab of Master Surface Use Plan (MSUP).
4. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing for mountainous terrain:

Grade	Drainage Spacing
2-4%	240 ft
5-8%	180 ft
9-12%	140 ft
12-16%	100 ft

5. Provide 4” of aggregate where grades exceed 8% for stability and erosion prevention.
6. All rills, gullies, and other surface defects shall be ripped to the full depth of erosion across the entire width of the roadway prior to final grading and surfacing.
7. The operator is responsible for having the licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
8. Reserve pit will be closed as soon as possible, but no later than **1 year** from time of drilling/well completion, unless the BLM Authorized Officer gives an extension. Squeezing of pit fluids and cuttings is prohibited. Pits must be dry of fluids or they must be removed via vac-truck or other environmentally acceptable method prior to backfilling, re-contouring and replacement of topsoil. Mud and cuttings left in pit must be buried at least 3-feet below re-contoured grade. The operator will be responsible for re-contouring any subsidence areas that develop from closing a pit before it is sufficiently dry.

9. Adequate drainage control must be in place at all stages of construction and culverts installed as soon as feasible.
10. If a dry hole, all rehabilitation work, including seeding, will be initiated within **30 days** after plugging operations are completed (pending seasonal conditions).
11. Interim Reclamation of disturbed areas will adhere to the following guidance (as per the Wyoming Policy on Reclamation (IM WY-90-231):
 - A. The reclaimed area shall be stable and exhibit none of the following characteristics:
 - i. Large rills or gullies.
 - ii. Perceptible soil movement or head cutting in drainages.
 - iii. Slope instability on, or adjacent to, the reclaimed area in question.
 - B. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 - C. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself.

This shall be demonstrated by:

 - i. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - ii. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 - D. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.
12. All topsoil removed during construction activities will be respread for interim reclamation success.
13. If well is productive, an approved sundry notice will be required prior to the installation of production facilities.
14. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

Clayey Ecological Site

Seed Mix

10-14” Precipitation Zone

Clayey Ecological Site Seed Mix		
Species	% in Mix	Lbs PLS*
<i>Western Wheatgrass</i> (Pascopyrum smithii)	35	4.2
<i>Green needlegrass</i> (Nassella viridula)	30	4.8
<i>Slender Wheatgrass</i> (Elymus trachycaulus ssp. trachycaulus)	20	1.2
<i>Prairie coneflower</i> (Ratibida columnifera)	5	0.6
<i>White or purple prairie clover</i> (Dalea candidum, purpureum)	5	0.6
<i>Rocky Mountain beeplant</i> (Cleome serrulata)	5	0.6
Totals	100%	12 lbs/acre

*PLS = pure live seed

*Northern Plains adapted species

*Double this rate if broadcast seeding

This is a recommended seed mix based on the native plant species listed in the NRCS Ecological Site descriptions, U.W. College of Ag., and seed market availability. A site-specific inventory will allow the resource specialist to suggest the most appropriate species, percent composition, and seeding rate for reclamation purposes.

Soils & Vegetation

1. **Well #79:** Engineered pad and engineered access road are located in soils identified as having poor reclamation suitability. 30-day site stabilization and additional interim reclamation efforts will be provided to ensure re-vegetation, reduce topsoil loss, and minimize growth of noxious weeds. Silt fence and erosion logs will be provided along N/NW perimeter of pad to minimize surface run-off. Energy dissipation will be provided at all culvert outlets and erosion control at all culvert inlets. All grades over 8% will be surfaced before drilling starts. Stabilization efforts shall be finished within 30 days of the initiation of construction activities.
2. **Well #78 Exception:** Engineered pad and engineered access road are located in soils identified as having poor reclamation suitability. 30-day site stabilization and additional interim reclamation efforts will be provided to ensure re-vegetation, reduce topsoil loss, and minimize growth of noxious weeds. Silt fence and erosion logs will be provided along north and west perimeter of pad to minimize surface run-off and avoid sedimentation into minor drainage to north. Energy dissipation will be provided at

all culvert outlets and erosion control at all culvert inlets. All grades over 8% will be surfaced before drilling starts. Stabilization efforts shall be finished within 30 days of the initiation of construction activities.

