ENVIRONMENTAL ASSESSMENT

BEAVER CREEK COAL BED NATURAL GAS

PILOT PROJECT

FREMONT COUNTY, WYOMING

U.S. Department of the Interior
Bureau of Land Management
Wyoming State Office
Lander Field Office
Lander, Wyoming

September 2007

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ACRONYMS

- A -

amsl	above mean sea level
ANC	Acid Neutralization Capacity
APD	Application for Permit to Drill
AQRV	Air Quality Related Value
AUM	Animal Unit Month

- B -

bbl	barrels
BCPA	Beaver Creek Project Area
BCF	billion cubic feet
BCU	Beaver Creek Unit
b_{ext}	light-extinction coefficient
bgs	below ground surface
BHL	Bottom Hole Location
BLM	Bureau of Land Management
BMP	Best Management Practice
BTEX	benzene, toluene, ethylbenzene, xylene

- C -

CBM	Coal Bed Methane
CBNG	Coal Bed Natural Gas
CDP	Central Delivery Point
CEHE	Critical Elements of the Human Environment
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CEQ	Council on Environmental Quality
CFS	cubic feet per second
CH_4	methane
CH_2O	formaldehyde
CIAA	Cumulative Impact Analysis Area
CO	carbon monoxide
COA	Conditions of Approval

- D -

dB	decibel
dBA	A-weighted decibel

- E -

EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act

- F -

FCEMA	Fremont County Emergency Management Agency
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act
FO	Field Office
FOOGLRA	Federal Onshore Oil and Gas Leasing Reform Act
FONSI	Finding of No Significant Impact
FY	fiscal year

- H -

HAP	Hazardous Air Pollutants

- I -

IDT	Interdisciplinary Team
ISC3	Industrial Sources Complex

- K -

km	kilometers

- L -

LEPC	Local Emergency Planning Committee
LOP	Life of Project

- M -

MACT	Maximum Achievable Control Technology
MLA	Mineral Leasing Act
MSDS	Material Safety Data Sheet

- N -

NAAQS	National Ambient Air Quality Standards

NCDC	National Climate Data Center
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NSR	Noise Sensitive Receptors
NSS2	Native Special Status 2
NSS3	Native Special Status 3
NSS4	Native Special Status 4
NTMB	Neotropical Migratory Bird
NWS	National Weather Service

- O -

O_3	Ozone
OHV	Off-Highway Vehicle
ORV	Off-Road Vehicle
OSHA	Occupational Safety and Health Administration

- P -

PILT	payments-in-lieu of taxes
PM_1	Particulate Matter
$PM_{2.5}$	Particulate Matter
POD	Plan of Development
PSD	Prevention of Significant Deterioration

- R -

RCRA	Resource Conservation and Recovery Act
RFD	Reasonably Foreseeable Development
RFFA	Reasonably Foreseeable Future Activities
RMP	Resource Management Plan
RN	Roaded Natural
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	Right-of-Way

- S -

SARA	Superfund Amendments and Reauthorization Act
SAR	Sodium Adsorbtion Ratio
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SPCC	Spill Prevention, Control and Countermeasure
SPM	Semi-Primitive Motorized
SVR	Standard Visual Range

- T -

T&E	Threatened and Endangered
TCF	Trillion Cubic Feet
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
TPQ	threshold planning quantity

- U -

USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

- V -

VOC	Volatile Organic Compounds
VRM	Visual Resource Management

- W -

WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WCRO	Wyoming Cultural Records Office
WDEQ	Wyoming Department of Environmental Quality
WDEQ-AQD	Wyoming Department of Environmental Quality-Air Quality Division
WDEQ-SWD	Wyoming Department of Environmental Quality-Solid Waste Division
WDEQ-WQD	Wyoming Department of Environmental Quality-Water Quality Division
WEMA	Wyoming Emergency Management Agency
WGF	Wyoming Game and Fish Department

WGFD	Wyoming Game and Fish Department
WRIR	Wind River Indian Reservation
WSEO	Wyoming State Engineer's Office
WTPD	White-tailed Prairie
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database

1.0 PURPOSE AND NEED FOR THE ACTION

1.1 INTRODUCTION

The Beaver Creek Coal Bed Natural Gas (CBNG) Pilot Project Environmental Assessment (EA) has been prepared to analyze proposed CBNG development on Bureau of Land Management-managed lands within Devon Energy Production Company's L.P. (Devon) existing Beaver Creek Unit (BCU) in Fremont County, Wyoming. This EA is a site-specific analysis of potential impacts that could result with the implementation of Alternative A (Proposed Action) or Alternative B (No Action). The purpose of this EA is to assist the Bureau of Land Management (BLM), Lander Field Office (FO) in project planning, ensuring compliance with the *National Environmental Policy Act* (NEPA), and in making the determination of any "significant" impacts could result from the analyzed actions. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS), or a "Finding of No Significant Impact" (FONSI). If the agency determines that no significant impacts would result from the alternatives, a Decision Record and FONSI would be prepared approving the selected alternative. A FONSI is a document that briefly presents the reasons why implementation of an alternative would not result in "significant" environmental impacts. If the decision maker determines that this project has "significant" impacts following the analysis in the EA, an EIS would then be prepared for the project.

1.2 DESCRIPTION OF PROJECT AREA

Devon has submitted a proposal to the BLM to explore and develop CBNG wells on Federal lands administered by the BLM's Lander FO. The Beaver Creek Project Area (BCPA) is located approximately nine aerial miles southeast of Riverton, Wyoming, and encompasses approximately 1,750 acres within the existing BCU in Sections 27 and 28; Section 33 (E1/2 of NW/4; NE/4; N1/2 of SE/4); and Section 34 NW/4, in Township 34 North and Range 96 West in Fremont County, Wyoming (Figure 1-1, in Appendix A). Access to the BCPA from the town of Riverton is by US 26 South to WY 136 and southeast on WY 135. The BCPA is located entirely on Federal surface.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed project is to allow Devon to commercially develop their current leases within the BCPA. National mineral leasing policies, and the regulations by which they are enforced, recognize the statutory right of leaseholders to develop mineral resources to meet continuing national needs and economic demands as long as undue environmental degradation is not incurred. Increasing development of oil and gas resources in an environmentally responsible manner is necessary to satisfy the Federal Energy Policy (NEPDG 2001).

The Mineral Leasing Act of 1920 (MLA), as amended, provides that exploration and development of domestic oil and gas is in the best interest of the United States. The intent of the MLA and its implementing regulations are to allow, and encourage, lessees or potential lessees to explore for oil and gas or other mineral reserves on Federally-administered lands. The Federal Land Policy and Management Act of 1976 (FLPMA) mandates that the BLM manage public lands on the basis of multiple use [43 U.S.C. § 1701(a)(7)]. Minerals are identified as one of the principal uses of public lands in Section 103 of FLPMA [43 U.S.C. § 1702(c)]. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA) also authorizes the BLM to encourage oil and gas leasing for the development of domestic oil and gas reserves to reduce the dependence of the United States on foreign energy sources.

In 2005, the Energy Policy Act was enacted by Congress. The objective of the Energy Policy Act is to reduce the Nation's dependence on imported petroleum and encourage the development of a comprehensive long-range energy policy. The Act also provides incentives for traditional energy production as well as newer, more efficient energy technologies and conservation.

1.4 CONFORMANCE TO THE LANDER RESOURCE MANAGEMENT PLAN

The Resource Management Plan (RMP) that directs the management of the Lander Resource Area is the *Final Resource Management Plan/Environmental Impact Statement for the Lander Resource Area, Lander, Wyoming* (BLM 1986) and *Record of Decision for the Lander Resource Management Plan* (BLM 1987). Management direction also is provided in the *Grazing Supplement to the Final Resource Management Plan/Environmental Impact Statement for the Lander Resource Area, Lander, Wyoming* (BLM 1986).

The Lander FO, as required by 43 CFR 1610.5, has determined that the Proposed Action conforms to the decisions, guidelines, terms and conditions for the Beaver Creek Management Unit, as described in the Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) for the Lander RMP. The Lander RMP states that "public lands will be made available for oil and gas leasing and development to the maximum extent possible, while giving due consideration to the protection of other significant resource values." The proposed BCPA is located in the Beaver Creek Management Unit of the Lander Resource Area. The Beaver Creek Management Unit is open for oil and gas leasing with standard requirements (Map 17 in the RMP). Thus, development of natural gas reserves within the BCPA would be in conformance with the Lander RMP.

This EA incorporates the appropriate decisions, terms, and conditions of use described in the Lander RMP. Use authorizations for well pads, roads, pipelines, and well site facilities would be processed through the BLM Application for Permit to Drill (APD), Sundry Notice, and/or Section 390 Statutory Categorical Exclusion processes. All project-related activities would be conducted in full compliance with the terms and conditions of the applicable federal leases.

1.5 RELATIONSHIP TO STATUTES, REGULATIONS, AND/OR OTHER PLANS

Development of Federal oil and gas leases is an integral part of the BLM oil and gas leasing program under the authority of the MLA of 1920 (30 USC 181 et seq.), the FLPMA of 1976 (43 U.S.C. 1701), the FOOGLRA of 1982 (30 USC 1732 and 1755), and the *Federal Onshore Oil and Gas Leasing Reform Act of 1987* (P.L. No. 100-203). The BLM's oil and gas leasing program is intended to encourage the development of domestic oil and gas resources, thereby reducing national dependence on foreign energy supplies.

This EA is being prepared in accordance with the NEPA (42 U.S.C. 4321-4347, as amended. The regulatory framework that governs oil and gas drilling, production and abandonment involves a number of policies, legislation and regulations. The proposed project must be reviewed in accordance with requirements of *Onshore Oil and Gas Operations* (43 CFR 3160), BLM *Onshore Oil and Gas Order Nos. 1 through 7* (43 CFR 3164), NEPA and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), *BLM Handbook H-1790* (BLM 1988, Department of the Interior DM-516 (2004), and BLM *NEPA Process Desktop Reference* (BLM 1999).

For an overview of the key regulatory requirements that would govern project implementation, refer to Table 1-1.

1.6 BLM DECISION MAKING PROCESS

First, the BLM Lander FO analyzes the potential impacts to the environment from the Proposed Action and alternatives. Second, the Lander FO will determine if implementation of the proposed project would result in "significant impacts" to the human environment. As previously discussed, if significant impacts are likely to occur, Devon could either modify the Proposed Action to avoid significant impacts or prepare an EIS. If BLM determines that implementation of the Proposed Action would not result in significant impacts, BLM would prepare a *FONSI* and Decision Record. After the submittal of the FONSI and Decision Record, the NEPA process would be satisfied, and Devon could proceed with implementation of the Proposed Action, pending any appeals. In addition, Devon would be required to conform with lease stipulations and Conditions of Approval (COAs) in the approved APDs and Right-of-Way (ROW) permits.

Table 1-1. Major Federal, State and Local Permits, Approvals and Authorizing Actions that may be applicable to the Beaver Creek CBNG Pilot Project, Fremont County, Wyoming[1]

FEDERAL		
Office of the President	Environmental justice	Executive Order 12898
Bureau of Land Management (BLM)	Permits to drill, deepen, or plug back on BLM-managed land (APD/Sundry Notice process)	*Mineral Leasing Act of 1920* (30 USC 181 et seq.); 43 CFR 3162
	Right-of-way grants and temporary use clearances on federal lands	*Mineral Leasing Act of 1920*, as amended (30 USC 185); 43 CFR 3180; *Federal Land and Policy Management Act* (43 USC 1761- 1771); 43 CFR 2800
	Antiquities, Cultural and Historic resource clearances on BLM-managed land	*Antiquities Act of 1906* (16 USC 431-433); *Archeological Resources Public Protection Act of 1979* (16 USC 407aa-470l); 43 CFR 3; *National Historic Preservation Act of 1966* (16 USC 470, et seq) and Advisory Council on Historic Preservation regulations (36 CFR 800); *American Indian Religious Freedom Act of 1978*, as amended (42 USC 1966 et seq.); *Native American Graves Protection and Repatriation Act of 1990*, as amended (25 USC 3001-3013) and implementing regulations
	Approval to dispose of produced water from BLM-managed land	*Mineral Leasing Act of 1920* (30 USC 181 et seq.); 43 CFR 3164; *Onshore Oil and Gas Order No. 7*
	Pesticide Use Proposals and noxious weed control	*Federal Land and Policy Management Act (*43 USC 1701-1712)*; Public Rangelands Improvement Act* (43 USC 1901 et seq)*; Federal Insecticide, Fungicide and Rodenticide Act (*P.L.92-516)*; Federal Noxious Weed Act of 1974* (7 USC 2801-2813).

Agency		
		Federal Noxious Weed Act of 1974, as amended by Sec. 15 – Management of Undesirable Plants on Federal Lands, 1990. *Executive Order 13112 – 1999, Invasive Species.*
	Initiation of Section 7 consultation with USFWS	*Endangered Species Act*
U.S. Fish and Wildlife Service (USFWS)	ESA Section 7 consultation, coordination, and impact review on federally listed threatened and endangered (T&E) species	*Fish and Wildlife Coordination Act* (16 USC 661, et seq.); Section 7 of *the Endangered Species Act of 1973*, as amended (16 USC 1531, et seq.); *Bald Eagle Protection Act of 1940*, as amended (16 USC 668-668d); *Migratory Bird Treaty Act of 1918* (16 USC 704)
U.S. Environmental Protection Agency (EPA)	Regulation of hazardous waste treatment, storage and/or disposal	*Resource Conservation and Recovery Act of 1976* (42 USC 6901)
	Underground Injection Control permits (through Wyoming OGCC)	
	Review and comment on major federal actions	
	Spill Prevention Control and Countermeasure (SPCC) Plans	
	Air quality permits	
U.S. Department of Transportation (USDOT)	Approval of construction and operation and maintenance of natural gas pipelines	49 CFR 191, 192
U.S. Army Corps of Engineer (USACE)	Section 404 permit process participation and coordination on impacts to fish and wildlife and state-sensitive species	
STATE		
WYDEQ – Air Quality Division	Air quality permits	
WYDEQ - Water Quality Division	Regulation of off-lease disposal of drilling fluids from abandoned reserve pits	*Wyoming Environmental Quality Act* (W.S. 35-11-301 – 35-11-311)
	National Pollutant Discharge Elimination System (NPDES) permits for discharging waste water and stormwater runoff	WDEQ Rules and Regulations, Chapter 18; *Wyoming Environmental Quality Act* (W.S. 35-11-301 – 35-11-311); Section 405 of the *Clean Water Act* (40 CFR 122-124)
Wyoming Department of Transportation (WYDOT)	Permits for oversize, overlength and overweight loads	WYDOT Rules and Regulations, Chapters 17 and 20
	Permits for utility crossings of state roads	
Wyoming State Historic Preservation Office (SHPO)	Section 106 consultation for cultural resource clearances, inventories, evaluation, and mitigation	Section 106 of the National Historic Preservation Act (16 USC 470, et seq); Advisory Council on Historic Preservation Regulations (36 CFR 800)
Wyoming State	Permits to appropriate groundwater	W.S. 41-121 – 41-147 (Form U.W.5)

Agency		
Engineer's Office (WSEO)	(use, storage, wells, dewatering)	
LOCAL		
Fremont County	County road crossing/access permits	Engineer's Department

[1]This list is intended to provide an overview of the key regulatory requirements that would govern project implementation. Additional approvals, permits and authorizing actions may be necessary.

1.7 PUBLIC SCOPING AND DEVELOPMENT OF ISSUES

Public scoping opportunities for the Beaver Creek CBNG project have been substantial.

A Scoping Notice discussing the Proposed Action and CBNG EA was mailed on June 16, 2006 to a total of 153 government agencies, government officials, public land user groups, private landowners, newspapers, and radio stations. A list of agencies and organizations that received the scoping notice is provided in Chapter 5, Table 5-1, and the actual scoping notice is provided in Appendix B. The notice of availability for the scoping notice and the date of the first public scoping meeting appeared in the Casper Star-Tribune, Lander Journal, Riverton Ranger, and Wind River News. The original scoping comment period was scheduled for 30 days and ended on July 21, 2006. However, several commenters requested an extension of the comment period; therefore, the scoping comment period was extended to September 8, 2006, for a total scoping period of more than 60 days.

Flyers were posted at various locations in Lander, Riverton, Fort Washakie, Ethete, and St. Stephens, as well as other public places to announce the date, location, and time of public scoping meetings. The first public scoping meeting was held at the Holiday Inn in Riverton, Wyoming on July 6, 2006. At the request of some of the members of the public, a second scoping meeting was held on August 23, 2006 at the Public Library in Lander, Wyoming.

A total of 14 comment letters were received from individuals, agencies and organizations, (refer to Table 5-2). The issues identified in the comment letters are provided below. A summary of the comments and responses to the comments is provided in Appendix B.

1.7.1 IDENTIFIED ISSUES

During the scoping process, a BLM interdisciplinary team (IDT) considered the potential consequences and issues of the Proposed Action and alternatives on various environmental resources. Chapter 3 of this EA contains a checklist of resources considered, as set out in the Wyoming BLM NEPA Handbook 1790. Of particular importance is the consideration of all Critical Elements of the Human Environment (CEHE), because these elements are subject to requirements specified in statutes, regulations, or executive orders, and must be considered in all EAs. The following issues and concerns were identified by the public through written and oral comments, and were utilized to develop and analyze the alternatives in this EA.

- Potential effects on cultural resources in the BCPA.
- Potential effects on wildlife species and their habitats.
- Loss of wildlife habitat from proposed project disturbance.

- Impacts on wildlife from proposed evaporation pond.
- Potential bird mortalities from birds flying into ponds and being contaminated with oil in evaporation pond.
- Overflowing of evaporation pond during heavy rainfall.
- Soil erosion
- Potential exposure of game species and other wildlife to the saline produced water.
- Water quality impacts from the produced water in the evaporation pond.
- Air quality impacts from construction, drilling, and production activities.
- Impacts to vegetation and soils.
- Potential impacts to nearby residential areas.
- Potential invasion of noxious weeds resulting from vegetation and soil disturbance.
- Depletion of groundwater needed for livestock.
- Increased traffic and associated impacts on County, State, and BLM roads and highways providing access to the BCPA.
- Reclamation success within the BCPA.
- Cumulative impacts of CBNG activities, when combined with past, present, and reasonably foreseeable future activities.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

The Proposed Action entails construction, drilling, completing, and producing 20 pilot CBNG wells in the BCPA, and construction of associated access roads, pipelines, production facilities, electric transmission lines, and an evaporation pond. Produced water from the CBNG wells would be transferred via pipeline either to a produced water disposal well or an 8.3 acre evaporation pond (Figure 2-1 in Appendix A). If the pilot project proves to be economically feasible, additional development would be proposed. However, additional development would require additional NEPA analysis that would more thoroughly evaluate the cumulative effects of the project in combination with the expanded project proposal and other past, present, and foreseeable future actions regardless of land ownership. The evaluation would occur over several temporal and spatial scales.

The objective of the pilot project is to obtain the following information:

- Determine if commercial quantities of CBNG are present in the three coal intervals (Shipton, Signor, and Hudson) within the Mesaverde Formation.
- Determine the amount of water produced associated with the coal seams.
- Determine quantity of produced water over time, so that water disposal needs can be determined.
- Evaluate the well density needed to optimize the CBNG production in the field.

It is anticipated that initial drilling operations would begin as soon as possible after the Record of Decision for this EA is signed. The estimated start date for the pilot project is Summer 2007. The life of project (LOP) is expected to be 20 to 30-years.

2.2 BACKGROUND ON COAL BED NATURAL GAS

This section of the EA provides some background information on CBNG, which is also referred to as coal bed methane (CBM).