3. **Well #69 Re-entry:** Engineered access road is located in soils identified as having poor reclamation suitability and will require 30 day site stabilization and erosion control methods such as riprap, silt fence, matting, erosion logs. Energy dissipation will be provided at all culvert outlets and erosion control at all culvert inlets. All grades over 8% will be surfaced before drilling starts. Stabilization efforts shall be finished within 30 days of the initiation of construction activities.
4. Grading, site preparation, and other soil retention measures will reduce soil losses. Topsoil segregation will occur at the proposed well pads to be used during interim and final reclamation. Existing roads and previous soil disturbances will be utilized where feasible to minimize impacts to soil resources. Existing roads to be used are identified in the Surface Use Plan of Operations.

Wildlife

Bald Eagles

1. The following conditions will alleviate impacts to bald eagles:
 No project related actions shall occur within one mile of bald eagle habitat along the South Fork Powder River annually from November 1 through April 1 (CM9), prior to a winter roost survey or from February 1 through August 15 (CM8) prior to a nesting survey. This timing limitation will be in effect unless surveys determine the nest/roost to be inactive. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
41N/81W	4	Well # 78

- a. If a roost is identified and construction has not been completed, a year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
- b. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle nest sites (February 1 - August 15).
- c. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.

Raptors

1. The following conditions will alleviate impacts to raptors:
 - a. No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
41N/81W	9	Well # 69 and access
41N/81W	4	Well # 78 and access

Township/Range	Section	Wells and Infrastructure
41N/81W	9	Well # 55 and access
41N/81W	9	Well # 40

- 1) Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.
 - 2) Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to the following nest(s): 6359, 6360, 6361 and 6362.
- b. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
 - c. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).

Sage Grouse

Mitigation measures and Recommended Management Practices (RMPs) utilized within the Tisdale North Unit Project which will effectively conserve sage-grouse habitats and other wildlife habitat affected by the proposal include but are not limited to the following:

1. Consolidate activities using existing roads and infrastructure.
2. Use flow lines to bring product to a central facility to reduce traffic and minimize perch sites for predators.
3. Technologies will be used that would reduce total surface disturbance within occupied sage-grouse habitat such as reinjection of produced water (injection water wells as opposed to reservoir containment).
4. Noise will be limited from industrial development or traffic to 10dBA above natural, ambient noise (~39 dBA) measured at the perimeter of the nearest Sage-grouse lek.
5. Utility corridors and flow lines will be co-located parallel and adjacent to existing access roads where feasible; previous disturbance corridors will be utilized where practical.
6. Employ 30 day site-stabilization and erosion mitigation techniques such as silt fencing, water bars, matting, erosion logs, rip-rap, to ensure re-vegetation, reduce topsoil loss, and minimize growth of noxious and invasive weeds.
7. Implement strategies to assist in prevention of the spread of noxious weeds or invasive plants detrimental to sage-grouse.
8. Above ground power lines will be constructed to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
9. Locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.

Consultation/Coordination:

Contact	Title	Organization	Phone Number	Present at Onsite?
Jenna Foss	Project Manager	Grouse Mtn Environ. Cons	307-684-2112	yes
Greg Fillpot	Production Forman	Hilcorp Energy Corp.	307-685-3145	yes
Josh Johnson	Surveyor	Bighorn Surveying & Eng.		yes
Clayton McGuire	Ranch Manager	TTT Ranch	307-738-2665	no

References and Authorities:

Agnew, W. D. 1983. Flora and Fauna Associated with Prairie Dog Ecosystems. Unpublished thesis. Colorado State University, Fort Collins. 47pp.

Agnew, W. D. 1988. Arthropod Consumption by Small Mammals on Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Eighth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM 154. pgs. 81-87.

Agnew, W., D. W. Uresk. and R. M. Mansen. 1986. Flora and Fauna Associated with Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Journal of Range Management 39, pgs 135-139

Apa, A. D. 1985. Efficiency of Two Black-tailed Prairie Dog Rodenticides and Their Impacts on Non-target Bird Species. Unpublished thesis, South Dakota State University Brookings. 71pp.

Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office. Prepared by the United States Department of the Interior, Bureau of Land Management, Buffalo Field Office, April 2001.

Avian Power Line Interaction Committee (APLIC) 2006. R. Harness, contributing author to: Suggested Practices for Avian Protection on Power Lines: State of the Art in 2006. 207pp.

Bennett, Robert A. 2004. Instruction Memorandum No. WY-2005-057: Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Bills, Thomas E. 2004. Powder River Basin Oil & Gas Project Semi-Annual Report: May 1, 2003 – October 31, 2003. BLM Buffalo Field Office. Buffalo, WY. 8pp.

Braun C. E. 1998. Sage-grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies. 67:134-144.

Braun C. E., M. F. Baker, R. L. Eng, J. S. Gashwiler, and M. H. Schroeder. 1976. Conservation committee report on effects of alteration of sagebrush communities on the associated avifauna. Wilson Bulletin. 88:165-171.

Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western north America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. In: Transactions of the 67th North American Wildlife and Natural Resources Conference. pp337-349.

Campbell, Thomas and Tim Clark. 1981. Colony Characteristics and Vertebrate Associates of White-tailed and Black-tailed Prairie Dogs. American Midland Naturalist, Vol. 105, No. 2 (April 1981). pgs 269-276.

Code of Federal Regulations (CFR)

- 40 CFR All Parts and Sections inclusive Protection of Environment Revised as of July 1, 2001.
- 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.

Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Chapter 6 in Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana, coordinated by G. Joslin and H. Youmans. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.

Clark, T. W., T. M. Campbell, D. G. Socha, and D. E. Casey. 1982. Prairie Dog Colony attributes and Associated Vertebrate Species. Great Basin Naturalist 42: 572-582.

Confluence Consulting, Inc. 2004. Powder River Biological Survey and Implications for Coalbed Methane Development. Bozeman, MT. 179pp.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines for management of sage grouse populations and habitats. Wildlife Society Bulletin 28:967-985.

Cornish, Todd. Personal Communication. Wyoming State Veterinary Laboratory, University of Wyoming. Laramie, WY. (307) 742-6638. tcornish@uwyo.edu.

Covell, D.F. 1992. *Ecology of swift fox (Vulpes velox) in southeastern Colorado*. MS thesis, University of Wisconsin, Madison.

Dantzker, M. S., Deane, G. B. & Bradbury, J. W. 1999. Directional acoustic radiation in the strut display of male sage grouse Centrocercus urophasianus. Journal of Experimental Biology, 202, 2893–2909.

Danvir, Rick E. 2002. *Sage Grouse Ecology and Management in Northern Utah Sagebrush-Steppe: A Deseret Land and Livestock Wildlife Research Report*. Deseret Land and Livestock Ranch and the Utah Foundation for Quality Resource Management. Woodruff, UT.

Deisch, M. S., D. W. Uresk, and R. L. Lindor. 1989. Effects of Two Prairie Dog Rodenticides on Ground Dwelling Invertebrates in Western South Dakota. Ninth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM. Pgs 171-181.

Dobkin D. S. 1994. *Conservation and management of Neotropical migrant landbirds in the northern Rockies and Great Plains*. University of Idaho Press, Moscow, ID.

Fahrig, L., and J. Paloheimo. 1988. Determinations of local population size in patchy habitats. Theoretical Population Biology 34:194-213.

- Fertig, W. 2000. *Status Review of the Ute Ladies Tresses (Spiranthes diluvialis) in Wyoming*. Wyoming Natural Diversity Database, Laramie, Wyoming.
- Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.
- Gelbard J. L., and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. Conservation Biology. 17:420–432.
- Gibson, R. M. 1989. Field playback of male display attracts females in lek breeding Sage Grouse. Behavioral Ecology and Sociobiology 24: 439-443.
- Gibson, R. M. and J. W. Bradbury. 1986. *Male and female mating strategies on sage grouse leks*. Pp. 379-398 in Ecological aspects of social evolution: birds and mammals (D. I. Rubenstein and R. W. Wrangham, eds.). Princeton Univ. Press, Princeton, New Jersey.
- Grenier, M., B. Oakleaf, K. Taylor, and M. Hymas. 2004. *Inventory and Mapping of Black tailed Prairie Dogs in Wyoming – An Estimate of Acreage Completion Report*.
- Grenier, Martin. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16pp
- Grouse Mountain Environmental Consultants. 2008. Tisdale North Unit Plan of Development Wildlife Habitat Assessment Report. Grouse Mountain Environmental Consultants, Buffalo WY.
- Haug, E. A. and L. W. Oliphant. 1985. Movements, Activity Patterns, and Habitat Use of Burrowing Owls in Saskatchewan. Journal of Wildlife Management. 54(1):27-35.
- Hazlett, D.L. 1996. *The discovery of Spiranthes diluvialis along the Niobrara River in Wyoming and Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.
- Hazlett, D.L. 1997. *A 1997 search for Spiranthes diluvialis in southeastern Wyoming and western Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.
- Heidel, Bonnie. Botanist. Wyoming Natural Diversity Database. University of Wyoming. Laramie, WY
- Heidel, B. 2007. *Survey of Spiranthes diluvialis (Ute ladies'-tresses) in eastern Wyoming, 2005-06*. Prepared for Bureau of Land Management and Thunder Basin National Grassland. Wyoming Natural Diversity Database, Laramie, WY.
- Hiat, G.S. and D. Baker. 1981. Effects of oil/gas drilling on elk and mule deer winter distributions on Crooks Mountain, Wyoming. Wyoming Game and Fish Department.
- Hillman, C. N., and J. C. Sharps. 1978. Return of the swift fox to the northern plains. Proc. South Dakota Acad. Sci. 57:154-162.
- Hines, T. D. 1980. *An ecological study of Vulpes velox in Nebraska*. M. S. Thesis. Univ. of Nebraska, Lincoln.

- Holloran, M. J., and S. H. Anderson. 2005. Spatial distribution of Greater Sage-Grouse nests in relatively contiguous sagebrush habitats. *Condor* 107:742-752.
- Holloran, Matthew J.; Brian J. Heath; Alison G. Lyon; Steven J. Slater; Jarren L. Kuppiers; and Stanley H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. *J. Wildl. Manage.* 69(2):638-649.
- Hoogland, J. 1995. *The black-tailed prairie dog: Social life of a burrowing mammal*. Chicago: Chicago University Press.
- Hubert, W. A. 1993. *The Powder River: a relatively pristine stream on the Great Plains*. Pages 387-395 in L. W. Hesse, C. B. Stalnaker, N. G. Benson, and J. R. Zuboy, editors. Restoration planning for the rivers of the Mississippi River ecosystem. Biological Report 19, National Biological Survey, Washington, D.C.
- Ingelfinger, F., and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. *Western North American Naturalist* 64:385-395
- Ingelfinger F. 2001. *The effects of natural gas development on sagebrush steppe passerines in Sublette County, Wyoming*. M.Sc. thesis, University of Wyoming, Laramie, WY.
- Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.
- Jellison, Bert. 2005. *Sage-Grouse Restoration Project: Lake DeSmet Conservation District*. Wyoming Game and Fish Department. Sheridan, WY.
- Kahn, R., Fox, L., Horner, P., Giddings, B., and C. Roy. 1997. Conservation assessment and conservation strategy for swift fox in the United States. Division of Wildlife, Denver, CO. 54 pp.
- Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.
- Kilgore, D. L. Jr. 1969. An ecological study of the swift fox (*Vulpes velox*) in the Oklahoma panhandle. *American Midland Naturalist* 81:512-534.
- King, J. A. 1955. Social Behavior, Social Organization and Population Dynamics in a Black-tailed Prairie Dog Town in the Black Hills of South Dakota. *Contr. Lab. Vert. Biol.*, University of Michigan. 67pp.
- Klute, D. S., L.W. Ayers, M.T. Green, W.H. Howe, S.L. Jones, J.A. Shaffer, S.R. Sheffield, and T.S. Zimmerman. 2003. *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States*. U.S. Department of the Interior; Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.
- Knick, S. T., and J. T. Rotenberry. 1995. Landscape characteristics of fragmented shrubsteppe habitats and breeding passerine birds. *Conservation Biology* 9:1059-1071.