2.2.1 COMPOSITION AND FORMATION OF CBNG

Natural gas, which is composed mainly of methane (CH_4), can be derived from organic matter, such as the remains of plants or animals. This organic matter has been compressed under the earth's surface at very high pressure for millions of years, which resulted in the formation of oil and/or gas. Another way in which natural gas (i.e., methane) is created is through the "coalification process", whereby organic material is geologically converted to coal. When the coal and methane conversion process occurs, such that the coal is saturated with water and methane, the result is "coal bed methane." CBM, or CBNG, is essentially the same compound as conventional natural gas; it is simply derived from a different geologic situation. CBNG currently supplies approximately eight percent of the natural gas in the U.S., and is expected to increase in importance (EIA 2001).

CBNG is associated with coal seams that act as both a source and a reservoir. Significant reserves of coal underlie approximately 13 percent of the United States' landmass. Since coal seams have large internal surfaces, they can store six to seven times more gas than the equivalent volume of rock in a conventional gas reservoir (USGS 1997). CBNG exists in the coal in three basic states:

as free gas; as gas dissolved in the water in the coal; and as gas "adsorbed" on the solid surface of the coal and held in place by hydrostatic (water) pressure.

2.2.2 CBNG PRODUCTION

Although CBNG is used in the same manner as conventional gas, its method of production is different. To extract CBNG, large volumes of water must be pumped from coal seams in order to reduce hydrostatic pressure that traps the gas within the coal. This "dewatering" process releases the gas and allows it to flow through the fractures and/or cleats into a well bore to the surface. It is for this reason that CBNG wells initially produce primarily water. As the hydrostatic pressure is lowered, gas production increases and water production declines.

In general, CBNG wells are drilled vertically through the coal section(s). A production casing is then set and cemented back to the surface. In areas where the natural fracture system is not fully developed, the coal may be artificially fractured. The shallow CBNG wells (generally no more than 5,000 feet deep) are typically drilled with a small mobile rig mounted on a truck and have a residual footprint of approximately 0.25 acre (ALL Consulting 2003). Horizontal drilling is sometimes pursued depending on the characteristics of the coal seam. Once the well is completed, an artificial lift system is run into the well to pump the water from the coal seam. The methane flows up the casing of the well and is sent via pipe to a compression station.

2.2.3 PRODUCED WATER IN THE CBNG PRODUCTION PROCESS

Water disposal and treatment options and costs are an important aspect of the CBNG industry, because the volume of water produced may be substantial, especially during initial production operations. Both the quality and quantity of water produced from well to well can vary greatly.

2.3 ALTERNATIVE SELECTION PROCESS

The development of alternatives to the Proposed Action is critical to the implementation of NEPA and its accompanying regulations. In accordance with 40 CFR 1502.14(a), the BLM is required to clearly define issues and evaluate all reasonable alternatives.

Based on the planning information provided by Devon and the comments submitted through the scoping process, two alternatives are analyzed in this EA. The alternatives analyzed in this EA are the Proposed Action and the No Action Alternative. These alternatives are discussed in Sections 2.3.1 and 2.3.2, respectively. Other alternatives considered for analysis in this EA but not carried forward for evaluation are discussed in Section 2.4 in this chapter, as well as the rationale for why they are not carried forward.

2.3.1 ALTERNATIVE A - PROPOSED ACTION

Under the Proposed Action a total of 20 pilot CBNG wells would be drilled over a one-year period in Sections 27 and 28; Section 33 E1/2 of NW/4, NE/4, N1/2 of SE/4; and Section 34 NW/4; in Township 34 North and Range 96 West in Fremont County, Wyoming. Each well would be constructed on 80-acre well density (i.e., one well/80 acres) (Figure 2-1 in Appendix A). Construction, drilling, and completion operations are provided in the following sections. Water disposal for the pilot project (i.e., injection well and evaporation ponds) is provided in Section 2.3.1.11. A summary of surface disturbance resulting from the Proposed Action is provided in Section 2.3.1.16 and Table 2-1.

2.3.1.1 Pre-construction Planning and Site Layout

Devon has submitted APDs for the 20 pilot wells and associated ROW applications to the BLM. The individual applications includes maps; site-specific plans, such as drilling plans with the casing/cementing program; surface use plans with road and drill pad construction details; and site-specific reclamation plans. The planned operations are in accordance with *"Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases."*

Each proposed well location will be inspected by the BLM to determine conformance with the Lander RMP (BLM 1987), and approved mitigation measures incorporated into the Lander RMP. Should conformance be confirmed, the BLM would then approve each proposal and attach the COAs, as appropriate, to each permit.

2.3.1.2 Construction

Construction techniques under the Proposed Action are intended to minimize surface disturbance as much as possible. Surface disturbance that results from the construction of the well pads, access roads, pipelines, and electrical power lines, and ancillary facilities immediately after the completion of construction is referred to as "initial disturbance." Surface disturbance that remains after successful interim reclamation of portions of the well pads, roads, and pipeline ROWs is referred to as "residual disturbance." Interim and final reclamation are discussed in Section 2.3.1.5.

A general discussion of access roads and well pad construction techniques that would be used by Devon for the Proposed Action is provided below.

Access Road Construction

Access to the BCPA is provided by various roads shown in Figure 2-1. All new access roads within the BCPA would be constructed for the specific purpose of the pilot project. Roads would be designed to minimize disturbances and maximize transportation efficiency. New access roads would be designed and constructed in accordance with BLM road standards. Roads would be closed and reclaimed by Devon when they are no longer required for production operations, unless otherwise directed by the BLM. Approximately four miles of access roads would be constructed, resulting in 26 acres of estimated disturbance.

Construction equipment and techniques utilized by Devon would be standard (e.g., crown-and-ditch method). All construction will be in accordance with 2006 edition of *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*, the "Gold Book" (Gold Book), and the BLM Road Standards Manual. Rock and gravel used for surfacing will blend to match the surrounding terrain. Should soft spots develop on the roadway during construction or drilling operations, they would be promptly covered with crushed rock or gravel. Areas on access roads to producing well sites identified during on-site review by the BLM, would be covered with gravel to a depth of four to six inches to reduce erosion and sedimentation. Interim reclamation measures would be implemented during the first operating season after well completion or abandonment (see Section 2.3.1.5). In the event a drilled well is a dry hole or plugged and abandoned, the disturbed areas, including the access road, would be reclaimed to the conditions that existed prior to construction, or as instructed by the BLM Authorized Officer (AO). Markers for abandoned wells would be placed at a height of approximately six to seven feet, and identified with the lease number. According to Onshore Oil and Gas Order Number 2, Drilling Operations

states "All casing shall be cut-off at the base of the cellar or three feet below final restored ground level (whichever is deeper). The well bore shall then be covered with a metal plate at least ¼ inch thick and welded in place, or a 4-inch pipe, 10-feet in length, four feet above ground and embedded in cement as specified by the authorized officer. The well location and identity shall be permanently inscribed. A weep hole shall be left if a metal plate is welded in place. Reclamation and site stabilization techniques would be applied, as specified by the BLM AO and in accordance with the operator's Storm Water Pollution Prevention Plan (SWPPP). (Refer to Appendix C for details on reclamation.) If a well is productive, the access roads to the well site would remain in place for well servicing activities (i.e., maintenance, improvements, etc.) for the life of the project. Road maintenance would include dust suppression during dry periods and snow removal in the winter. Interim reclamation and revegetation of the road would occur on portions of the ROW that are no longer needed. Further information on reclamation and revegetation is provided in Section 2.3.1.5 of this chapter and in Appendix C.

Well Pad Design and Construction

During well pad construction, all available topsoil (up to 12 inches) would be removed from the well pad area and stockpiled adjacent to the well pad. Stockpiled topsoil would be stored in a manner to maintain soil viability. Cut and fill slopes would be constructed, if necessary, in a manner that would hold topsoil during reclamation and subsequent re-establishment of vegetation. Topsoil salvage depths are site specific and will be determined on site by an experienced soil professional. After topsoil-stripping operations have been completed, construction of the well pad would begin.

Construction practices would involve use of standard earthmoving equipment. Components of the well pad would include construction of a reserve pit to store drilling fluids (a liquid with lubricating properties that is used during the drilling of a well), cuttings (pieces of rock removed during the drilling operations), and water produced during drilling, and a flare pit for emergency and development flaring. Gas would be flared for emergency purposes to control the pressure in the well, so that a blow out does not occur. Construction of a well pad and associated facilities would usually require approximately two to five days to complete, depending on site and terrain limitations. Well pads will be 310 feet by 200 feet, with an additional .5 acres (approximate) for spoil and soil piles at each pad. Reserve pit would be 60 feet by 90 feet by 10 feet. Well sites and reserve pits will be constructed according to the standards in Onshore Order #7 in accordance with the APD and standards prescribed by the BLM AO and the Gold Book.

Projected initial surface disturbance resulting from well pad construction is estimated to be 2.1 acres per well pad (W. Frank, Devon, personal communication, September 2006). Total initial disturbance from well pad construction under the Proposed Action is estimated to be 42 acres. Following successful interim reclamation, residual disturbance from construction of the well pad for the 20-30 year LOP would be approximately 23 acres. In the event a drilled well is a dry hole, the well would be plugged and abandoned, and the disturbed areas, including the well pad, would be reclaimed to the conditions that existed prior to construction.

2.3.1.3 Drilling Operations

Drilling a well would require transport of approximately 10 to 20 truckloads of drilling-related equipment and materials to facilitate the drilling operation, depending upon the development area. This includes transportation of the drill rig, drill pipe, drilling fluid products, and related support equipment, but does not include the truck traffic required for re-supplying the operation (e.g., fuel, drilling fluid additives, etc.). The extent of additional traffic would depend on the phase of

the drilling operation, but would not exceed more than six or seven vehicles per day per drill site throughout the drilling operation. Total rig-up activities and installation of ancillary facilities would take approximately three days to complete.

Early in the drilling operations, surface casing would be installed in the well. Surface casing would be set deep enough and cemented to the surface to protect freshwater aquifers. Drilling and production operations would continue over the development phase of the Proposed Action, until all 20 pilot wells are drilled. Completion operations for each productive well would commence as soon as possible after the drilling rig moves off location.

The geologic formation to be tested in the BCPA is the Mesaverde Formation. The drilling depth is anticipated to be approximately 4,000 feet for a well drilled through the Mesaverde Formation, requiring approximately seven to ten days to drill a vertical well, barring any major drilling problems.

A fresh water-based mud system would be used for the drilling operations. Drilling muds and cuttings would be placed in an earthen reserve pit lined with an impermeable synthetic liner to prevent seepage into the soil. The synthetic liner would be at least 12 mil (0.012 inch) thick, be resistant to decay from sunlight and hydrocarbons, and be compatible with the drilling fluids to be retained.

All reserve pits would be fenced and covered with netting or flagged to prevent access by birds and other animals. The reserve pits would be monitored daily for the presence of floating oil condensate. When oil accumulations are observed, they would be removed immediately. Reserve pit fluids would be allowed to dry by natural evaporation or by a mechanical evaporator to speed the drying process. The reserve pit would then be "closed," which involves the following steps:

- The liner is cut to just above the drilling mud line and disposed of in accordance with BLM requirements.
- The contents of the reserve pit are then covered to a depth of at least three feet by spoil and then topsoil.
- The buried liner continues to act as an impermeable barrier to the soil for many years, since it degrades very slowly.

Service trailers located on the well pad would be self-contained and would not require a septic system. Sewage would he hauled off-site to an approved disposal site.

If a well is productive, site erosion and sedimentation would be controlled by revegetating the areas around the well pads in the next fall or spring season with seed material and application rate specified by the BLM AO. Reseeding (reclamation) is discussed in Section 2.3.1.5 and in Appendix C. If surface water begins to mobilize sediment, it would be controlled by BMPs implemented through the SWPPP such as berms, sediment collection traps, diversion ditches and erosion stops, as needed.

2.3.1.4 Completion and Testing Operations

Well completion operations include perforation of the casing, stimulation, and testing of potentially productive zones. Casing prevents drill hole cave-in and aquifer mixing, confines production to the well bore, and provides a means of controlling pressure to facilitate installation of surface and subsurface well equipment. The CBNG completions in the BCPA would use a

string of tubing that is inserted in the casing to the bottom of the perforated productive zone to allow gas and water to flow or be pumped to the surface, where they would be collected, measured, and contained. Perforation, stimulation, and testing require the use of heavy equipment at the well site. Completion operations can take up to 30 days. If the well enters into commercial production, then production casing would be set to ensure well bore stability and protect geologic zones.

2.3.1.5 Interim and Final Reclamation

As set out in the Gold Book, interim reclamation consists of actions designed to minimize surface disturbance on all portions of the well site not needed for long-term production operations (BLM/USFS 2006). Final reclamation consists of actions designed to restore the character of the land and water to its pre-disturbance condition following well completion operations or conclusion of ancillary facility operations (BLM/USFS 2006).

Interim reclamation would be implemented on parts of the well pad, access road, and ROW that are no longer needed after completion and testing operations. Prior to seeding, reclaimable areas would be disced or ripped. Topsoil that had been stockpiled on the well pad would be placed over the disturbed surface. The surface would be graded to the original contour of the disturbed area or as directed by the BLM AO. The viability of the seed would be tested prior to use of the seed. Commercial seed would be certified or registered, and the seed container would be tagged in accordance with Wyoming State law. The planting depth would not exceed one-half inch using a seed drill.

The seed mixture used for reclamation and revegetation would be in accordance with the requirements of the BLM AO. Appendix C provides an example of the interim and final reclamation requirements. The seed would have to meet the following minimum requirements:

- Germination – 85%
- Purity – 95%
- Noxious weed content – 0 %
- Pure Live Seed – 81%

Percentage of pure live seed will be taken into consideration when application rate is being determined. Other weed species other than noxious weeds will be minimized as much as possible.

Seeding would occur during the months of September through November, or before the ground freezes, and in the spring after the ground has thawed, prior to May 15th. The BLM AO would supervise the seeding project. Seeding would be repeated until the AO has determined that the seeding is successful.

Closure of the evaporation pond would be conducted in accordance with BLM procedures. Prior to closure, a site inspection would be conducted between the operator and the BLM to determine the appropriate closure procedures. The closure procedures would include testing of the pit solids remaining after evaporation of the pit liquids to evaluate whether excavation and disposal of these materials would be necessary.

For more details on reclamation, see Appendix C.

2.3.1.6 Water Use for Construction, Drilling and Completion

Water for drilling, completion, and dust abatement would be obtained from a water well owned by Devon (BCU #118). Approximately 3,500 barrels of water may be used to drill each of the 20 wells, while approximately 1,000 barrels of water per well may be used for dust abatement, depending on weather conditions. Thus, a total of 90,000 barrels (or 11.6 acre-feet) of water may be used during the proposed project.

2.3.1.7 Pipeline Construction

Pipeline construction would occur in a planned sequence of operations following natural gas pipeline installation specifications, and would take place along a corridor of continuous activity. A 50-foot ROW would exist for the electrical power lines and co-located gas and water pipelines. A pipeline trench would be excavated mechanically with trenching equipment, such as a backhoe or trencher. The width of the trench would range from 18 - 24 inches. The trench would be constructed to a depth that would maintain at least 36 inches of normal soil cover or 24 inches of cover in consolidated rock.

Pipe laying activities would include pipe stringing, bending, welding, coating, lowering of pipeline sections, and backfilling the trench with soil. Newly constructed pipelines would be hydrostatically tested to evaluate structural soundness. Integrity tests would be conducted in full compliance with the mandatory BLM pipeline stipulations. The pipeline pressure would be slowly increased to the maximum operating pressure of the pipeline. This pressure would be maintained for 24 hours. If a leak is discovered, the pipeline would be purged, repaired, and the pressure tested again by the same procedure. For the hydrostatic testing of the pipeline, water would be taken from the Devon water well. In the winter, ethylene glycol would be used for testing to prevent the pipe from freezing. The hydrostatic testing liquid would be transported by truck to the reserve pit. The ethylene glycol would be separated from the water and placed in a storage tank, and reclaimed for reuse.

Approximately 10 miles of new pipeline (gas and water lines) would be constructed under the Proposed Action. Of these 10 miles, eight miles of pipeline ROW would include electrical power lines on the surface. The ROWs for the electrical power lines and co-located gas and water pipelines would tie into the remaining two miles of water pipelines ROWs, which would connect to the injection well and existing evaporation pond.

Initial disturbance from the 10 miles of pipeline ROW would be approximately 53 acres. Of the total 53 acres, 49 acres would occur as a result of construction of a 50-foot wide ROW for the electrical power lines and co-located gas and water pipelines. The remaining four acres would occur as a result of construction of the two miles of gas and water pipelines.

Following pipeline installation, surface disturbed by pipeline burial would be completely reclaimed, resulting in no further surface disturbance from the pipelines. However, the residual reclamation for the electrical utility lines would be approximately 49 acres. More information is provided in section 2.3.1.9.

2.3.1.8 Compressors

No compression is proposed for the BCPA. An existing compressor outside the BCPA would provide the necessary compression for the proposed project.

2.3.1.9 Electrical Power Lines

As indicated in Section 2.3.1.7, the electrical power lines would be co-located with the proposed pipelines. There would be no disturbance beyond what was indicated in Section 2.3.1.7. The 50-foot wide ROW would remain for accessing the electrical power line route for routine maintenance (W. Frank, Devon, personal communication, November 2006), resulting in residual disturbance of 49 acres for the electrical power line ROW.

2.3.1.10 Estimated Traffic and Employment Requirements for Drilling and Completion Operations

Traffic for drilling operations would include surveying crews, engineers, drilling rig crews, casing crews, roustabouts, supervisory staff, and loggers. It is estimated that approximately 200 trips using pickups and trucks would be necessary during drilling. Traffic for completion operations would require rig crews, logging, acid, and frac crews, watering, well pipeline, and supervisory crews to make an estimated 140 trips (W. Frank, Devon, personal communication, 2006).

Numerous workers would be employed in various phases of the pre-drilling, construction, drilling, completion/testing and production, and pipeline construction. It should be noted that many of the personnel employed in different phases of the project would not be employed full-time on an annual basis, but would be employed for shorter periods of time, as needed. The manpower estimated for drilling is 85 personnel, working 3,843 hours, or approximately 480 man-days (W. Frank, Devon, personal communication, 2006) per well. Manpower estimates for completion operations are 50 personnel, at 1,052 hours for a total of 131 man-days (W. Frank, Devon, personal communication, 2006) per well.

2.3.1.11 Water Disposal

It is estimated that, on average, each CBNG well could initially produce 500 barrels of water per day, based on results of pilot wells in the Riverton Dome field immediately to the north of the BCPA. The amount of produced water from CBNG wells is expected to decline rapidly over time. The primary water disposal method for this pilot project involves the use of an injection well, with evaporation ponds used as a backup method, when the injection well is being repaired or the produced water exceeds the capacity of the injection well. The two disposal methods are described below.

Injection Wells

Devon plans to drill a new well that will be drilled and constructed as a produced water injection well. The new well will be located inside the BCU in Section 21. The well will be cased to protect fresh water aquifers. The procedure for transferring the produced water from the CBNG well to the injection well is described below.

Once the produced water is removed from formation by pumps, it would go through the various phases of separation and would be temporarily stored in a holding tank until it is injected into the water disposal well. A centrifugal pump would pull the water from the storage tanks and force the water through a filter to remove particulate matter. After the water passes through the filters, corrosion and scale inhibitors would be injected into the stream. The water then travels to the injection pump suction, where it would be pressured up by the pump and forced down hole in the injection well.

The produced water would be injected into the Madison Formation at a depth of approximately 12,500 feet. This geologic formation is composed of limestone can accept about 15,000 barrels of water per day.

Devon is currently preparing an APD for the proposed injection well and will submit it to the BLM for review and approval. In addition, an Underground Injection Control permit would be obtained from the Wyoming Oil and Gas Commission and/or WDEQ prior to drilling of this well.