- Knick S. T., D. S. Dobkin, J. T. Rotenberry, M. A. Schroeder, W. M. Vander Haegen, and C. van Riper III. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. Condor. 105:611–634.
- Knight R. L., and J. Y. Kawashima. 1993. Responses of raven and Red-tailed Hawk populations to linear right-of-ways. Journal of Wildlife Management. 57:266–271.
- Knopf F.L. and J.R. Rupert. 1995. Habits and habitats of Mountain Plovers in California. Condor 97:743-751.
- Landry, R.E. 1979. *Growth and development of the Burrowing Owl.* M.S. thesis, California State University, Long Beach, CA.
- Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.
- McCraken, J. G., D. W. Uresk and R. M. Mansen. 1985. Burrowing Owl Foods in Conata Basin, South Dakota. Great Basin Naturalist 45: 287-290.
- McDonald, D., N.M. Korfanta, and S.J. Lantz. 2004. *The Burrowing Owl (Athene cunicularia): a technical conservation assessment.* USDA Forest Service, Rocky Mountain Region.
- Meffe, G.K. and C.R. Carroll. 1994. *Principles of Conservation Biology.* Sinauer Associates, Inc. Sunderland, MA.
- Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003.
- Moynahan, Brendan J.; Mark S. Lindberg; Jay J. Rotella; and Jack Ward Thomas. 2005. Factors Affecting Nest Survival of Greater Sage-Grouse in Northcentral Montana. J. Wildl. Manage.
- Moynahan, Brendan J. and Mark S. Lindberg. 2004. *Nest Locations of Greater Sage-Grouse in Relation to Leks in North-Central Montana. Presented at Montana Sage-Grouse Workshop, Montana Chapter of The Wildlife Society, Billings.*
- Murkin, James W. 1990. Instruction Memorandum No. WY-90-564: Resource Management Plan Action and Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.
- Naugle, David E.; Cameron L. Aldridge; Brett L. Walker; Todd E. Cornish; Brendan J. Moynahan; Matt J. Holloran; Kimberly Brown; Gregory D. Johnson; Edward T. Schmidtman; Richard T. Mayer; Cecilia Y. Kato; Marc R. Matchett; Thomas J. Christiansen; Walter E. Cook; Terry Creekmore; Roxanne D. Falise; E. Thomas Rinkes; and Mark S. Boyce. 2004. West Nile virus: Pending Crisis of Greater Sage-grouse. Ecology Letters. 7:704-713.
- Northeast Wyoming Sage-grouse Working Group. 2006. *Northeast Wyoming Sage-Grouse Conservation Plan.*

- Noss, R. F. and A. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Defenders of Wildlife and Island Press, Washington, D. C.
- Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.
- Oedekoven, Olin O. 2004. Sheridan Region Wyoming Game and Fish Department: Annual Sage-Grouse Completion Report for 2004. Wyoming Game and Fish Department. Gillette, WY.
- Olenick, B. E. 1990. *Breeding biology of burrowing owls using artificial nest burrows in southeastern Idaho*. Thesis, Idaho State University, Pocatello, Idaho, USA.
- Paige, C., and S. A. Ritter. 1999. *Birds in a sagebrush sea: managing sagebrush habitats for bird communities*. Partners in Western Flight working group, Boise, ID.
- Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (*Haliaeetus leucocephalus*) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.
- Porneluzi, P, J. C. Bednarz, L. J. Goodrich, N. Zawada, and J. Hoover. 1993. Reproductive performance of territorial Ovenbirds occupying forest fragments and a contiguous forest in Pennsylvania. *Conservation Biology* 7:618-622.
- Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. Prepared by the Department of the Interior, Bureau of Land Management, Wyoming State Office in Campbell, Converse, Johnson and Sheridan Counties, Wyoming. Approved April 30, 2003.
- Primack, R.B. 1993. Essentials of conservation biology. Sinauer Associates, Sunderland, Massachusetts, USA.
- Reading, R. P., S. R. Beissinger, J. J. Grensten, and T. W. Clark. 1989. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. pgs 13-28.
- Robinson, S. K. 1992. *Population dynamics of breeding birds in a fragmented Illinois landscape*. Pages 408-418 in J. Hagan and D. W. Johnston, editors. *Ecology and conservation of neotropical migrant land birds*. Smithsonian Institution press, Washington, D. C.
- Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.
- Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah

- Rotenberry J. T., and J. A. Wiens. 1980a. Habitat structure, patchiness, and avian communities in North American steppe vegetation: a multivariate analysis. Ecology. 61:1228–1250.
- Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.
- Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.
- Saab, V., and T. Rich. 1997. *Large-scale conservation assessment for neotropical migratory landbirds in the Interior Columbia River Basin*. USDA Forest Service General Technical Report PNW-GTR-399, Portland, Oregon, USA.
- Steenhof K., M. N. Kochert, and J. A. Roppe. 1993. Nesting by raptors and Common Ravens on electrical transmission line towers. Journal of Wildlife Management. 57:272–281.
- Stinson, D. W., D. W. Hays, and M. A. Schroeder. 2004. Washington State Recovery Plan for the Sage-grouse. Washington Department of Fish and Wildlife, Olympia, Washington. 109 pages.
- Temple S, . A. 1986. Predicting impacts of habitat fragmentation on forest birds: A comparison of two models. Pages 301-304 in Wildlife 2000 (J. Verner, C. J. Ralph, and M. L. Morrison, Eds.). Univ. Wisconsin Press, Madison.
- Temple S, . A., and J. R. Cary. 1988. Modeling dynamics of habitat-interior bird populations in fragmented landscapes Conserv.B iol.2 :340-347.
- Temple, S.A., and B.A. Wilcox. 1986. Introduction: Predicting effects of habitat patchiness and fragmentation. In *Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates*, ed. J. Verner, M.L. Morrison, and C.J. Ralph, 261-62. Madison: University of Wisconsin Press.
- The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).
- Thiele, Dan. 2005. Northeast Wyoming Local Working Group Area: Annual Sage-Grouse Completion Report for 2005. Wyoming Game and Fish Department. Buffalo, WY. 42pp.
- Urban, D. L., and H. H. Shugart, Jr. 1984. Avian demography in mosaic landscapes: modeling paradigm and preliminary results. Pages 273-280 in J. Verner, M. L. Morrison, and C. J. Ralph editors. *Wildlife 2000: Modeling habitat relationships of terrestrial vertebrates*. University of Wisconsin Press, Madison.
- Uresk, D. W. and J. C. Sharps. 1986. Denning Habitat and Diet of the Swift Fox in Western South Dakota. Great Basin Naturalist 46: 249-253.

- U.S. Department of the Interior 2001, Bureau of Land Management, Buffalo Field Office. Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.
- U.S. Department of the Interior 2003, Bureau of Land Management. Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.
- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.
- U.S. Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.
- U.S. Fish and Wildlife Service (USFWS). 1995. Recommendations and guidelines for Ute's ladies'-tresses orchid (*Spiranthes diluvialis*) recovery and fulfilling Section 7 consultation responsibilities. Autho. 5 pp.
- U.S. Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.
- Vander Haegen, W. M., F. C. Dobler, and D. J. Pierce. 2000. Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA. Conservation Biology 14:1145-1160.
- Windingstad, R. M., F. X. Kartch, R. K. Stroud, and M. R. Smith. 1987. Salt toxicosis in waterfowl in North Dakota. Jour. Wildlife Diseases 23(3):443-446.
- Wyoming Game and Fish Department (WGFD). 2004. Minimum Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats on BLM Lands. WGFD. Cheyenne, WY
- WGFD. 2003. Wyoming Greater Sage-Grouse Conservation Plan. WGFD. Cheyenne, WY

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