Evaporation Ponds

Introduction

The secondary method for holding and disposing of produced water would be use of evaporation ponds. One new evaporation pond is proposed in the BCPA. An existing evaporation pond may also be utilized. The evaporation ponds would be used as a "backup," if the injection well is shut down or if the produced water exceeds the capacity of the injection wells. Injection wells and the equipment associated with these wells, such as pumps and filters, may experience mechanical failure from time to time. It is possible, but unlikely that the injection well could be inoperative for one week at a time, up to three times a year. During these situations, the two evaporation ponds would be available to hold the produced water, so that the dewatering process could continue without a setback.

There is an existing evaporation pond on private property northwest of the BCPA in Section 12, T2S, R4E, which is presently being used to hold produced water from the Riverton Dome CBNG wells. It is approximately 600 feet by 600 feet (8.3 acres) in size and has an estimated capacity of 385,000 barrels (bbl) of produced water. Since this evaporation pond would be primarily used for the Riverton Dome project, capacity of this pond could occasionally be a concern, depending on the level of production at the Riverton Dome field. Therefore, an evaporation pond system is proposed for the Beaver Creek project in Section 28, T34N, R96W, and would have a similar holding capacity as the pond in the Riverton Dome field. Figure 2-1 shows the location of these evaporation ponds. Neither the existing pond nor the proposed pond location occurs within any existing drainage routes.

The proposed evaporation pond would be lined with a 60 mil plastic liner to prevent percolation into the soil. A leak-detection system also would be installed. In addition, the walls of the pond would extend above ground level. A drainage ditch would be constructed to divert rainwater away from the pond. The produced water would be transported to the evaporation ponds via a 4-inch pipeline. The water in the evaporation pond would remain in place until evaporation occurs. Evaporation measurements conducted by the National Weather Service during the period between 1956 and 1970 reveal that the average annual free water surface evaporation is about 37.5 inches in the Riverton area (Wyoming Climate Atlas 2004). Therefore, for each pond, the estimated annual evaporation would be approximately 25.9 acre-feet, or 200,941 barrels (550 bbls/day).

Most of the evaporation would occur during May through October of each year. When the water level reaches a point two feet below the top of the bank of the pond (i.e., two feet of freeboard), no further water would be piped to the pond. Because of the two feet of freeboard, the evaporation pond would not overflow during a 100-year rainfall event (i.e., three inches of rain).

Bird Avert System

To prevent wildlife (especially birds) from entering the ponds, each pond would be equipped with a system of hazing devices called the "Peregrine Birdavert System," which is manufactured by Peregrine Systems, Salt Lake City, UT, and is based on emission of sounds, light, or motion at random intervals to deter birds and other wildlife from entering the pond.

The Peregrine Birdavert System's radar is used to detect birds in flight. During periods of heavy rain or high wind, the radar-detection equipment becomes dormant, which eliminates false alarms. Once birds are detected by the radar, the computer software activates the remote controller units, consisting of the hazing devices. There are a total of eight hazing devices, consisting of oversized plastic falcons, with five-foot wingspans. They flap their wings violently, when computer commands are issued to deter birds in flight from landing on the ponds. Only a few studies have been completed on the effectiveness of radar-activated bird deterrent systems (Stevens et. al. 2000, Ronconi et. el. 2004 and 2006); however, these studies have shown that these systems do reduce bird landings at industrial wastewater ponds and thus reduce mortality. The Birdavert system, which has been in operation for approximately one year in the Riverton Dome field, appears to work very well (B. Skelton, Devon, December 2006). However, the system is not 100% effective.

Produced Water Treatment

Devon's primary means of preventing birds from coming into contact with oil on the ponds would be to remove the oil from the produced water prior to entering the pond. At each of the CBNG wellheads, an emulsion-breaking chemical would be injected into the fluid stream. This would be the first phase of separation. This chemical would help the oil and water separate from each other.

The fluid produced from the CBNG wells would then be pumped to a heated Free Water Knockout (FWKO) vessel where the second phase of oil-water separation would take place. The water would then be sent to gun-barrel tanks where the water would pass through the third phase of separation. The water would then be sent to the water storage tanks where the produced water would pass through the fourth phase of separation.

Phase 4 separation would consist of four 500 bbl water tanks equipped with fluid spreaders and overflow piping. As the fluid enters the tanks, the stream would spread out near the bottom of the tank where the fluid velocity slows. The oil, being lighter in density than the water, would migrate up through the water to the top of the tank where it would collect and then overflow into the oil tanks through the overflow piping. The water would then be pulled from the tanks into the disposal pumps for down hole injection. Water that overflows the water tanks would then be routed to the Serpentine pit for the fifth phase of separation.

Phase 5 separation consists of a single "S" shaped pit that would allow the water to density-separate. In this process, the oil is pulled off the top of the pit, which is netted, by a vacuum truck as it builds up. The water would then be pulled from the bottom of the pit and pumped into the evaporation pond.

In addition to the water-oil separation process, Devon would continually monitor the evaporation pond for oil on the surface, and would use a vacuum trailer small enough to operate from the top of the evaporation pond dike. The vacuum trailer would be used to remove the oil from the surface of the water whenever any oil is observed. Any oil removed from the evaporation pit would be sold with other oil produced from the Beaver Creek Field.

2.3.1.12 Production and Maintenance Operations

Production operations would occur on a year-round basis, occasionally limited by weather, maintenance, workover operations, and ground and site conditions. Maintenance of the access roads would occur during the spring, summer and fall months. Winter maintenance would include blading of snow from the access roads, as necessary, with the blade kept above the ground surface. Cut and fill slopes associated with each production well site would be reclaimed, as prescribed in the approved APDs and ROW permits. Each producing well would flow to a common facility or central delivery point (CDP). All wells would be manually operated and typically visited on a daily basis. Monitoring and maintenance of the Storm Water Discharge runoff/erosion control BMPs will occur at the required intervals.

2.3.1.13 Production Estimates

Since no CBNG production has occurred within the BCPA, production estimates would not be available until the conclusion of the 20-well pilot project.

2.3.1.14 Central Distribution Point

Devon would construct a central distribution point to meet production needs. Two potential facility locations are shown in Figure 2-1, one of which would be utilized for the pilot project. The 40,000 square foot (.92-acre) facility would include two heated “knockouts” (i.e., a vessel that typically separates oil and gas from large amounts of water), two vertical separators, four gun-barrel tanks, four water tanks, two oil tanks, a water transfer pump, and filter skid. A filter skid removes the solid particles (sand and/or coal fines) from the produced water before it enters the injection well pumps. The vessels would be covered by a metal building to prevent freeze-up in the winter months (W. Frank, Devon, personal communication, November 2006). The water tanks would be covered by a separate building. Header houses, where the gathering pipelines come to the surface and converge, would also be located on the central distribution point pad.

2.3.1.15 Well Abandonment and Final Reclamation

Wells reaching ultimate recovery would be plugged and abandoned after production ceased, and the well pads would be reclaimed. Thus, over the life of the project the surface disturbance would be reduced to the minimum necessary for production operations. At the end of the life of the project, the well pads, the central distribution point, access roads, and electrical lines would be reclaimed using the final reclamation procedures described in Section 2.3.1.5.

2.3.1.16 Initial and Residual Disturbance Resulting from the Proposed Action

Total initial surface disturbance resulting from the Proposed Action would be approximately 132 acres (approximately 7.5 percent of the BCPA (Table 2-1)), resulting from:

- 20 well pads creating approximately 42 acres of initial surface disturbance.
- One salt-water disposal well creating approximately two acres of initial surface disturbance
- 4 miles (26 acres) of surface disturbance from new roads or upgrades of existing roads;
- One proposed evaporation pond approximately 8 acres in size;
- 8 miles (49 acres) of co-located pipelines and electrical power lines;
- 2 miles (4 acres) of disturbance associated with the pipelines carrying produced water to the evaporation ponds and injection well; and
- Approximately 1 acre of new surface disturbance from the BCU facility pad.

It is important to note that this acreage total is slightly higher than the resource-specific disturbance totals calculated in Chapter 4 (e.g., pronghorn crucial winter range), since the latter calculations are based on GIS mapping which takes overlapping elements into account.

Interim reclamation of the disturbed land would begin as soon as possible after the completion of the drilling and completion program. The portion of the ROWs used for pipelines would be completely reclaimed. Unproductive wells would be plugged and abandoned and the well pads subsequently reclaimed. Wells reaching ultimate recovery would be plugged and abandoned after production ceased, and the well pads subsequently reclaimed. During the 20 to 30-year life of the project (LOP), residual surface disturbance would be reduced to approximately 92 acres or approximately 5.2 percent of the BCPA, as shown in Table 2-1.

Table 2-1. Surface Disturbance Summary for the Proposed Action [1]

Well Pads /Reserve Pit/Soil and Spoil Piles	42	23
Salt Water Disposal Well	2	1
Access Roads	26	10
Pipelines co-located with electrical lines	49	49
Pipeline to existing evaporation pond and SWD well	4	0
Evaporation Pond	8	8
Central Distribution Point	1	1
Total Disturbance (acres)	**132***	**92***
Percent of Project Area	7.5%	5.2%

[1]Project Area is approximately 1,750 acres
[2]Under "No Action," the Proposed Action would not be implemented.
[3]**Initial disturbance** is the surface disturbance resulting from construction of the well pads, salt water disposal well, access roads, pipelines, and electrical power lines, evaporation pond, and central distribution point immediately after construction operations.
[4]**Residual disturbance** is the surface disturbance after interim reclamation of portions of the well pads, roads, and pipelines no longer needed for the production phase of the operations. It is the surface disturbance that will remain for the life of the project.
* Total of individual disturbances is slightly higher than GIS-generated total disturbances presented in chapter 4 due to GIS removal of overlapping disturbance areas.

2.3.2 ALTERNATIVE B - NO ACTION ALTERNATIVE

NEPA and its implementing regulations require that a No Action Alternative be evaluated for comparison with the other alternatives analyzed. The No Action Alternative serves as a benchmark, enabling decision-makers to compare the magnitude of environmental effects resulting from the Proposed Action. Under the No Action Alternative, the BLM would reject Devon's proposal to conduct a 20-well pilot project to explore and develop coal bed natural gas in the BCU, as described in the Proposed Action.

If the Proposed Action is rejected, then no well pads, access roads, pipelines, electrical power lines or evaporation ponds would be constructed, therefore, 132 acres of disturbance in association with this project would not occur. Under the No Action Alternative, there would be no new disturbance from the proposed project to vegetation, wildlife, special status plant and animal species, soil, cultural resources, paleontological resources, recreation, surface water and groundwater, range resources, and other resources.

Under the No Action Alternative, workers that would be used to assist with the construction, drilling, and development of the proposed project would not be employed.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

In accordance with the CEQ regulations (40 CFR 1502.14a), the BLM is required to explore and evaluate all reasonable alternatives identified in the public scoping comments. Those alternatives that were considered, based on public comments, but eliminated from detailed analysis are discussed below and the rationale for eliminating them is provided.

2.4.1 ELIMINATION OF THE EVAPORATION POND

Several commentors on the Beaver Creek Scoping Notice expressed concern with the use of evaporation ponds for holding produced water. Concerns expressed include the following:

- The design and management of the evaporation pond should prevent potential direct, indirect, and cumulative impacts to surface and groundwater quality.
- Evaporation pond overflow could potentially affect water quality in Beaver Creek and downstream waterways, and causing soil erosion.
- Contact with fluids in the evaporation pond could potentially cause mortality to wildlife, especially birds; thus, the use of effective wildlife exclusionary devices recommended.

As indicated in Section 2.3.1.11, the existing and proposed evaporation ponds would serve as a backup method for water disposal; when the injection well is being repaired or the produced water exceeds the capacity of the injection well. Since the proposed evaporation pond would contain a 60 mil liner and a leak detection system, produced water would not affect groundwater quality. The evaporation pond would also have two feet of freeboard (i.e., the top two feet of the pond would contain no water), so that water would not overflow from the pond during a 100-year flood event, which consists of three inches of rain. Therefore, water would not reach Beaver Creek and downstream waterways, and would not affect surface or groundwater quality.

A wildlife exclusionary system (i.e., Bird Avert) would be in place to prevent wildlife, especially birds, from landing on the evaporation pond. In addition, a fence would be placed around the pond to keep out game species and other animals.

Based on the information above, elimination of the proposed evaporation pond from the Proposed Action, was considered, but eliminated from detailed analysis.

2.4.2 SURFACE DISCHARGE OF PRODUCED WATER

A water quality analysis was conducted of the produced water from an existing CBNG well in the Riverton Dome field. A comparison of major ion chemistry with Wyoming DEQ standards for groundwater suitability indicates that produced water is generally suitable for livestock use, but is unsuitable for domestic supply or irrigation without treatment or dilution. Calculated values for Sodium Adsorption Ratio (SAR) and residual sodium carbonate exceed the agriculture suitability limits. Parameters measured at concentrations that exceed Wyoming drinking water standards include iron, chloride, and Total Dissolved Solids (TDS). Unless the produced water is purified to lower sodium and bicarbonate and lower mineralization, irrigation with this water could reduce infiltration in the soil and potentially decrease crop production. The environmental concerns of surface discharge of produced water and the high costs associated with treatment of the water, resulted in the elimination of this alternative from detailed analysis.

2.4.3 DIRECTIONAL DRILLING

Directional drilling, including various cluster drilling patterns and multilateral (or pinnate) drilling patterns, has become technically and economically feasible for many types of field development projects in diverse settings. The use of one pad to drill multiple wells reduces surface disturbance associated with the construction of roads and pads and related environmental effects. These drilling techniques, while feasible in some cases, are considered to be potentially unreliable or resulting in increased risk of failure, particularly when a project involves an exploratory area and exploration wells. In the Northern San Juan Basin in New Mexico and Colorado where innovative directional drilling techniques have been tried for development of CBNG, problems encountered have included holes plugging with coal fines, well bore instability, and fluids collecting in deviated sections (USFS 2004).

Large drilling angles introduce significant drilling and production risk, which is multiplied as the angle increases. In addition, due to the shallow depth of the producing horizon and the proposed 80-acre spacing of the wells, the risk associated with achieving a successful completion using a directional well is high. It is also important to maintain a relatively uniform distance between the 20 pilot CBNG wells, so that the necessary "interference" can be achieved. This interference among wells is needed to adequately remove the CBNG from the coal seam. As a result of the technical risks, directional drilling of these exploratory wells could prohibit Devon from developing their Federal mineral leases, thereby limiting their ability to meet the purpose for the project. Therefore, due to significant drilling and production problems that could result, directional drilling was considered but eliminated from detailed analysis.

2.4.4 CONSTRUCTION OF A SECOND WATER DISPOSAL WELL

As described in Section 2.3.1.11, Devon proposes to drill a produced water injection well in Section 21, T34N:R96W. The proposed injection well is expected to accommodate all produced water from the 20 pilot wells. However, the injection well and the equipment associated with this

well, such as pumps and filters, may experience mechanical failure from time to time. It is possible, but unlikely that the injection well could be inoperative for one week at a time, up to three times a year. As such, on occasion a secondary water disposal source may be needed. Therefore, as also described in Section 2.3.1.11, Devon proposes to construct an evaporation pond system in Section 28, T34N, R96W as a secondary or "backup" method for water disposal. During the public scoping period, several public comments expressed concern about the use of evaporation ponds in the BCU and suggested the construction and use of a second injection well as the "backup" method of water disposal instead of an evaporation pond system. The rationale for dismissing this suggestion is provided below:

The primary need for having an alternate source of water disposal is due to the rare potential for injection well failure. An injection station (central station that consists of charge pumps, injection pumps, electrical controls, air controls, filters, etc.) controls the operation and functioning of injection wells. Thus, when an injection well "fails" to work, it is generally the injection station equipment that fails rather than the actual injection well itself. Building a redundant or second injection well in the BCU would not alleviate the potential for failure and would not provide a secondary method for water disposal as both injection wells would be controlled by the same injection station. Thus, if the proposed injection well in Section 21, T34N:R96W were to temporarily fail, the secondary injection well would also fail, and there would be a loss, however lengthy or short-lived, of water disposal capability within the BCU. An evaporation pond, on the other hand, would provide a separate water disposal system that would not be susceptible to or affected by the failure of the injection station.

In addition to not providing an independent backup water disposal source, a second injection well was also dismissed from detailed analysis because of the substantial costs associated with its development. Construction of a second injection well would require up to 85 workers at 480 man-days for drilling, and 50 workers at 131 man-days for completion per well. These additional construction and drilling requirements would result in substantially increased costs (approximately $3 million more) as compared to the construction of an evaporation pond. The difference in the costs of a second injection well versus an evaporation pond as a back-up method of water disposal is provided below in Table 2-2. Since the potential success and production of the pilot project is unknown at this time, drilling a second water disposal well would entail a substantial and premature expenditure for a "backup" water disposal facility on an exploratory project that, under worst-case conditions may only be needed three times per year.

For the above technical and economic reasons, a second injection well was dismissed from detailed analysis.

Table 2-2. Estimated Costs of Construction of an Evaporation Pond vs a Second Injection Well

Evaporation Pond	$600,000	$0.55/ barrel
Injection Well	$3,600,000	$9.50/ barrel
COST DIFFERENCE	**$3,000,000**	**$8.95/ barrel**

Source: Wally Frank, Devon, personal communication, December 2006.

2.4.5 DRILLING MORE THAN OR LESS THAN 20 PILOT WELLS

A pilot project consisting of drilling more than 20 wells or less than 20 CBNG wells was initially considered for this EA. However, based on Devon's recent experience with CBNG development in other fields in Wyoming, New Mexico, and other states, the company has determined that a pilot project of 20 wells was statistically necessary in order to:

- Determine if 80-acre spacing is sufficient to maximize the drainage of the reservoir.
- Obtain pressure depletion data for each of the three coal intervals.
- Obtain interference/communication data between the 20 wells.
- Obtain data about the quality of the gas (i.e., CO_2) from the wells.
- Determine the typical amount of produced water from the 20 pilot wells.

Devon has determined, based on experience with CBNG development in other fields in Wyoming and other states, that 20 CBNG wells is a statistically significant minimum number of pilot wells necessary to obtain the above information and to meet the purpose for the project. Based on this information, an alternative analyzing the development of fewer wells was dismissed from analysis. Furthermore, Devon has determined that a pilot project of more than 20 wells is not necessary to meet the purpose for the project, and thus was dismissed from analysis. Should the pilot project prove successful, this information will enable Devon to design and develop a field development program that minimizes impact to the human environment and maximizes the drainage of the reservoir, as required by Federal statutes.

2.4.6 SHUT IN THE WELLS WHEN PROBLEMS OCCUR WITH THE INJECTION WELL

Another alternative that was considered but eliminated from detailed analysis included shutting in the 20 CBNG wells when unforeseen problems arise or when routine maintenance is needed on the proposed water disposal / injection well. Devon has indicated that numerous technical and mechanical impacts may occur from shutting in the CBNG wells. They include 1) potential negative impact on de-watering of the reservoirs and 2) potential negative impact on well-bores. Some of the problems associated with shutting in the wells are described below.

To extract CBNG, water is pumped from the coal seams, the hydrostatic pressure is reduced, and the gas within the coal is released. As this process continues over time, gas production increases and water production declines. If any well is shut-in, and more importantly if all the wells are shut-in, this process is disrupted. The reservoir may not be static during the period the wells are shut-in. As a result, when a well starts to produce again, the hydrostatic pressure may have increased and the process of decreasing the hydrostatic pressure must begin again. The effect on the reservoir should all the wells be shut-in at the same time could be significant.

When a CBNG well is shut-in, coal fines in the water may settle out and clog the perforations and/or the water pump that has been lowered into the wellbore. As a result, when production from the shut-in well is started up again, one or both of these problems may become apparent and a workover of the well is required to "clean-out" the perforations and/or the pump. In addition, there is a risk that the reservoir itself is damaged by the coal fines and the quantity of production after the well is shut-in is less than the quantity that existed prior the time the well was shut-in.

Therefore, shutting in the wells if a problem occurs with the proposed injection well was considered, but eliminated from detailed analysis.

2.4.7 EVAPORATION PONDS ONLY

Another alternative considered, but eliminated from detailed analysis was using evaporation ponds only for holding the produced water. The reason why this alternative was eliminated from detailed analysis is provided below.

Use of two evaporation ponds, (i.e., the proposed evaporation pond in the proposed BCPA and the existing evaporation pond on fee lands), does not provide sufficient holding capacity for the produced water. As a result, multiple ponds (resulting in additional surface disturbance) would be required if this alternative was selected in order to handle the anticipated volume of produced water and avoid the problems of shutting down the wells. In addition, the evaporation process varies seasonally, functioning more efficiently in the summer than the winter. Thus, the wells would probably need to be shut-in periodically, when the evaporation ponds are "full." The problems associated with shutting in the wells are discussed in Section 2.4.6. Therefore, the alternative of using evaporation ponds only was considered, but eliminated from detailed analysis.

2.4.8 BURIED POWERLINES

Burial of all proposed powerlines was considered but eliminated from detailed analysis for the following technical and safety reasons:

- Powerline maintenance and changes to powerline configuration would result in maintenance and safety issues if powerlines are buried. Any maintenance or repair activities would require re-excavation of the powerline following interim reclamation, this would result in re-disturbance, and could substantially delay Devon's ability to conduct maintenance or repair work.
- As committed to in Section 2.5, Devon has agreed to work closely with the BLM to develop effective ways to reduce the potential for collisions with or electrocution of raptors by powerlines. Such measures would include the use of the *"Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006"* (APLIC 2006) and *"Avian Protection Plan (APP) Guidelines"* (APLIC and USFWS 2005). Implementation of these measures would minimize or effectively eliminate the potential concerns that lead to initial consideration of a buried powerline alternative.

2.5 MITIGATION MEASURES

Regulatory requirements and applicant-committed measures for the proposed project are specified in the following documents:

- Stipulations attached to the individual leases,
- Decisions in the Lander RMP (BLM 1987) for oil and gas operations,
- BLM BMPs, COAs, and Seasonal Wildlife Restrictions in each APD (see Appendix C in this EA),

- The Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities (BLM 2005) (see Appendix D in this EA), and
- WDEQ Storm Water WYPDES Permit.

In addition to required mitigation measures specified in the documents identified above, Devon has voluntarily committed to using BMPs and mitigation measures to avoid or minimize impacts from the Proposed Action to the natural resources in the BCPA. These mitigation measures are identified below by resource. It should be noted that many of the measures identified would benefit most, if not all resources in the BCPA.

Air Quality

- Unpaved access roads constructed by Devon would be watered or treated with dust suppressant, as needed, to minimize the release of dust into the air.
- Carpooling of workers would be encouraged, in order to reduce the amount of dust from vehicles during well development.
- Speed limits would be reduced to minimum design speeds for roads as discussed in the Gold Book.

Water/ Soils

- Pipelines would be installed in a manner that utilizes the existing topography to the greatest extent possible in order to ensure the shortest pipeline route possible, while minimizing the amount of surface disturbance associated with pipeline installation.
- Proposed project facilities would be constructed with erosion and sedimentation controls to reduce erosion rates.

Paleontological Resources

- Pre-disturbance surveys would be conducted to reduce the likelihood that significant fossil resources would be damaged or destroyed.

Vegetation

- Existing roads and corridors would be used for construction and development operations to the extent possible to minimize disturbance to vegetation.
- Reclamation of well pads, pipelines, and other disturbed areas would be monitored to ensure that native plants are re-colonizing the disturbed area and noxious weeds are controlled.
- Fencing the revegetated areas would be utilized, where appropriate to keep cattle from feeding on the newly reclaimed areas. Fencing would involve the installation of a temporary fence, such as an electric, fence, or a more permanent three-strand barbed wire fence, suitable for cattle and antelope.
- Weed infestations would be treated with herbicides specified by the BLM AO, to prevent spread of weeds. The method of weed treatment would be determined by the BLM AO.

Wildlife

- In the unlikely event that an animal is killed by vehicular traffic the carcasses would be removed from the access roads or road shoulders or ROWs to minimize collisions between vehicles and scavenger wildlife species.
- All drivers would be informed about the types of wildlife in the area that are susceptible to vehicular collisions and the measures that would be taken to minimize collisions.
- Reclamation of disturbed sites will include seeding native species suitable for each range site.
- Raptor deterrents would be installed on overhead powerlines in accordance with the *"Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006"* (APLIC 2006) and *"Avian Protection Plan (APP) Guidelines"* (APLIC and USFWS 2005).

Special Status Species

- A field survey for sensitive plant species would be conducted prior to surface disturbance, and locations of these species would be identified, so that occupied habitat would be avoided.
- A raptor nest survey would be conducted in the spring prior to surface disturbance so that active raptor nests would be avoided by the proposed development.
- Project employees and contractors would be prohibited from collecting plants, since BLM sensitive plant species may be present in the BCPA.
- Project activities would avoid white-tailed prairie dog colonies to protect the habitat for future reintroduction of the black-footed ferret.
- Seeds planted as part of reclamation would include sagebrush and other vegetation species, as specified by the BLM Authorized Officer, to restore disturbed habitat of sensitive species, including the greater sage-grouse.
- This project has been identified as being in potential sage grouse nesting habitat. According to 43 CFR 3101.1-2, new surface disturbing activities may be prohibited during the lease year to minimize adverse impacts where resource values were previously unrecognized (e.g., sage grouse nesting). During the period from March 15th to July 15th, the operator shall notify the Lander Field Office, in writing, ten (10) days prior to initiating any surface disturbing activities. An evaluation will be conducted of the area and a decision will be made by the Authorized Officer to either proceed, require surveys, or delay activities. Any variances to this Condition of Approval must be approved in writing by the Authorized Officer prior to any surface disturbing activities.
- If sage-grouse nesting is documented within the BCPA or associated with a new lek found within two miles of the BCPA, new surface disturbing activities would be prohibited from March 15th to July 15th unless the BLM Authorized Officer approves the activities, in writing. No surface disturbance will be allowed within ¼ mile of a sage grouse lek if discovered within the BCPA.
- This project has been identified as being in potential mountain plover nesting habitat. According to 43 CFR 3101.1-2, new surface disturbing activities may be prohibited during the lease year to minimize adverse impacts where resource values were previously unrecognized (e.g., mountain plover nesting). During the period from April 10th to July 10th, the operator shall notify the Lander Field Office, in writing, ten (10) days prior to initiating any surface disturbing activities. An evaluation will be conducted of the area and a decision

will be made by the Authorized Officer to either proceed, require surveys, or delay activities. Any variances to this Condition of Approval must be approved in writing by the Authorized Officer prior to any surface disturbing activities.

- Seasonal restrictions on new surface-disturbing activities between April 10th and July 10th within ¼ mile of suitable nesting habitat for mountain plover exist.

Range Resources

- The size of access roads, wells and production facilities would be the minimum acreage necessary for drilling and production, to minimize impacts to rangeland operations.
- Disturbed areas would be stabilized and seeded with native species appropriate for each specific range site where disturbance has occurred and to minimize the loss of livestock Animal Unit Month's (AUM).

Cultural Resources

- Workers would be informed that identified cultural sites would be avoided at all times.
- Workers would be instructed to cease operations should unexpected cultural sites be encountered during any operation.

Transportation

- Speed limits on Devon–constructed access roads would be reduced to minimize the risk of traffic accidents, dust generation, and noise levels.
- Carpooling by workers would be encouraged to reduce traffic on roads.
- Load limits for vehicles would be observed at all times to prevent damage to existing road surfaces.

Visual Resources

- Wells and facilities would be painted with flat colors, as specified by the BLM AO, that blend with the adjacent surrounding undisturbed terrain.
- During night drilling operations, lights would be mounted at the lowest possible height in order to minimize visual impacts.

Health and Safety/ Fire Management

- To minimize undue exposure to hazardous situations, warning signs and fencing would be installed around facilities, as required by regulations, to prevent unauthorized access and alert the public to potential hazards in the area.
- Pipeline markers would be posted at frequent intervals along existing gas pipelines and other areas likely to be disturbed by construction activities, to warn excavators and to reduce the risk of accidental rupture.
- All employees and subcontractors would receive training in H_2S awareness, fire prevention and control, incident reporting and response, first aid, general emergency response, and spill prevention and response for chemical spills and releases.

- To minimize the risks of fires and their severity, suppression equipment (fire extinguishers, fire water and hoses) would be available during construction and maintained on-site at various facilities.

3.1 INTRODUCTION

Chapter 3 of this EA describes the baseline conditions within the BCPA. The baseline conditions are used as a comparison for determining the effects of the Proposed Action on the critical elements of the human environment, as identified in BLM's NEPA Handbook H-1790-1 (BLM 1988).

The critical elements of the human environment, their status in the BCPA, and their potential to be affected by the proposed project are listed in Table 3.1-1. They are addressed in the following sections of this chapter.

Table 3.1-1. Critical Elements of the Human Environment, Beaver Creek CBNG Pilot Project, Fremont County, Wyoming

Air Quality	Potentially Affected	Yes
Areas of Critical Environmental Concern	None present	No
Cultural Resources	Potentially Affected	Yes
Farm Lands (prime or unique)	None Present	No
Floodplains	None Present	No
Fuels/ Fire Management	Potentially Affected	Yes
Health and Safety	Potentially Affected	Yes
Invasive, Non-native Species	Potentially Affected	Yes
Native American Concerns	Potentially Affected	Yes
Paleontological Resources	Potentially Affected	Yes
Range Resources	Potentially Affected	Yes
Socioeconomics/ Environmental Justice	Potentially Affected	Yes
Soil Resources	Potentially Affected	Yes
Threatened and Endangered Plant and Animal Species	Potentially Affected	Yes
Vegetation	Potentially Affected	Yes
Water Quality (surface and groundwater)	Potentially Affected	Yes
Wetlands/Riparian Zones	None Present	No
Wild and Scenic Rivers	None Present	No
Wilderness	None Present	No
Wildlife and Fisheries	Potentially Affected	Yes

[1]In alphabetical order

3.2 GEOLOGY AND MINERALS

3.2.1 GEOLOGY

3.2.1.1 Regional Geology

The BCPA lies within the southeastern part of the Wind River Basin, a large trapezoidal-shaped structural and topographic basin that occupies about 8,500 square miles in central Wyoming (Keefer 1965, 1970). The basin is surrounded by a series of anticlinal structural uplifts including:

(1) the Washakie Range to the northwest; (2) the Owl Creek Mountains to the north; (3) the southern Bighorn Mountains to the northeast; (4) the Casper Arch to the east; (5) the Rattlesnake Hills Anticline to the southeast; (6) the Sweetwater Arch to the south; and (7) the Wind River Range to the southwest.

The Wind River Basin began forming in late Cretaceous time with pronounced downwarping of the basin trough and broad doming of parts of the surrounding areas (Keefer 1970). The formation of the basin continued through the Paleocene and culminated in earliest Eocene time as high mountains were uplifted along reverse faults surrounding the basin. Sediments of the Wind River Formation were deposited during the early Eocene (circa 52 million to 50 million years) in a variety of environments related to their distance from the mountain fronts. Near the mountains, landslides, mudslides and alluvial fans accumulated coarse-grained sediments. Progressively basin-ward from the mountains, deposition reduce mountain relief, and streams, rivers, and ponds or lakes accumulate fine-grained sediments in a broad ancient floodplain. The thickness of these sedimentary rocks ranges from approximately 7,285-26,825 feet. The thickest and oldest sediments accumulated in the basin center with progressively thinner and younger sediments accumulating toward the basin margins (Keefer 1970).

The Wind River Formation overlies older Mesozoic sedimentary rocks composed mainly of shales, siltstones, and sandstones. These Mesozoic rocks overlie Paleozoic strata consisting chiefly of resistant limestone, dolomite, and sandstone that accumulated during repeated transgressions of the sea along the then stable western edge of the North American continent. The Paleozoic rocks overlie Precambrian age metamorphic and igneous rocks of Archean age (2.5 to 3.4 billion years old) that comprise the ancient Wyoming Craton, one of the older stable continental areas of North America (Keefer 1965, 1970). Regionally, surface exposures of the Wind River Formation increase to 1,800 feet thick, and the formation attains 3,000 feet or more in thickness along the basin axis (Keefer 1965).

3.2.1.2 BCPA Geology

The Wind River Formation underlies the entire proposed BCPA, and consists chiefly of lenticular beds of poorly sorted feldspar- and arkose-rich fluvial sandstone, pebble conglomerate and alluvial variegated mudstones. The sandstone and conglomerate weather to form minor cliffs on slopes and the mudstones weather to form gently dipping slopes. The color banding in the variegated mudstones of formation is the result of paleosol (ancient soil) development (Keefer 1965), but less so than in other areas of the Wind River Basin. A prominent bed of tuff (volcanic ash), the Halfway Draw Tuff, occurs at an elevation of about 5,300 ft in the proposed BCPA stratigraphically above a prominent river channel sandstone. The sandstone comprising the channel and the tuff are well cemented and resistant to erosion and as a result, form a resistant bed that underlies and holds up the topographic high points in the area. The tuff has been dated at 50.5 million years and is best exposed at Halfway Draw immediately northeast of the Beaver Creek Field. The section of exposed Wind River Formation in the proposed BCPA includes approximately 25 feet of drab yellow and gray siltstone, sandstone and some red mudstone exposed below the tuff and a similar thickness of drab gray and red mudstone exposed above the tuff. Quaternary sediments are located immediately to the west of the proposed BCPA ea and consist of alluvium deposited along Beaver Creek and the lower reaches of the ephemeral tributaries to Beaver Creek.

3.2.2 MINERAL RESOURCES

Mineral resources within the proposed BCPA and vicinity include natural gas and coal. Each of these resources is described below.

3.2.2.1 Natural Gas

There are a total of 13 existing gas wells in the BCPA. Johnson et al. (1993) have provided estimates of the natural gas resources in the Mesaverde Formation for the central Wind River Basin. For low, medium, and high productivity estimates for different depths of drilling, Johnson et al. (1993) estimate that the Mesaverde Formation gas resources total 110, 269, and 604 billion cubic feet (BCF) for the 300-3,000-foot interval, 1.05, 1.75, and 2.45 trillion cubic feet (TCF) for the 3,000-6,000-foot interval, and 1.46, 2.30, and 3.14 TCF for the 6,000-9,000-foot interval. However, because the gas-producing horizons in the Mesaverde Formation are composed of relatively impermeable ("tight") sandstones, only a fraction of these estimated resources may be recoverable.

3.2.2.2 Coal

The proposed BCPA lies within the Beaver Creek and Muddy Creek Coal Districts of the Wind River Basin (Glass and Roberts 1978). The thickest and most important coal deposits within the basin occur in the Upper Cretaceous Mesaverde and Meeteetse Formations. In the Beaver Creek Field, coal occurs in 29 individual beds. These beds range in thickness from 2 to 15 feet, with an aggregate thickness of 165 feet through a total stratigraphic interval of 1,200 feet. Hickling et al. (1989) state that large amounts of Wind River Basin coal occur in the Frontier, Mesaverde, and Meeteetse formations. None of the coal resources lie near enough to the surface in the proposed BCPA to make surface mining economic. The potential for exploitation of coal bed natural gas is currently being explored, as described in this EA.

3.3 AIR QUALITY

3.3.1 REGULATORY ENVIRONMENT

In general, the U.S. Environmental Protection Agency (EPA) has primary regulatory authority for implementing various air quality control statutes established by Congress. However, EPA has granted this authority to states, pending EPA's approval of state implementation plans (SIPs). Since the entire BCPA falls under State of Wyoming jurisdiction, it is subject to the Wyoming Air Quality Standards and Regulations (WAQSR) implemented by the Wyoming Department of Environmental Quality, Air Quality Division (WDEQ-AQD).

3.3.1.1 Ambient Air Quality Standards

National and Wyoming Ambient Air Quality Standards (NAAQS and WAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. Pollutants for which standards have been set include sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$).

Comprehensive air quality monitoring has not been conducted within the BCPA. However, background concentrations of pollutants recorded in the surrounding region are considered

representative of the air quality in the BCPA. All of these measured values are below the NAAQS and WAAQS.

While oil and gas development activities proposed throughout the region have the potential to negatively impact the air quality of the region, the current air quality in and surrounding the area is expected to be relatively good due to the limited number of existing large industrial emission sources and predominately favorable atmospheric dispersion conditions.

The existing sources of air pollution within the surrounding region include:

- Exhaust emissions, primarily CO, oxides of nitrogen (NO_x), and formaldehyde (CH_2O) from natural gas fired compressor engines used in the production of natural gas;
- Natural gas dehydrator still-vent emissions including volatile organic compounds (VOC), BTEX compounds (benzene, toluene, ethylbenzene, and isomers of xylene) and *n*-hexane;
- Power plant SO_2, CO, NO_x and particulate emissions;
- Gasoline- and diesel-fueled vehicle tailpipe emissions consisting of VOC, NO_X, CO, SO_2, PM_{10}, and $PM_{2.5}$;
- Fugitive dust (PM_{10} and $PM_{2.5}$) from vehicle traffic on unpaved roads, wind erosion in areas of soil disturbance, road sanding during winter months, and from coal mines; and
- Long-range transport of pollutants from distant sources.

The number of large emission sources and subsequent impacts to ambient air quality in the region are expected to increase as the current pace of oil and gas development continues into the future. Specifically, large oil and gas developments proposed to the immediate north of the BCPA in the Wind River Indian Reservation (WRIR) (BIA 2004) present the greatest potential to impact the ambient air quality of the region.

3.3.1.2 Prevention of Significant Deterioration (PSD) Increments

Under the Prevention of Significant Deterioration (PSD) regulations (40 CFR part 51.166 Prevention of Significant Deterioration of Air Quality), incremental increases of specific pollutant concentrations are limited above a legally defined baseline level. Many national parks and wilderness areas are designated as PSD Class I. The PSD program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Areas of the state not designated as PSD Class I are classified as Class II. For Class II areas, greater incremental increases in ambient pollutant concentrations are allowed.

The BCPA and surrounding region is Federally designated as a PSD Class II. The two nearest PSD Class I areas are Bridger and Fitzpatrick Wilderness areas located directly west of the BCPA in the Wind River Mountain Range. Contiguous with Bridger Wilderness are Popo Agie Wilderness and the Wind River Roadless Area, both designated as PSD Class II. Nearby tribal areas of special concern within the WRIR include Wind River Canyon (PSD Class II) located northeast outside of the BCPA and Phlox Mountain, located in the Owl Creek range (PSD Class II) within the northern extent of the BCPA. More distant Class I areas include Grand Teton and Yellowstone National Parks, and Washakie, Teton, and North Absaroka Wilderness areas. Cloud Peak Wilderness is designated as PSD Class II.

3.3.1.3 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental impacts. The EPA has classified 187 air pollutants as HAPs. Examples of classified HAPs include formaldehyde (CH_2O), BTEX compounds (benzene, toluene, ethylbenzene, and isomers of xylene) and normal-hexane (*n*-hexane). These chemicals are present in oil. Small amounts of oil have been reported from the coal seams in the Beaver Creek field (Wally Frank, Devon, personal communication, November 2006).

The Clean Air Act (CAA) requires the EPA to regulate emissions of toxic air pollutants from a published list of industrial sources referred to as "source categories." As required under the CAA, EPA has developed a list of source categories that must meet control technology requirements for these toxic air pollutants. Under Section 112(d) of the CAA, the EPA is required to develop regulations establishing national emission standards for hazardous air pollutants (NESHAP) for all industries that emit one or more of the pollutants in major source quantities. These standards are established to reflect the maximum degree of reduction in HAP emissions through application of maximum achievable control technology (MACT). Source categories for which MACT standards have been implemented include oil and natural gas production and natural gas transmission and storage.

3.4 WATER RESOURCES

Water resources in the proposed BCPA include surface water and groundwater. Surface water resources within the BCPA consist of several ephemeral drainages that are tributaries to Beaver Creek. These streams drain the interior portions of the proposed BCPA and flow towards Beaver Creek. Groundwater is contained primarily in unconsolidated Quaternary-aged deposits of sand and gravel and in the Wind River Formation. Other groundwater-bearing units occur within the deeper Mesozoic, Paleozoic, and Precambrian rocks.

3.4.1 SURFACE WATER

The closest stream to the proposed BCPA is Beaver Creek, as shown in Figure 3.4-1. Approximately six miles north of the Proposed Project is the Little Wind River, which flows into the Wind River. The drainages within the BCPA are ephemeral and flow to the southwest into Beaver Creek. Ephemeral streams are those streams that flow only in direct response to a rainfall or runoff event and often have periods of no flow. The downstream portion of Beaver Creek, near the confluence with the Little Wind River, is intermittent, whereas the upstream portion of Beaver Creek within the Beaver Creek Unit southwest of the BCPA contains perennial flow. A portion of the flow within the upstream portion of Beaver Creek is from discharge of produced water from the existing Beaver Creek Oil and Gas Field. The effluent discharge is covered by an existing National Pollutant Discharge Elimination System (NPDES) permit.

3.4.1.1 Stream Classification

The WDEQ classifies Wyoming surface water resources according to quality, existing and designated uses, and degree of protection (WDEQ, 2001a). There are four major classes with various subcategories within each class. Beaver Creek is designated as Class 3B from the Reservation boundary upstream to Little Sand Draw and Class 2AB for the remainder of its length (WDEQ 2001b). The Little Wind River is designated as Class 2AB.

Class 3B waters are tributary waters that because of natural habitat conditions do not support, nor have the potential to support, fish populations or drinking water supplies and where those uses are unattainable. Class 3B waters provide support for invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. Class 3B waters are protected for aquatic life other than fish, recreation, wildlife, industry, agriculture, and scenic values.

Class 2AB waters are known to support game fish populations or spawning and nursery areas, at least seasonally, and where a game fishery and drinking water use is otherwise attainable. These waters are protected for game fisheries and drinking water supplies, and can be either "cold water" or "warm water" depending on the species present. Class 2AB waters are also protected for non-game fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture, and scenic values.

3.4.1.2 Stream Flow

Two United States Geological Survey (USGS) surface water gauging stations are located to the north of the BCPA on Beaver Creek and the Little Wind River. The station on Beaver Creek (USGS 06235000) was only monitored for discharge from May 1950 to September 1953. Station 06235500, located south of Riverton on the Little Wind River, has been monitored continuously since June 1941.

Table 3.4-1 presents summary flow data for the two gauging stations. Mean monthly stream flow over the period of record for the Little Wind River ranges from 186 cubic feet per second (cfs) to 366 cfs within the period September to May. Stream flow increases dramatically during June, July, and August due to snow melt in the adjacent Wind River Mountains, with mean monthly flows over the period of record of 1,095 cfs in June, 2,336 cfs in July, and 978 cfs in August. For Beaver Creek, the limited information available shows low flows during the period August to April, ranging from no flow in August to 8.82 cfs in November. Peak flows are in May, June, and July for Beaver Creek with a maximum monthly discharge of 84.8 cfs in May. Based on the data from station 06235500 on the Little Wind River, 1950, 1951, and 1952 (the period of record for Beaver Creek) were above-average years for stream flow (about 27% higher than average).

Table 3.4-1. Stream Gauging Data for the Little Wind River and the Beaver Creek

Little Wind River near Riverton (06235500)	186 (January) to 2,336 (July)	156 (2001) to 998 (1995)	564	June 1941-Sept 2004
Beaver Creek near Arapahoe (06235000)	0 (August) to 84.8 (May)	15.3 (1951) to 22.0 (1952)	18.7	May 1950 to September 1953

Source: http://water.usgs.gov/nwis

3.4.1.3 Surface Water Quality

The water quality characteristics of surface waters in the vicinity of the BCPA reflect the chemical nature of precipitation and the geologic strata over which the water flows. The following section describes the chemical quality of these waters, based on data collected by the USGS at the two gauging stations. For Beaver Creek, samples for chemical analysis were collected in April 1951, from March 1967 to September 1981, and from June 1985 to May 1992. Samples for chemical analysis were collected from June 1953 to September 1954 and from October 1959 to August 2004 for the Little Wind River.

Table 3.4-2 provides a summary of the water quality data collected at USGS station 06235000 on Beaver Creek. Waters in Beaver Creek are described as calcium-sodium sulfate-bicarbonate type waters with high hardness (535 mg/L as $CaCO_3$). Total dissolved solids (TDS) content is variable during the year, ranging from 168 mg/L to 2,490 mg/L, and averages 1,107 mg/L. The waters are generally alkaline with pH ranging from 7.2 to 8.6 units. The mean value for all parameters reported is less than the associated water quality standards formulated by the WDEQ (2001). The maximum reported value for chloride (234 mg/L) is above the standard of 230 mg/L for aquatic biota and the maximum value for total iron (1,000 micrograms per liter (ug/L)) is above the drinking water standard of 300 ug/L and equal to the aquatic biota standard. The SAR of the water, a measure of the sodium hazard, is 3.1. Waters with SARs in the range from 0 to 6 can generally be used on all soils with little problem of a sodium buildup (Hergert et al. 1997).

Table 3.4-3 provides a summary of the data collected at USGS station 06235500 on the Little Wind River. Waters in the Little Wind River are also described as calcium-sodium sulfate-bicarbonate type waters with high hardness (314 mg/L as $CaCO_3$) but contain lower concentrations of all of these parameters as compared to Beaver Creek. TDS content is also lower, ranging from 122 mg/L to 1,180 mg/L, and averages 574 mg/L. The waters are generally alkaline with pH ranging from 6.9 to 8.8 units. The mean value for all parameters reported is less than the associated water quality standards formulated by the WDEQ (2001). The maximum reported value for fluoride (5 mg/L) is above the drinking water standard of 4 mg/L, the maximum value for nitrate (14 mg/L) is above the drinking water standard of 10 mg/L, and the maximum value of total iron (450 ug/L) is above the drinking water standard of 300 ug/L. The average SAR of the water is 1.47 which is about 50 percent less than that of Beaver Creek.

Table 3.4-2. Summary of Water Quality Analysis for Beaver Creek, USGS Gauging Station 06235000

General Water Quality Indicators					
Temperature (°C)	-	-	131	0-32	8.46
Specific Conductance (uS/cm)	-	-	72	552-3,060	1,590
pH (standard units)	-	6.5-9.0	86	7.2-8.6	8.0
Total Hardness (mg/L)	-	-	113	130-990	535
Sodium-Adsorption Ratio (ratio)	-	-	111	1-6	3.1
Acid-Neutralizing Capacity (mg/L)	-	-	104	82-430	198
Total Dissolved Solids (mg/L)	-	-	50	168-2,490	1,107

Parameters	Standards[1]		Summary Statistics		
	Drinking Water[2]	Aquatic Biota[3]	No. of Samples	Range	Mean
Ionic Constituents					
Calcium (mg/L)	-	-	113	35-280	150
Magnesium (mg/L)	-	-	113	8.9-96	39.1
Sodium (mg/L)	-	-	111	35-386	169
Potassium (mg/L)	-	-	115	1.1-93	9.16
Chloride (mg/L)	-	230	113	17-**234**	97.2
Sulfate (mg/L)	-	-	113	110-1,100	560
Fluoride (mg/L)	4	-	113	0.3-3.5	1.07
Total Phosphorous (mg/L)	-	-	63	<0.01-2	0.2
Bicarbonate (mg/L)	-	-	113	100-520	241
Nitrite & Nitrate (mg/L)	10	-	15	0-1	0.24
Nitrate (mg/L)	10	-	58	0-0.7	0.12
Silica (mg/L)	-	-	113	0-28	16.5
Barium (ug/L)	2,000	-	50	30-610	264
Total Iron (ug/L)	300	1,000	32	0-**1,000**	140
Iron (ug/L)	300	1,000	17	<10-260	54.7

All samples are dissolved (filtered) unless otherwise noted
Bold values exceed Wyoming Water Quality Standards
[1]Wyoming Surface Water Quality Standards (WDEQ 2001)
[2]Human health value, drinking water and fish
[3]Aquatic life chronic value

Table 3.4-3. Summary of Water Quality Analyses for the Little Wind River, USGS Gauging Station 06235500

General Water Quality Indicators					
Temperature (°C)	-	-	411	0-26.5	11.3
Specific Conductance (uS/cm)	-	-	287	161-1,590	287
pH (standard units)	-	6.5-9.0	309	6.9-8.8	8.0
Dissolved Oxygen (mg/L)	-	-	72	6.6-13.4	9.7
Total Hardness (mg/L)	-	-	290	66-540	314
Sodium-Adsorption Ratio (ratio)	-	-	284	0.4-3	1.47
Acid-Neutralizing Capacity (mg/L)	-	-	275	45-246	148
Total Dissolved Solids (mg/L)	-	-	192	122-1,180	574
Ionic Constituents					
Calcium (mg/L)	-	-	307	14-940	74.9
Magnesium (mg/L)	-	-	307	1.2-85	31.2
Sodium (mg/L)	-	-	302	9-160	60.0

Parameters	Wyoming Standards[1]		Summary Statistics		
	Drinking Water[2]	Aquatic Biota[3]	No. of Samples	Range	Mean
Potassium (mg/L)	-	-	304	0.1-49	2.78
Chloride (mg/L)	-	230	312	0.1-30	10.1
Sulfate (mg/L)	-	-	312	38-642	271
Fluoride (mg/L)	4	-	311	0-**5**	0.48
Total Phosphorous (mg/L)	-	-	132	0-1.55	0.13
Bicarbonate (mg/L)	-	-	286	55-300	181
Nitrite (mg/L)	1	-	10	<0.001-0.005	0.002
Nitrate (mg/L)	10	-	261	<0.001-**14**	1.11
Silica (mg/L)	-	-	312	0.2-32	8.54
Barium (ug/L)	2,000	-	191	0-650	96.9
Total Iron (ug/L)	300	1,000	29	0-**450**	77.6
Iron (ug/L)	300	1,000	23	0-200	40.0

All samples are dissolved (filtered) unless otherwise noted
Bold values exceed standards
[1]Wyoming Surface Water Quality Standards (WDEQ 2001)
[2]Human health value, drinking water and fish
[3]Aquatic life chronic value

3.4.2 GROUNDWATER

Groundwater resources in the vicinity of the BCPA occur in unconsolidated deposits of Quaternary age consisting of floodplain alluvium, the Tertiary Wind River Formation, and older Mesozoic, Paleozoic, and Precambrian rocks (Plafcan et al. 1995). Groundwater beneath the BCPA is recharged through direct infiltration of precipitation or through seepage of surface water.

Groundwater quality is affected by a variety of factors, including the geochemical composition of the aquifer materials, retention time in the aquifer, and the quality of recharge water. Numerous studies have been completed on water quality characteristics of the aquifers in the Wind River Basin. However, groundwater quality data within the BCPA are limited. The following sections present a general overview of the water quality characteristics of the groundwater-bearing units which underlie the Wind River Basin, including the unconsolidated deposits of Quaternary age, the Tertiary Wind River Formation, and the other groundwater-bearing units.

3.4.2.1 Quaternary Deposits

Plafcan et al. (1995) collected groundwater samples from 47 wells completed in Quaternary deposits throughout Fremont County. Thirty-three wells are completed in alluvium and colluvium and 10 are completed in terrace deposits. The remaining four wells are completed in glacial, landslide, or dune sand deposits. None of these wells are located within the BCPA. The results of this study indicated that groundwater from alluvial and colluvial deposits within Fremont County has TDS ranging from 141 to 1,430 mg/L. Most samples were classified as calcium carbonate or sodium-calcium carbonate-sulfate type waters with moderate to very high hardness.

3.4.2.2 Wind River Formation

The water chemistry of the Wind River Formation within Fremont County was evaluated by Plafcan et al (1995) based on chemical analyses of water quality samples from 95 wells completed in the Wind River Formation at depths ranging from 35 feet to over 700 feet below ground surface (bgs). The water chemistry of the Wind River Formation is quite variable due to its variable lithology, permeability, and recharge conditions. Table 3.4-4 provides a summary of the analyses for wells completed in the Wind River Formation.

Table 3.4-4. Summary of Water Quality Analyses for the Wind River Formation

Temperature (°C)	-	-	83	5.5	16	10.9	11
Specific Conductance (uS/cm)	-	-	87	202	6300	1880	1580
pH (standard units)	-	6.5-9.0	73	**5.3**	**10**	8.0	8.0
Total Hardness (mg/L)	-	-	81	5	1400	277	160
Sodium-Adsorption Ratio (ratio)	-	-	83	0.1	60	14.9	12
Total Dissolved Solids (mg/L)	-	-	81	248	5110	1320	1000
Calcium (mg/L)	-	-	81	1.7	380	78.5	42
Magnesium (mg/L)	-	-	81	0.09	99	18.4	8
Sodium (mg/L)	-	-	81	4.5	1500	324	270
Potassium (mg/L)	-	-	80	<0.1	30	4.36	2.6
Chloride (mg/L)	-	230	81	1.7	**420**	39.5	19
Sulfate (mg/L)	-	-	80	4.1	3100	664	481
Fluoride (mg/L)	4	-	81	<0.1	**6.9**	1.23	0.9
Bicarbonate (mg/L)	-	-	31	23	549	221	210

Source: Plafcan et al. (1995)
All samples are dissolved (filtered) unless otherwise noted
Bold values exceed standards
[1]Wyoming Surface Water Quality Standards (WDEQ 2001)
[2]Human health value, drinking water and fish
[3]Aquatic life chronic value

3.4.2.3 Other Groundwater-Bearing Units

Dissolved solids in groundwater from upper Mesozoic rocks in Fremont County generally range between 280 and 6,000 mg/L, but may be higher when associated with oil field produced water. TDS in the Paleozoic groundwater generally ranges between 300 to 3,000 mg/L, but Permian rocks have been known to have groundwater with dissolved solids over 10,000 mg/L (Plafcan et al. 1995).

3.5 SOIL RESOURCES

The development of soils is governed by many factors, including climatic conditions (the amount and timing of precipitation, temperature, and wind), the parent material that the soil is derived from, topographic position (slope, elevation, and aspect), geomorphic processes, and time. Soils in the BCPA are developed on terraces and floodplains of ephemeral tributaries to Beaver Creek, alluvial fan aprons, hill slopes, ridges, knobs, and toe slopes. In addition, portions of the proposed BCPA are covered by bare rock outcrop.

There are seven soil complexes and associations within the BCPA and along the two pipeline routes that extend outside the BCPA boundary, as shown on Figure 3.5-1. Soil complexes consist of two or more soils in such an intricate pattern that they cannot be separated for mapping purposes. Soil associations are composed of two or more geographically associated soils that were grouped together because it was not practical or necessary to map each soil type separately. Table 3.5-1 summarizes the 11 soil types occurring in the BCPA.

Soil map unit 100, the Absher-Elkol complex, occurs only in the extreme southwest corner of the BCPA. There are no proposed facilities that would lie on this soil complex.

Soil map unit 117, the Blackhall-Carmody association, occurs on hills, ridges, and knobs in the northern one-half of the BCPA. These very shallow (<0.25 m) to moderately deep (0.5 to 1 m) soils were formed from residuum and slope alluvium derived from sandstone. No well pads would be located on this soil association. However, a small portion of the proposed access road to proposed well pads BCU MV 28-32 and BCU MV 28-23, a portion of the proposed co-located electrical line and pipeline to proposed well pad BCU MV 27-21, and a portion of the proposed pipeline route to the existing O'Conner evaporation pond would cross areas covered by this soil association.

Soil map unit 118, the Blazon-Rock outcrop-Carmody complex, occurs on hills, ridges, and escarpments. This soil complex covers part of the eastern portion of the BCPA, and occurs on two ridges that traverse the central portion of the proposed BCPA and trend to the northeast. These very shallow (<0.25 m) to moderately deep (0.5 to 1 m) soils were formed from residuum and slope alluvium derived from sandstone and shale. The rock outcrop occurs as soft shale exposed on the summits of hills, ridges, and escarpments in these areas. Well pads BCU MV 27-41, BCU MV 27-32, BCU MV 27-14, BCU MV 33-41, BCU MV 33-32, BCU MV 33-21, BCU MV 28-34, and BCU MV 27-12 would be located entirely or partially on these soils. In addition, portions of proposed access roads to these well pads and the pipeline corridors to the existing O'Conner evaporation pond and proposed injection well in Section 35 would cross lands covered with these soils.

Soil map unit 140, the Cushool-Rock River association, occurs on alluvial fan aprons, terraces, and hillslopes and covers about one-half of the BCPA. The moderately deep (0.5 to 1 m)

Cushool soils were derived from residuum and slope alluvium derived from sandstone, and the very deep (<1.5 m) Rock River soils were derived from alluvium. Proposed well pads BCU MV 27-21, BCU MV 28-41, BCU MV 28-12, and BCU MV 28-23, and a portion of well pad BCU MV 34-21, would lie on this soil association. In addition, portions of the proposed access roads and co-located pipelines and electrical lines, and the pipeline corridors to the existing O'Conner evaporation pond and proposed injection well in Section 35, would cross lands covered with these soils.

Soil map unit 158, the Havre-Forelle-Glendive complex, occurs on floodplains and adjacent toe slopes of hillsides and occupies several low areas adjacent to ephemeral drainages that trend to the northeast in the BCPA, as well as portions of the pipeline corridors to the existing O'Conner evaporation pond and proposed injection well in Section 35. These very deep (<1.5 m) soils were derived from alluvium. Proposed well pads BCU MV 27-23, BCU MV 28-14, BCU MV 33-43, and BCU MV 34-12 and portions of the proposed access roads and co-located pipelines and electrical lines to these well pads would lie on this soil complex. In addition, the proposed evaporation pond in the center of the BCPA would be built on these soils.

Soil map unit 196, the Rock outcrop-Blackhall complex, occurs on hillslopes, the sideslopes of ridges, and knobs in the northern portion of the BCPA. The rock outcrop occurs as exposures of soft sandstone on the summits of hills, ridges and escarpments. The Blackhall soils are very shallow (<0.25 m) to shallow (0.25 to 0.5 m) and are developed on residuum and slope alluvium derived from sandstone. Proposed well pad BCU MV 28-21 and portions of the proposed access road and co-located pipeline and electrical line to this well pad would lie on this soil complex.

Soil map unit 197, the Rock outcrop-Blazon complex, occurs on three isolated knobs in the central portion of the BCPA. The rock outcrop occurs as soft shale exposed on the summits these knobs. The Blazon soils are very shallow (<0.25 m) to shallow (0.25 to 0.5 m) and are developed on residuum and slope alluvium derived from soft shale. Proposed well pad BCU MV 27-43 and a small portion of the proposed access road to this well pad would lie on this soil complex. In addition, part of the BCU MV 34-21 well pad and the nearby co-located pipeline and electrical line would lie on these soils.

For evaluation of potential environmental impacts to soils, the key attributes are their erosion potential and ease of reclamation after soil disturbance. Soil mapping conducted by the National Resource Conservation Service (NRCS) under the US Department of Agriculture (USDA) typically provides information about each soil type within the mapped area that can be used to evaluate the erosion potential and reclamation potential of each soil unit.

Erosion potential can vary widely among soil units within a given area, and is generally dependent on the particle size distribution of the soil, the slopes on which it is found, and the amount and type of vegetative cover. Erosion hazards may become a critical issue when protective vegetation is removed during and following activities such as access road and well pad construction. Erosion potential for both water and wind erosion were rated for 10 of the 11 soil types by the USDA (1993). Erosion potentials are not estimated for rock outcrops. Water erosion potential is considered to be slight for the Elkol, Havre, Forelle, and Glendive soils, moderate for the Absher, Cushool, and Rock River soils, moderate to severe for the Carmody soils, and severe for the Blackhall and Blazon soils. The wind erosion hazard is considered to be moderate for the Absher, Elkol, Blazon, Havre, and Forelle soils, moderate to severe for the Carmody soils, and severe for the Blackhall, Cushool, Rock River, and Glendive soils.

Reclamation potential is dependent on the soil structure and texture, clay content, soil salinity, and organic matter content, among other factors. Excessive salinity (salt content), acidity, or alkalinity can inhibit the growth of desirable vegetation. The USDA has provided reclamation material source ratings for many of the soils in the BCPA. Table 3.5-1 provides the reclamation source material ratings, and identifies the factors which could inhibit successful reclamation for each soil type. Soil map units 117, the Blackhall-Carmody association, and 118, the Blazon-Rock outcrop-Carmody complex, are rated poor for reclamation potential based on the attributes of the primary soil type. For the Blackhall soils, the poor rating is due to the shallow depth to bedrock, low organic matter content, high sodium content, and severe erosion potential for both water and wind. The Carmody soils are shallow, have low organic matter content, and moderate to severe water and wind erosion potentials. The Blazon soils are shallow, have low organic matter content, contain too much clay, and have severe water erosion potential.

Reclamation material source ratings were not given for soil map units 196, the Rock outcrop-Blackhall complex, and 197, the Rock outcrop-Blazon complex, because the dominant soil type in both of these soil complexes is rock outcrop. However, as noted above, both the Blackhall and Blazon soils are rated poor.

The remaining soil types are rated fair for reclamation potential. The Cushool, Rock River, Havre, Forelle, and Glendive soils all have low organic matter contents. In addition, the Havre soils are shallow, and the Havre and Forelle soils have moderate wind erosion potentials.

In summary, over one-half of the proposed project facilities would be constructed on soil types that have a moderate to sever erosion potential and/or poor reclamation potential.

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Table 3.5-1. Characteristics of Soil Map Units in the BCPA

100	Absher-Elkol complex	Absher	Loam, silty clay, silty clay loam	Terraces	Alluvium derived from various sources	55%	1 to 4%	Very deep	7.9-9.6	Well drained	Slow	Moderate	Moderate
		Elkol	Silty clay loam, clay, very fine sandy loam	Terraces	Alluvium derived from various sources	30%	0 to 3%	Very deep	8.5-9.0	Well drained	Slow	Slight	Moderate
117	Blackhall-Carmody association, hilly	Blackhall	Fine sandy loam, sandy loam	Hills, ridges, and knobs	Residuum and slope alluvium derived from sandstone	45%	5 to 45%	Very shallow to shallow	7.4-9.0	Well drained	Rapid	Severe	Severe
		Carmody	Fine sandy loam, very fine sandy loam	Hills	Residuum and slope alluvium derived from sandstone	35%	5 to 25%	Moderately deep	7.9-8.4	Well drained	Medium	Severe	Severe
118	Blazon-Rock outcrop-Carmody complex, hilly	Blazon	Clay loam	Hills, ridges, and escarpments	Residuum and slope alluvium derived from shale	50%	3 to 40%	Very shallow to shallow	7.9-9.0	Well drained	Rapid	Severe	Moderate
		Rock outcrop	Occurs as exposures of soft shale	Summits of hills, ridges, and escarpments	--	20%	--	--	--	--	Rapid	--	--
		Carmody	Gravelly sandy loam, very fine sandy loam	Hills, ridges, and escarpments	Residuum and slope alluvium derived from sandstone	15%	2 to 30%	Moderately deep	7.9-8.4	Well drained	Medium	Moderate	Moderate
140	Cushool-Rock River association	Cushool	Sandy loam, sandy clay loam, fine sandy clay loam	Fan aprons and hillslopes	Residuum and slope alluvium derived from sandstone	55%	3 to 15%	Moderately deep	6.6-9.0	Well drained	Medium	Moderate	Severe
		Rock River	Fine sandy loam, sandy clay loam	Fan aprons and terraces	Alluvium derived from various sources	35%	1 to 8%	Very deep	7.4-9.0	Well drained	Slow	Moderate	Severe
158	Havre-Forelle-Glendive complex	Havre	Loam, sandy clay loam with lenses of very fine sandy loam, fine sandy loam and clay loam	Floodplains	Alluvium derived from various sources	45%	0 to 3%	Very deep	7.4-8.4	Well drained	Slow	Slight	Moderate
		Forelle	Loam, clay loam, sandy loam	Toe slopes	Alluvium derived from various sources	20%	1 to 3%	Very deep	6.6-9.0	Well drained	Slow	Slight	Moderate
		Glendive	Sandy loam, sandy loam with lenses of loamy sand, loam and sandy clay loam	Floodplains	Alluvium derived from various sources	15%	0 to 3%	Very deep	7.4-9.0	Well drained	Slow	Slight	Severe
196	Rock outcrop-Blackhall complex, hilly	Rock outcrop	Occurs as exposures of soft sandstone	Summits of hills and ridges and escarpments	--	40%	--	--	--	--	Rapid	--	--
		Blackhall	Sandy loam	Hillslopes, sides of	Residuum and slope alluvium derived from	40%	5 to 45%	Very shallow to	7.4-9.0	Well drained	Rapid	Severe	Severe

				ridges, and knobs	sandstone			shallow					
197	Rock outcrop-Blazon complex, hilly	Rock outcrop	Occurs as exposures of soft shale	Summits of knobs	--	50%	--	--	--	--	Rapid	--	--
		Blazon	Clay loam	Sideslopes of knobs	Residuum and slope alluvium derived from soft shale	30%	6 to 40%	Very shallow to shallow	7.9-9.0	Well drained	Rapid	Severe	Moderate

Sources: USDA-NRCS, Soil Properties available at: http://soildatamart.nrcs.usda.gov
USDA (1993), Soil Survey of Fremont County, East Part and Dubois Area, Wyoming

3.6 PALEONTOLOGY

The Wind River Formation is well known to produce scientifically significant fossils throughout its extent. Fossil vertebrates, plants, and invertebrates are known from a great number of widely dispersed localities in the formation throughout the Wind River Basin (Denison 1937; Love 1937; Keefer 1965; Guthrie 1971; Krishtalka 1976; Stucky and Krishtalka 1982, 1983; Schoch 1986; Winterfeld 1986; Hirsch and others, 1987; Rose et al. 1991; Stucky et al. 1990; Beard et al., 1992), but the eastern and northwestern parts of the basin have been most extensively studied. With the exception of early paleontological evaluations in the early 1900s (Sinclair and Granger 1911) and brief reconnaissance effort by the USGS in the 1980s, the central parts of the basin remains essentially unstudied (Bown 2003). Because of limited exposures, the Wind River Formation along the western and northern sides of Beaver Rim also remains relatively unstudied.

Traditionally the Wind River Formation, with the exception of the northeastern part of the Wind River Basin, has been divided into two members, the upper Lost Cabin Member and lower Lysite Member (Granger 1910; Sinclair and Granger 1911, Van Houten 1964; Keefer 1965; Korth 1982; Lillegraven 1993). The formation within the BCPA appears to be age equivalent to the Lost Cabin Member.

Fossil mammals from the Lost Cabin Member range from late early Eocene (Lost Cabinian) to earliest middle Eocene (Gardnerbuttean) in age. The fossil richness of the Lost Cabin member is shown by two fossil localities located to the northeast of the BCPA that provide documentation on the rich yield of fossil vertebrates from the member – the Buck Spring Quarries and Davis Ranch. The Buck Spring Quarries, discovered in 1984, have produced 105 fossil vertebrate taxa including 65 species of mammals, and 22 species of frogs, salamanders, lizard, snakes, and birds. The Davis (or Sullivan) Ranch locality is one of the most diverse Eocene fossil localities known in North America (Stucky et al 1989). More than 2,000 specimens, representing 75 mammalian species, have been collected from this locality.

The University of Wyoming, Department of Geology records no fossil localities within the BCPA in its database of fossil vertebrate localities. The closest fossil vertebrate localities were discovered by G. F. Winterfeld and S. Fukuoka in 2000 just east of the Beaver Creek Field, about 3.5 miles southeast of the BCPA. These two localities (UW 2000-14 and 2000-18) both occur stratigraphically below the Halfway Tuff and have yielded 12 fossil mammalian genera including primates (*Cantius* and *Microsyops*), condylarths (*Phenacodus* and *Hyopsodus* (2 species), tillodont (*Esthonyx*), palaeanodont (*Palaeanodon*), creodont (*Oxyeana*), horse (*Hyracotherium*), tapir (*Heptodon*), and artiodactyl (*Diacodexis* and *Lambdotherium*). The presence of *Lambdotherium* makes these deposits no older than Lost Cabinian (Late Wasatchian) in age.

Field evaluation of the Wind River Formation for paleontological resources did not lead to the discovery of any fossil vertebrate localities within the BCPA. The Wind River Formation is poorly exposed in most of the BCPA and the Halfway Draw Tuff, which is the main unit exposed in the area, does not appear to contain fossils. The proposed project will primarily affect colluvium and alluvium which are too young to contain fossils (G. Winterfeld, Erathem-Vanir Geological, Personal Communication, August 2006).

3.7 VEGETATION (INCLUDING SPECIAL STATUS SPECIES)

3.7.1 INTRODUCTION

The BCPA is within Wyoming's Wind River Basin. This basin is home to more than 200 plant species and nine primary vegetative communities. These vegetative communities form ecological systems that characterize the basin's landscape. The character and existing "functionality" of the basin landscape is derived from the composition, productivity, and ecological condition of each community. Environmental factors, such as soil, topography, climate, and micro-climate variables, as well as historical and current uses, directly affect the vegetation species composition, morphology, and distribution within a vegetation community.

Annual precipitation in the BCPA is less than 10 inches, classifying the area as "semi-desert." The majority of this precipitation comes in the form of snow or as rain from intense, short-duration thunderstorms. Annual temperatures vary widely and are directly influenced by Canadian air outbreaks, Chinook winds, and winds associated with thunderstorms.

The majority of the land within the BCPA has been historically and is currently used to provide forage and water for livestock and various habitats for wildlife species. The semi-desert climatic regime, coupled with site-specific soil development, creates a fairly harsh environment for revegetation efforts. Site-specific seed mixes adapted to specific sites and soils within the BCPA afford the best opportunity for re-establishing desired vegetation following disturbance.

3.7.2 VEGETATION COMMUNITIES

Within the BCPA, Wyoming big sagebrush is the dominant vegetative community. This community is widespread throughout the western United States and can be found from the short-grass prairies of the western Great Plains to the north, as far west as British Columbia, and south as far as northern Nevada. Sagebrush of this type occupies moderately deep loamy soils derived from a variety of parent materials on middle and lower slopes and in draws. The Wyoming big sagebrush contributes the most cover and is often the only shrub present throughout the Wind River Basin (Fox and Dolton, 1995; Reid, et al., 2002).

The Wyoming big sagebrush vegetative community is characterized by a moderately sparse to moderately dense (20-70 percent cover) shrub overstory. In the BCPA, dominant shrub species include: Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria viscidiflorus*) with limited patches of Gardner's saltbush (*Atriplex gardnerii*). The herbaceous understory is relatively sparse and often dominated by perennial grasses (less than 20 percent cover) that occupy patches in the shrub matrix (WYNDD 2003; Reid et al. 2002). Dominant understory vegetative species in the area include western wheatgrass (*Pascopyrum smithii*), Indian ricegrass (*Achnatherum hymenoides*), needle-and-thread grass (*Hesperospita comata*), Sandberg bluegrass (*Poa secunda*), prairie junegrass (*Koeleria macrantha*) and prickly pear cactus (*Opuntia polycantha*).

Historic livestock grazing has played its part in maintaining and/or changing the native vegetation cover. Areas overgrazed by livestock and the introduction of oil and gas exploration and development have encouraged the spread of invasive grasses, such as cheatgrass (*Bromus tectorum*), and noxious weeds. Heavy grazing on reseeded areas has resulted in prolonged or

limited success of reclamation efforts in some areas. Heavy grazing has also removed potential grass fuels, thus minimizing the likelihood of periodic fires, but increasing shrub densities.

3.7.3 THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES

The Wyoming Natural Diversity Database (WYNDD) maintains a list of Wyoming Plant and Animal Species of Special Concern (WYNDD 2003). This list summarizes information on species in Wyoming that are rare, endemic, disjunct, threatened, or otherwise biologically sensitive. Plants are considered for inclusion on this list if they are vulnerable to extirpation at the global or state level due to: 1) their rarity (e.g., restricted geographic range, small population size, or low population density), 2) inherent vulnerability (e.g., specialized habitat requirements, or restrictive life history), and/or 3) threats (e.g., significant loss of habitat, sensitivity to human-caused mortality, or habitat disturbances). A review of the Wyoming Plant and Animal Species of Special Concern list (WYNDD 2003) revealed that no Federally-listed threatened or endangered plant species occur in the BCPA.

The Wyoming BLM also prepares a list of sensitive species to focus species management efforts toward maintaining habitats under a multiple use mandate (BLM 2002). The intent of the sensitive species designation is to ensure that actions on BLM-administered lands consider the welfare of the species and do not contribute to the need to list any other special status species under the provisions of the ESA.

Table 3.7-1 evaluates the potential for Wyoming BLM sensitive plant species to occur within the BCPA. The potential for occurrence is based on current information and potential distribution models. The absence of a species' occurrence in this database is not proof that the plant species does not occur there. A review of the WYNDD (2003) revealed that two BLM sensitive plant species, the Porter's sagebrush (*Artemisia porteri*) and Nelson's milkvetch (*Astragalus nelsonii*) have the potential to exist in the western end of the BCPA. Habitat for both species is limited to the alkaline, often seleniferous, clay soils and sparsely vegetated badlands. In addition, a third BLM sensitive species, the Cedar Rim thistle (*Cirsium aridum*), is known from an adjoining township; however, the elevational range associated with the BCPA is outside of the known range for this species and may preclude the presence of this species.

Table 3.7-1. The Potential for Wyoming BLM Sensitive Plant Species to Occur in the BCPA[1]

Porter's Sagebrush	*Artemisia porteri*	Yes	Mat-forming perennial sub-shrub with numerous slender annual stems. Endemic to Wyoming and restricted to the Wind River and Powder River Basins in Fremont, Johnson and Natrona counties. Sparsely vegetated badlands of ashy or tufaceous mudstones and clay slopes. 5,300-6,500 ft. Potential habitat occurs in the western portion of the BCPA as indicated by potential distribution models (WYNDD 2006).
Nelson's Milkvetch	*Astragalus nelsonianus -or- Astragalus pectinatus var. platyphyllus*	Yes	Occurs on alkaline, often seleniferous, clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders. Potential habitat occurs in the western portion of the BCPA as indicated by potential distribution models (WYNDD 2006)

Common	Scientific Name		
Cedar Rim Thistle	*Cirsium aridum*	No	A tap-rooted herb with lavender flowers and woolly-hairy stems up to 30 cm tall, this species is endemic to Wyoming and can be found within the Beaver Rim area of Fremont County. Barren, chalky hills, gravelly slopes, and fine-textured, sandy shaley draws. 6,700-7,200 ft. Although this species is known to occur in an adjoining township, the elevational range associated with the BCPA is outside the known range for this species and may preclude the presence of this species.
Beaver Rim Phlox	*Phlox pungens*	No	Sparsely vegetated slopes on sandstone, siltstone, or limestone at 6,000-7,400 ft. Elevation range associated with this species is too high for the BCPA.
Rocky Mountain Twinpod	*Physaria saximontana var. saximontana*	No	Sparsely vegetated rocky slopes of limestone, sandstone or clay at 5,600-8,300 ft. Elevation range associated with this species is too high for the BCPA.

[1]Source: BLM 2002a.
[2]Source: WYNDD 2006

Site-specific plant surveys for the five BLM sensitive plant species listed in Table 3.7-1 were conducted in the BCPA in spring 2006 and no BLM sensitive plant species were identified at the time of the survey (Buys & Associates, Inc. 2006). Therefore, only BLM sensitive plant species with potential habitat in the BCPA are analyzed further in this EA. BLM sensitive plant species that do not have potential habitat or have an "unknown" presence in the BCPA have been eliminated from further consideration in this EA.

3.7.4 WETLANDS AND RIPARIAN HABITATS

There are no wetland and/or riparian habitats within the BCPA.

3.7.5 INVASIVE AND NOXIOUS WEEDS

The spread of invasive and noxious weeds is a concern in all areas proposed for surface disturbance. Noxious weeds are plants designated by a Federal, State, or county government as injurious to public health, agriculture, recreation, wildlife, or property. The Wyoming State Statutes define noxious weeds as weeds, seeds or other plant parts that are considered detrimental, destructive, injurious, or poisonous, either by virtue of their direct effect or as carriers of diseases or parasites that exist within the state. Invasive weeds are plant species that are not native to a particular area and are not listed as noxious. Many consider a plant to be invasive if it has been introduced into an environment where it did not evolve. As a result, invasive plants do not have any natural enemies (e.g. insects or other plants) to limit their reproduction and thus they can out compete native vegetation.

Noxious weed species in Fremont County that may occur in the BCPA include Canada thistle (*Cirsium arvense*), Russian knapweed (*Centaurea repens*), hoary cress (*Cardria draba*), leafy spurge (*Euhorbia esula*), musk thistle (*Carduus nutans*), perennial pepperweed (*Lepidium latifolium*), dalmatian toadflax (*Linaria dalmatica*), spotted knapweed (*Centaurea maculosa*),

diffuse knapweed (*Centaurea diffusa*), saltcedar (*Tamarix spp.*), St. Johns wort (*Hypericum perforatum*), and common tansy (*Tanacetum vulgare*) (Baker 2003).

Infestations of invasive and noxious weeds occur within the BCPA along existing access roads, pipelines, well pads, and in areas used for grazing.

3.8 WILDLIFE AND FISHERIES

The BCPA supports a diversity of wildlife and wildlife habitats. Species occurrences are typically dependent on habitat availability, carrying capacities, and the degree of existing habitat disturbance. The BCPA consists of approximately 1,750 acres of wildlife habitat, consisting of a relatively level, gently sloping valley with low lying, hilly terrain that ranges in elevation from approximately 5,000 feet to 5,500 feet.

The following sections discuss the big game species, raptors, upland game birds, migratory birds, and special status wildlife species, including threatened and endangered species and BLM sensitive species that occur or may occur within the BCPA.

3.8.1 BIG GAME SPECIES

Big game species that occur within the BCPA include the pronghorn antelope (*Antilocapra americana*), and mule deer (*Odocoileus hemionus*).

3.8.1.1 Pronghorn Antelope

Pronghorn antelope typically inhabit grasslands and semi-desert shrublands of the western and southwestern United States. The State of Wyoming supports the largest population of pronghorn in North America (Clark and Stromberg 1987). This species is most abundant in short and mixed-grass prairie habitats between elevations of 4,000 and 6,000 feet. Some pronghorn make seasonal migrations between summer and winter habitats, but these migrations are often triggered by the availability of succulent plants and not by local weather conditions (Fitzgerald et al. 1994).

The BCPA occurs within the Beaver Rim herd unit (herd unit #632). Populations for the Beaver Rim herd unit have fluctuated below objective since the mid-1990s due to periods of drought that impacted fawn survival and yearling recruitment; however, the population surpassed objective in 2004 following two years of greatly improved fawn production. Spring precipitation in 2004 and 2005 was greater than in preceding years, when the herd unit was in one of the worst drought periods ever recorded in central Wyoming. The WGFD objective for the Beaver Rim herd unit is 25,000 pronghorn and estimates for the post-2005 season (period covering 6/1/2005-5/31/2006) show that the population was 26,730 pronghorn or seven percent above its objective. WGFD suggests that the doe/fawn harvest should be increased to reduce the population to its objective. As such, the doe/fawn harvest was doubled in 2006 to start reducing the herd towards objective (WGFD 2006a). Recent pronghorn antelope population levels for the Beaver Rim herd unit are summarized below in Figure 3-8**.**

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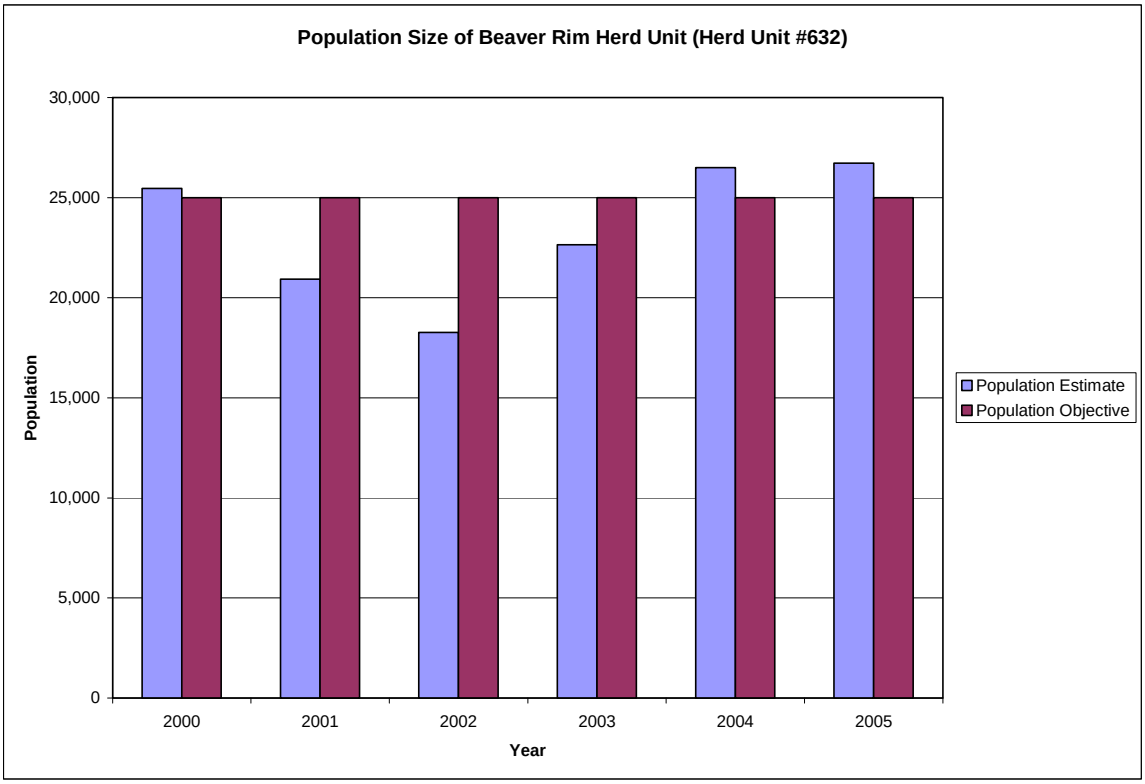
Figure 3-8. Comparison of Population Estimates and Objectives for the Beaver Rim Herd Unit



Source: (WGFD 2006b)

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Pronghorn occupy much of the BCPA on a year-round basis. A total of 347 acres of crucial value winter/year-long habitat, 803 acres of winter/year-long habitat, and 600 acres of year-long habitat (based on GIS calculations) have been identified within the BCPA (Figure 3.8-1) by the Wyoming Game and Fish Department (WGFD).

3.8.1.2 Mule Deer

The BCPA has been designated by the WGFD as having "no herd unit" for mule deer; however, incidental observations of mule deer have been reported within the BCPA.

3.8.2 BIRDS

Bird species that may occur within the BCPA include raptors, upland game birds, and migratory bird species. These species are discussed in more detail in the sections that follow. Other, more common birds observed within the BCPA include the American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), and the black-billed magpie (*Pica pica*).

3.8.2.1 Raptors

No raptor nests were found within the BCPA during a field survey conducted in May 2006 (Buys & Associates, Inc. 2006); however, suitable nesting and/or foraging habitats do exist for a number of raptor species within the BCPA. The raptor survey report is available at the BLM Lander FO. Table 3.8-1 identifies the raptor species with the potential to occur in the BCPA, and a description of their nesting habitats.

Table 3.8-1. Raptor Species That May Occur in the BCPA

Burrowing Owl*	*Athene cuniculara*	Prairie dog colonies
Ferruginous Hawk*	*Buteo regalis*	Ground, pinyon-juniper woodlands, balanced pinnacles
Golden Eagle*	*Aquila chrysaetos*	Cliff ledges and rock outcrops
Red-Tailed Hawk	*Buteo jamaicensis*	Tall trees with nearby open feeding areas
Northern Harrier	*Circus cyaneus*	Open fields, savannas, meadows, and marshes

All raptor species and their nests are protected from take or disturbance under the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 703 et seq.), which prohibits killing migratory birds (including raptors) and/or destroying their nests and eggs without a permit. Because the ferruginous hawk (*Buteo regalis*), golden eagle, and burrowing owl (*Athene cuniculara*) are special status wildlife species (as denoted by asterisk [*] in Table 3.8-1), they are discussed in more detail in Section 3.8.4.

Red-Tailed Hawk

Red-tailed hawks utilize a variety of habitats and typically nest in patches of tall trees or on secluded cliff faces. Red-tailed hawks are more tolerant to human activities than are other raptors. Typical prey species include rodents and other small mammals. In Wyoming, this species is a

year-round resident common to most habitats below 9,000 feet in elevation, including prairie grasslands, riparian areas, sagebrush communities, and pinyon/juniper woodlands (Luce et al. 1999). Red-tailed hawks have been observed in the BCPA (Buys & Associates, Inc. 2006).

3.8.2.2 Upland Game Birds

Upland game birds that occur in Fremont County (WGFD 1999) and may occur in the BCPA include chukar (*Alectoris chukar*), gray partridge (*Perdix perdix*), greater sage-grouse (*Centrocerus urophasianus*), mourning dove (*Zenaida macroura*), and ring-necked pheasant (*Phasianus colchicus*). The greater sage-grouse is discussed further in Section 3.8 because it is listed as a sensitive species by Wyoming BLM.

3.8.2.3 Neotropical Migratory Bird Species

Neotropical migratory bird (NTMB) species travel long distances from the wintering grounds in the New World tropics of Central and South America to the breeding grounds in North America. Neotropical migrants may utilize the habitats in the BCPA.

The migratory bird species that are listed on the BLM Wyoming state director's sensitive species list for the BLM Lander FO (Appendix E) and have the potential to occur in the BCPA include: Brewers sparrow (*Spizella breweri*), sage sparrow (*Amphispiza belli*), loggerhead shrike (*Lanius ludovisianus*), and sage thrasher (*Oreoscoptes montanus*).

3.8.3 REPTILES

Several reptile species may occur within the BCPA, including the eastern short-horned lizard (*Phyrnosoma douglassii brevirostre*), northern sagebrush lizard (*Sceloporus graciosus graciosus*), bullsnake (*Pituophis melanoeucas sayi*), eastern yellowbelly racer (*Coluber constrictor flaviventris*), Great Basin gopher snake (*Pituophis melanoleucas deserticola*), prairie rattlesnake (*Crotalus viridis viridis*), and the wandering garter snake (*Thamnophis elegans vagrans*).

3.8.4 FISHERIES

There are no streams or water bodies within the BCPA that support fish populations. As previously discussed in Section 3.4.1, the closest stream to the BCPA is Beaver Creek, as shown in Figure 3.4-1. Approximately six miles north of the Proposed Project is the Little Wind River, which flows into the Wind River.

Beaver Creek is designated as Class 3B from the Wind River Reservation boundary upstream to Little Sand Draw and Class 2AB for the remainder of its length (WDEQ 2001b). Class 3B waters are tributary waters that because of natural habitat conditions do not support, nor have the potential to support, fish populations or drinking water supplies and where those uses are unattainable. Class 3B waters provide support for invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. Class 3B waters are protected for aquatic life other than fish, recreation, wildlife, industry, agriculture, and scenic values.

The Little Wind River is designated as Class 2AB. Class 2AB waters are known to support game fish populations or spawning and nursery areas, at least seasonally, and where a game fishery and

drinking water use is otherwise attainable. These waters are protected for game fisheries and drinking water supplies, and can be either "cold water" or "warm water" depending on the species present. Class 2AB waters are also protected for non-game fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture, and scenic values.

The Wind River and the Little Wind River serve as important recreational fishing areas. The WGFD periodically stocks these creeks with game species. Game species found in the Little Wind and Wind Rivers include burbot, brown trout, cutthroat trout, rainbow trout, sauger, walleye, and yellow perch. Both the sauger and burbot are listed as species of concern by WGFD attributed to declining populations within the Wind River watershed.

Non-game species that have been collected in the Little Wind and Wind Rivers include but are not limited to, creek chub, flathead chub, lake chub, longnose dace, and white sucker.

3.8.4 SPECIAL STATUS SPECIES

This section discusses wildlife species that have a Federal and/or State special status designation. In accordance with the ESA, the BLM, in coordination with the USFWS, must ensure that any Federal action to be authorized, funded, or implemented does not adversely affect a Federally-listed threatened or endangered species. It is BLM's current policy that USFWS candidate species, BLM-sensitive species, and State-sensitive species are also managed to prevent a future Federal listing as threatened or endangered.

The USFWS has identified several Federally-listed endangered or threatened species and species of concern that may potentially inhabit the BCPA (USFWS 2006a). A brief description of each of the special status wildlife species that may potentially occur in the BCPA is presented in Table 3.8-2 and is further discussed in the following sections.

Table 3.8-2. Special Status Wildlife Species That Have the Potential to Occur in the BCPA

Mammals			
Black-Footed Ferret	*Mustela nigripes*	Endangered	Prairie dog towns
Pygmy Rabbit	*Brachylagus idahoensis*	Sensitive	Sagebrush shrublands
White-Tailed Prairie Dog	*Cynomys leucurus*	Sensitive	Arid grasslands and shrub/grasslands
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	Threatened	Found throughout the State
Burrowing Owl	*Athene cuniculara*	Sensitive	Prairie dog colonies
Ferruginous Hawk	*Buteo regalis*	Sensitive	Ground, pinyon-juniper woodlands, balanced pinnacles
Golden Eagle	*Aquila chrysaetos*	BGEPA	Cliff ledges and rock outcrops

Common Name	Scientific Name	Status	Habitat
Greater Sage-Grouse	*Centrocercus urophasianus*	Sensitive	Sagebrush shrublands
Mountain Plover	*Charadrius montanus*	Sensitive	Short-grass prairie and shrub-steppe habitat

3.8.4.1 Mammals

The following special status mammals could potentially be present in the BCPA.

Black-Footed Ferret

The last known wild population of black-footed ferrets (*Mustela nigripes*) was discovered in 1981 on a ranch in Meeteetse, Wyoming. By 1987, only 18 wild ferrets remained, primarily due to the effects of canine distemper. In a letter prepared by the USFWS (2004), the agency determined that black-footed ferrets were not likely to be present in most white-tailed prairie dog colonies in Wyoming. The goal of this letter was to prevent unnecessary black-footed ferret surveys throughout the State. As a result of this "block clearance," ferret surveys are no longer required in most areas of Wyoming. The BCPA falls under this block clearance and therefore, black-footed ferrets have been determined not to occur in the BCPA (Appendix F).

Pygmy Rabbit

The pygmy rabbit (*Brachylagus idahoensis*) is a BLM Lander FO sensitive species and a State Species of Special Concern. It was petitioned for listing under the ESA on April 21, 2003. This species occurs in portions of many of the western states including southwestern Wyoming, where a few isolated populations have been identified in Lincoln, Uinta, Sweetwater, Sublette and Fremont Counties (USFWS 2004).

Pygmy rabbits are found in close association with tall, dense stands of big sagebrush (*Artemesia tridentata*) on plains, alluvial fans, riparian gullies, and in fenced ROWs along roads. Pygmy rabbits are dietary and habitat specialists, and their habitat type dictates their distribution, as well as their spatial distribution. Potential habitat occurs in the BCPA; however, no pygmy rabbits have been reported in the BCPA (G. Morgan, BLM, personal communication, November 2006).

White-Tailed Prairie Dog

The white-tailed prairie dog (*Cynomys leucurus*) is listed as a BLM Lander FO sensitive species, is identified by the WGFD as a species of special concern, and is of concern to the USFWS because prairie dog colonies serve as habitat for the endangered black-footed ferret (USFWS 2006). The species inhabits primarily the western two-thirds of Wyoming, much of which is dominated by sagebrush and is considered common in the State. Mapping conducted by the WGFD in the late 1980s and early 1990s indicated approximately 138,000 ha (340,000 ac) of white-tailed prairie dog towns.

The white-tailed prairie dog inhabits arid grassland and shrub/grassland habitats, usually with slopes less than 12% to 15%. It lives primarily at higher elevations than the black-tailed prairie dog, in intermountain valleys, benches, and plateaus with diverse grass and forb cover. East of the Continental Divide in Wyoming, this species occupies areas that are too dry for the black-tailed

prairie dog. Population trends and status of white-tailed prairie dogs are not well documented. White-tailed prairie dog colonies have been observed within the BCPA (Buys & Associates 2006). The survey report is available at the Lander BLM FO.

3.8.4.2 Birds

The following special status birds could potentially be present in the BCPA.

Bald Eagle

Section 7 ESA Consultation between the Lander FO and the USFWS in October 2006 determined that the BCPA is not suitable for bald eagle (*Haliaeetus leucocephalus*) nesting, foraging or roosting due to a lack of open water and existing disturbance from oil and gas development (Appendix F).

Burrowing Owl

The burrowing owl (*Athene cuniculara*) is listed as a BLM Lander FO sensitive species. In addition, the WGFD classifies the burrowing owl as a Species of Special Concern, Native Species Status 4 (NSS4), because population status and trends are unknown, habitat is vulnerable, and the species is sensitive to human disturbance (WGFD 2005). In Wyoming, the highest concentrations of burrowing owls are in the southern and eastern part of the state. The burrowing owl is considered an uncommon summer resident in Wyoming.

The burrowing owl uses a wide variety of arid and semiarid environments, with well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground. It prefers open prairie, grassland, desert, and shrub-steppe habitats, and may also inhabit agricultural areas. The burrowing owl depends on mammals, particularly prairie dogs and ground squirrels that dig burrows, which it uses for nesting, roosting, and escape. Active prairie dog towns are the primary habitat for the owls (Butts 1973). As the range and abundance of the prairie dogs have decreased, so too has the status of the burrowing owl (WGFD 2005). Although burrowing owls have not been observed within the BCPA, the presence of white-tailed prairie dog colonies indicates that potential burrowing owl habitat is present in the BCPA (Buys & Associates, Inc. 2006).

Ferruginous Hawk

The ferruginous hawk (*Buteo regalis*) is listed as a BLM Lander FO sensitive species. The WGFD classifies the ferruginous hawk as a Species of Special Concern, Native Species Status 3 (NSS3), because the species is widely distributed, population status and trends are unknown, there is a significant loss of habitat, and because the species is sensitive to human disturbance (WGFD 2005). It is considered common in Wyoming and breeds throughout most of the State.

The ferruginous hawk inhabits semiarid open country, primarily grasslands, basin prairie shrublands, and badlands. It requires large tracts of relatively undisturbed rangeland and nests on rock outcrops, the ground, cutbanks, cliff ledges, or trees. Throughout their range, ferruginous hawks have been found nesting on a wide variety of substrates (Evans 1982). Generally, this species nests in areas where visibility is extensive and this, in part, may contribute to the species' relatively high sensitivity to human disturbance (Suter and Joness 1981). Ferruginous hawks lay eggs from mid-March through early April and the young fledge from early June to early July (Call 1978).

Conversion of native prairie to cropland, urbanization, loss of vegetative cover, poisoning, human disturbance near the nest site, and reduced prey availability, including the elimination of prairie dog colonies and ground squirrel colonies, has resulted in population decline of the ferruginous hawk (WGFD 2005). Although ferruginous hawks have not been reported in the BCPA, suitable nesting and foraging habitat is present.

Golden Eagle

The golden eagle (*Aquila chrysaetos*) is protected under the Bald and Golden Eagle Protection Act, based upon the similarity of the juvenile bald eagle's physical appearance to that of the adult golden eagle. Throughout the summer, golden eagles are found in mountainous areas, canyons, shrub-land and grassland. During the winter, they inhabit shrub-steppe vegetation, as well as wetlands, river systems and estuaries.

Golden eagles typically nest on open cliffs or in trees. Important foraging habitats include grasslands, sagebrush, and farmlands where the species forages on medium-sized mammals (Sibley 2003). In Wyoming, this species is considered a common year-long resident feeding mostly on jackrabbits, rodents, small mammals, and carrion in the winter (BLM 2003a). Golden eagle nests have been reported on cliffs in the BCPA (B. Skelton, Devon, personal communication, April 2006), and may forage on small mammals and carrion throughout the BCPA.

Greater Sage-Grouse

The greater sage-grouse (*Centrocercus urophasianus*) is listed as a BLM Lander FO sensitive species and is considered to be a species of concern by the WGFD (2005). The decline of the sage-grouse is attributed to agriculture, livestock grazing, sagebrush control using herbicides, and fire. Irrigation projects and commercial, industrial and power developments have also resulted in the loss of sagebrush habitat. The sage-grouse was petitioned for listing as threatened under the ESA. The USFWS reviewed the petition for listing and determined that the greater sage-grouse was not warranted for listing as endangered or threatened under the Act (70 FR 2244).

Leks (i.e., courtship areas) are the focal point of sage-grouse breeding and range in size from 0.04 to 40 ha. Leks are generally located in the vicinity of nesting areas, and winter and summer habitats. Most contain a central area that is barren, and a surrounding area containing sagebrush with a canopy cover of 20-50 percent. After mating, sage-grouse hens leave the lek to nest. Nesting typically occurs within 2-6 km from leks in sagebrush with an average height of 40 cm and a canopy cover of 20-40 percent. Females build nests, in shallow depressions on the ground sparsely lined with grass and sheltered by sagebrush or clumps of grass and incubate eggs from mid-March to mid-June. After hatching, chicks remain with the females until late summer or early fall, when they congregate with other sage-grouse in flocks for migration (Royal British Columbia Museum 1995). Wintering habitat consists of dense sagebrush with a canopy cover greater than 20 percent, standing an average of 25 cm above the snow (Royal British Columbia Museum 1995).

Sagebrush is the most important diet requirement of sage grouse during winter, but herbaceous forage and insects are very important during nesting and brood rearing. Sage grouse chick survival during the first few weeks following hatching is dependent on having quality and quantity forbs and insects available. Both sagebrush and grass is necessary to provide adequate nesting cover for eggs and chicks. Predation, especially during nesting, egg-laying, and brood-rearing, limits the increase of sage-grouse populations. Predators cause approximately 50 percent

of sage-grouse mortality. Adults are more vulnerable to predators in the winter as the snow makes them more visible (Royal British Columbia Museum 1995).

No sage-grouse leks have been reported within the BCPA; however, the WGFD has identified several leks west and southwest of the BCPA, with the closest known lek occurring approximately 2.5 miles southwest of the BCPA (G. Morgan, BLM, personal communication, November 2006). Sagebrush habitat occurs throughout the BCPA, which could provide potential sage-grouse habitat.

Mountain Plover

On February 16, 1999, the USFWS filed a notice in the Federal Register, which proposed listing the mountain plover (*Charadrius montanus*) as a threatened species pursuant to the ESA (64 FR 7587-USFWS 1999). However, on September 9, 2003, the USFWS withdrew the mountain plover from the proposed list of threatened species (USFWS 2003b; USFWS 2003c; USFWS 2003d). The mountain plover remains a BLM Lander FO sensitive species, a State species of special concern, and continues to be protected under the MBTA (16 U.S.C. 703 et seq.).

Historically, the mountain plover was abundant in eastern Colorado, Montana, Wyoming, western Nebraska and South Dakota, western and central Kansas, and Oklahoma (USFWS 1999). The population has declined range-wide by more than 50 percent since 1966 to fewer than 10,000 birds (Grunau and Wunder 2001). Reasons for the species' decline include loss of short-grass and shrub-steppe habitats, changes in range management to emphasize uniform grass cover, declines in native ungulates and burrowing animals (e.g., prairie dogs), and habitat loss and fragmentation caused by residential, commercial, and industrial development (USFWS 1999).

Mountain plovers show a preference for previously disturbed areas or modified habitat (e.g. prairie dog colonies) (USFWS 2002a). Mountain plovers usually breed and build nests in areas with sparse vegetation or bare ground (USFWS 1999). Nests have also been documented on bare ground created by oil and gas development activities (USFWS 2002b). Vegetation in nesting habitats is typically less than four inches in height (Knopf 1994; USFWS 2002b). Nest sites within the shrub-steppe community are found in areas of little or no vegetation. Breeding plovers exhibit close site fidelity, often returning to the same area in subsequent years (Knopf 1996; USFWS 1999).

Although mountain plover have not been observed within the BCPA, potential habitat is present in areas with sparse sagebrush vegetation or exposed bare ground (Buys & Associates, Inc. 2006).

3.8.4.3 Fisheries

Sauger

Sauger (*Sander canadensis*) are an important game fish within Wyoming. They are found in a wide band across mid-central North America, primarily in large muddy lakes and rivers, although they are tolerant of fast moving rivers. This species spawns in late spring to early summer in the north and earlier in the south, primarily when the water is between 39°F and 43°F. Nests are built in shallow water on gravel shoals. Sauger are mostly bottom feeders, with the majority of their diet consisting of fish such as shad, sunfish, and minnows (WGFD 1967).

In Wyoming, the sauger population has decreased substantially in recent years due to water development projects and hybridization with walleye, resulting in a loss in genetic purity. The

sauger population in Boysen Reservoir was surveyed in 1997 and no evidence of hybridization was discovered (Krueger et al., 1997). This population remains one of only two genetically pure populations of sauger in Wyoming. The other population is found in Yellowtail Reservoir and the Big Horn River near Thermopolis, WY (University of Wyoming 2003).

Burbot

The burbot (*Lota lota*), also called ling, is the only freshwater codfish. The body is elongate (almost snake-like) with a single median barbell or whisker. The burbot lives in cold, deep lakes and large rivers. Immature fish prefer rubble substrate, while adults remain in deep water to prey on other fish. In Wyoming, the burbot is native to the Big Horn and Tongue River systems. The species is found in larger lakes in the Lander and Dubois area, including Boysen Reservoir and Ocean Lake. Burbot populations in the Wind/Big Horn drainage have declined over the last two decades. However, established populations have also been discovered outside their native range in the Green River drainage (WGFD 2005).

Like the sauger, burbot is a Wyoming Species of Concern within the Wind River watershed. A decrease in burbot populations from fishing in Boysen Reservoir, water diversion structures in the area, and the introduction of predatory fishes has been suspected to be a problem for many decades (Hubert et al., manuscript in preparation). In the 2002 sampling of the southern reaches of the Wind River watershed upstream of Boysen Reservoir, burbot were found to be relatively uncommon. Only 49 burbot were collected through sampling of the Wind River watershed in 2002 (Amadio 2003). However, large numbers of juvenile burbot were found in Boysen Reservoir in late May 2005, suggesting that spawning occurs in or upstream of the reservoir (Hubert et al., manuscript in preparation).

3.9 RANGE RESOURCES

Cattle ranching is both an historic and active use of public lands in the BCPA. The BCPA is dominated by Wyoming sagebrush communities, with inclusions of mixed prairie grasslands.

The BCPA occurs within the East Beaver Common grazing allotment. This allotment consists of a total of 85,974 acres, of which 72,798 acres (or 85 percent) are public lands. The proposed BCPA would involve approximately 1,750 acres (or about 2 percent) of the public lands in the East Beaver Common grazing allotment. This allotment is currently grazed by cattle during the period May 1 through November 15. Forage production on these lands is expressed as an Animal Unit Month (AUM) which is equivalent to the amount of forage required to feed a 1,000-pound cow and her nursing calf for one month. The BLM current stocking rate is approximately 11 acres/AUM.

There are currently three grazing permittees authorized to graze the East Beaver Common grazing allotment. Table 3.9-1 provides pertinent grazing permit information.

Table 3.9-1. Grazing within the BCPA

Double G Ranch	240	5/01-11/01	100	1,460
Elk Mountain, LLC	1,200	5/01-11/15	87	5,496
Bill & Duveene Hamilton LLC	189	5/07-10/31	97	1,073
Total	1,629			8,029

Source: BLM files

Range improvements (e.g., fences, water wells, etc.,) are developed to further enhance livestock distribution to achieve rangeland management objectives. The allotment is currently unfenced. There are numerous water reservoirs throughout the allotment which gather surface runoff to aid in livestock distribution. Currently there are no water wells in the BCPA.

3.10 CULTURAL RESOURCES

The following section is organized to address a definition of cultural resources, the general cultural context of the study area, the nature and extent of existing information concerning cultural resources, and the potentially affected environment. A detailed discussion of archaeological analysis of the BCPA is provided in the Beaver Creek Archaeological EA (BLM 2006). A report on the results of the Class III archaeological survey for the BCPA was prepared by Western Archaeological Services (WAS 2007).

3.10.1 DEFINITIONS

Cultural resources are the products of human history in the form of material items produced by human workmanship or use, and elements of the natural environment that were altered by peoples' activities. Examples in the planning area include historic artifacts, buildings, mines, trails, railroads, ditches and trash dumps, and historic landscapes from the last two centuries, and archeological sites with stone tools and flaked debris from their production, remnants of animals and plants produced by food processing, the remains of fires, rock art, and other evidence of ancient human activity. Cultural resources are considered important because the resources may yield information that will expand understanding of history or prehistory and/or because the resources represent specific historic events, patterns of historic activities including building and engineering practices, or the lives of persons who were important in history. Physical manifestations of human activity must normally be more than 50 years old to be considered cultural resources, but sites, structures, or objects related to exceptional historical events within the past 50 years may also be considered to be cultural resources.

Cultural resources may also include Traditional Cultural Properties (TCPs), which are properties that are critical to a living community's beliefs, customs, and practices. TCPs may include religious or ceremonial sites, other locations important in the belief systems of the community, and areas used by the community for gathering or otherwise producing materials used for traditional ceremonial, spiritual, medicinal, or subsistence purposes. TCPs may be topographical features; stone alignments, rock art, or other physical artifacts; sources of plants or other materials; or areas without obvious physical manifestation of the site's cultural significance. Consideration of TCPs is especially pertinent in the current study area, because this area has been occupied by Shoshone people for at least several centuries and perhaps as long as 3,300 years.

One element of this project, a water discharge pipeline, is within the WRIR, and the remainder of the project is to the immediate south of the Reservation. The WRIR has been the permanent home of the Eastern Shoshone since 1868, and it has been home of the Northern Arapaho since 1878. Although none of this project is proposed to occur on tribal lands or lands of tribal members, the continuity of cultural association of these communities in the general vicinity of the BCPA could indicate a relatively high sensitivity for existence of TCPs.

As lead federal agency for the Beaver Creek CBM project, BLM is bound by provisions of NEPA, the National Historic Preservation Act (NHPA), and other laws and regulations of the United States pertaining to cultural resources. Impact assessment for cultural resources under NEPA generally follows provisions of NHPA and implementing regulations of the Advisory Council on Historic Preservation in 36CFR800. The affected environment for cultural resources is limited to those sites, structures, objects, or historic districts that are eligible for nomination to the National Register of Historic Places (NRHP). To be eligible for the NRHP, properties must have historical, archaeological, architectural, or engineering significance and must have sufficient integrity of location, design, setting, materials, workmanship, feeling, and association to convey the significance of the property (36CFR60.4; National Park Service 1991).

3.10.2 GENERAL CULTURAL CONTEXT OF THE STUDY AREA

Cultural resources may be significant within one or more historical contexts. The general prehistoric and historic contexts below provide a framework for identification and evaluation of cultural resources within the study area.

3.10.2.1 Prehistory

Prehistory can be defined as Native American activities prior to written Euro-American history in the region. Information about prehistoric lifeways and chronologies is gathered by means of archaeological, ethnographic, and linguistic investigations.

Previous archaeological investigations have indicated that the Wind River Basin has had human occupation for at least 11,000 years, from PaleoIndian periods to the present. The study area has been considered by archaeologists to be part of the Northwestern Plains culture area (Frison 1978, 1991), but research beginning in the late 1970s also indicates that prehistoric cultures in the study region had much in common with cultures from the Great Basin cultural area to the west and southwest. The cultural chronology for the Wyoming Basin developed by Metcalf (1987) and revised by Thompson and Pastor (1995) address the influences of the Great Basin cultures in western Wyoming, and that chronology is generally applicable to the study area. Metcalf (2001) further discussed the general prehistory and archaeological site data for the Beaver Creek Unit, including the current BCPA. Cultural periods are identified chronologically by years before present (B.P.).

3.10.2.2 Historic Period

The Historic Period in the general region may have begun in A.D. 1742-1743, when French traders Francois and Louis-Joseph Verendrye traveled from Mandan villages on the Missouri River in North Dakota southwestward, possibly as far as the Bighorn Mountains near current Sheridan, Wyoming. This period continued through the establishment of the WRIR to the present.

3.10.3 CULTURAL RESOURCES INVESTIGATIONS IN THE STUDY AREA

A Class III cultural resource inventory was conducted for all well locations and associated access/pipeline corridors on public lands administered by the BLM Lander Field Office. The objectives of the inventories were to locate, document, and evaluate any cultural resources within the BCPA. This information is used to predict possible impacts to historic and archaeological resources from development of the area for oil and gas exploration. Section 3.10.4, Previously Recorded Sites within the BCPA, reviews the previous cultural resource inventories conducted in the BCPA and their findings. Section 3.10.5, Newly Recorded Sites within the BCPA, reviews the current Class III 100 percent pedestrian coverage survey that was conducted for each well location and associated access/pipeline by Devon's cultural resource consultant and the survey findings.

3.10.4 PREVIOUSLY RECORDED SITES WITHIN THE BCPA

Previous cultural resources investigations in the study area were accomplished and reported under provisions of the NHPA because the surface and minerals are owned by the United States and are administered by the BLM. Records at the WCRO/SHPO contain reports of 66 previous cultural resource investigations within the BCPA, most of which occurred in advance of proposed oil or gas well development and/or related pipeline or access road development.

WCRO/SHPO records indicate that only 565 acres within these eight sections, or less than 12 percent (12%) of the total land area of these sections (roughly 4,800 acres) were block surveyed for cultural resources; the largest of these block surveys encompassed 40 acres. However, many additional surveys and other investigations were completed, for which the WCRO/SHPO records do not provide an acreage, because these surveys were for well pads or narrow corridors for small pipelines, transmission lines, or roads. Because little of the BCPA was surveyed for cultural resources, the results of surveys to date are representative of BCPA as a whole. A detailed discussion of the investigations is contained within the Beaver Creek Cultural Report (WAS 2007) on file at the BLM.

WCRO/SHPO records indicated that 31 cultural resource sites had been recorded within the BCPA. Prehistoric archaeological sites include hearths/fire cracked rock, lithic scatters, and a single stone circle site. Lithic scatters are primarily flaking debris from production of stone tools at various stages. In the vicinity of the current project, lithic scatters are typically sparse in content and do not contain tools that are particularly diagnostic of any temporal period or cultural affiliation. The BCPA does not contain substantial sources of lithic materials suitable for tool production. Many rock art sites are known to exist in the general region, but rock art sites have not been recorded within the BCPA, and the area does not contain large, exposed vertical rock faces that are likely to support rock art panels.

A small number of prehistoric sites (29) were recorded as a result of 66 investigations, apparently indicating a relatively low site density for the BCPA. However, hearths or fire cracked rock sites dominated the archaeological inventory, and at least some of those features or materials are elements or remnants of Late Prehistoric or Archaic Period pit features. Most of the previously recorded pit features had very few associated artifacts, were buried up to 10 centimeters below current ground surface, and were subtle in appearance when exposed. Recognition of the widespread distribution of the pit structures has occurred within the past 15 years, after many of the cultural resources surveys were completed in the BCPA. Many such features are known to exist immediately outside the BCPA, and indications of such features have been found within the BCPA. It was therefore recognized that undiscovered pit features could exist within the BCPA.

Historic settlement is not known to have occurred within the BCPA and therefore historic settlement sites or other historic resources not related to oil and gas production were not anticipated. Two historic sites have been recorded within the BCPA: a segment of a wagon trail and a historic debris assemblage.

Of the 29 prehistoric archaeological sites previously recorded within the BCPA, eight sites have been determined eligible for the NRHP or have been recommended as eligible, 13 sites have been formally determined as ineligible or recommended as ineligible, and eight sites have not been evaluated for NRHP eligibility. Neither of the two recorded historic period sites, a trail and a debris deposit, have been evaluated for NRHP eligibility.

3.10.5 NEWLY RECORDED SITES WITHIN THE BCPA

Table 3.10.1 lists the results of the most recent Class III Inventories performed in the BCPA by WAS. A total of 83 sites were found, of which 15 were determined eligible for the NRHP. 29 sites were determined to be ineligible, and NRHP eligibility remains undetermined for 39 sites.

These inventories show that the site density is higher than previously indicated, and that prehistoric cultural resources will be a factor to be considered in any future development scenarios.

Table 3.10-1. List of Recent Class III Cultural Inventory Results

48FR1523	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR1524	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR1525	Prehistoric campsite	Not Eligible	WAS	Clearance recommended with stipulations
48FR2927	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR3642	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR3711	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR3712	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR4257	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR4258	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations

Site Number	Site Type	NRHP Assessment	Recorded By	Avoidance Recommendations
48FR4342	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR4399	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR4493	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR4515	Prehistoric campsite	Not eligible	WAS	Clearance recommended with stipulations
48FR4612	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR4623	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR4625	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR4626	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR5957	Prehistoric campsite	Eligible	WAS	Clearance recommended with stipulations
48FR5958	Prehistoric campsite	Undetermined	WAS	Clearance recommended with stipulations
48FR5959	Prehistoric campsite	Not Eligible	WAS	Clearance recommended with stipulations
48FR5960	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5961	Prehistoric campsite	Eligible	WAS	Clearance recommended with stipulations
48FR5962	Prehistoric campsite	Not Eligible	WAS	Clearance recommended with stipulations
48FR5962	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5963	Prehistoric campsite	Eligible	WAS	Clearance recommended with stipulations
48FR5964	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5965	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations

Site Number	Site Type	NRHP Assessment	Recorded By	Avoidance Recommendations
48FR5966	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5967	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5968	Prehistoric campsite	Eligible	WAS	Clearance recommended with stipulations
48FR5969	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR5970	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR5971	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR5972	Prehistoric campsite	Undetermined	WAS	Clearance recommended with stipulations
48FR5973	Prehistoric lithic scatter	Not Eligible	WAS	Clearance recommended with stipulations
48FR5974	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5975	Prehistoric campsite	Not Eligible	WAS	Clearance recommended with stipulations
48FR5976	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5977	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR5978	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5979	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5980	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5981	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5982	Prehistoric campsite	Eligible	WAS	Clearance recommended with stipulations
48FR5983	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations

Site Number	Site Type	NRHP Assessment	Recorded By	Avoidance Recommendations
48FR5984	Prehistoric campsite & lithic scatters	Eligible	WAS	Clearance recommended with stipulations
48FR5985	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5986	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5987	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR5988	Prehistoric campsite	Not Eligible	WAS	Clearance recommended with stipulations
48FR5989	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5990	Prehistoric campsite	Eligible	WAS	Clearance recommended with stipulations
48FR5991	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5992	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5993	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5994	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5995	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5996	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5997	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5998	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR5999	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6000	Prehistoric campsite	Undetermined	WAS	Clearance recommended with stipulations
48FR6000	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations

Site Number	Site Type	NRHP Assessment	Recorded By	Avoidance Recommendations
48FR6001	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6002	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6003	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6004	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6005	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6006	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6007	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6008	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6009	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR6010	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6011	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6012	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6013	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6014	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6015	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6016	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations
48FR6017	Prehistoric campsite & lithic scatters	Not Eligible	WAS	Clearance recommended with stipulations
48FR6018	Prehistoric campsite & lithic scatters	Undetermined	WAS	Clearance recommended with stipulations

Site Number	Site Type	NRHP Assessment	Recorded By	Avoidance Recommendations
IF-1	N/A	Not Eligible	WAS	Clearance recommended with stipulations

3.11 SOCIOECONOMIC RESOURCES

3.11.1 LOCAL ECONOMY AND EMPLOYMENT

Historically, the major sources of employment in Fremont County have been professional services and government. The County's economy has become increasing dependant on these employment sectors. Between 1970 and 2000 the employment within these sectors increased by 79.4 percent and 16.9 percent, respectively. Other important employment sectors include construction and agriculture. Despite being among the smallest employment sectors (in number of jobs), the oil and gas industry is well established in Fremont County. Table 3.11-1 provides a summary of employment by sector in Fremont County.

Table 3.11-1. Employment by Sector in Fremont County

Farm and Agricultural Services	1,516	7.2
Oil and Gas/ Mining	643	3.0
Manufacturing	813	3.9
Services and Professional[1]	12,277	58.1
Construction	1,893	9.0
Government	3,974	18.8
Total	21,116	100

[1]Services and Professional includes transportation, public utilities, wholesale trade, retail trade, finance, insurance, real estate, health, business, and legal.
Source: Wyoming Department of Administration and Information- Economic Analysis Division 2006a

The labor market in Fremont County has improved in recent years; however, as of 2002, the unemployment rate (6.2 percent) was still above the State of Wyoming average (3.9 percent) and the United States average (4.8 percent) (BIA 2004).

Wages in Fremont County are typically below the statewide average and grow at a slower pace. In addition to below average wages, the per capita personal income and the median household income in Fremont County are also below the state and national averages.

3.11.2 REVENUES FROM OIL AND GAS ACTIVITIES

Revenue from Federal mineral royalties as well as Federal, state, and local taxes on minerals, mining, and extraction generates approximately two-thirds of the State of Wyoming's total revenue. These revenues provide funding for public schools, highways, government provided services, and the State's general tax fund. Because revenues from oil and gas development is high, the household tax burden in the State of Wyoming is among the lowest in the nation (Wyoming Department of Administration and Information- Economic Analysis Division 2006b). Fremont County ranks near the top in mineral production.

Federal mineral lease royalties are collected from oil and gas operations located on Federally-administered public lands in Fremont County. Federal mineral leasing regulations require the return of 50 percent of royalties collected from natural resource extraction on Federal lands to the state of origin.

3.11.3 ENVIRONMENTAL JUSTICE

The WRIR, located approximately one mile north of the BCPA, is the home of the Eastern Shoshone and Northern Arapaho Tribes. Statistical thresholds from the Bureau of the Census indicate that the Eastern Shoshone and Northern Arapaho Tribes meet the criteria of a minority and low-income population. The objective of environmental justice is to analyze/ determine whether Federal approval of an action would disproportionately impact these Tribes.

No development is proposed on the WRIR; however, water produced during drilling would go to an existing evaporation pond on private land within the jurisdictional boundary of the Reservation.

Public participation by potentially affected minority and low-income groups is important for environmental justice compliance. Tribal consultation was initiated with tribal elders of the Shoshone and Northern Arapahoe Tribes by the BLM's cultural resource specialist prior to a subsurface archaeological survey in the BCPA. Formal consultation with the Tribes has been ongoing throughout the EA process and was completed in September 2007 upon signing of the Decision Record. Both Tribes also participated in the public scoping process and were provided copies of the Draft EA.

3.12 RECREATION

Recreational use of the area is guided by the Lander RMP (BLM 1987) in accordance with BLM guidelines. The Recreation Opportunity Spectrum (ROS) is the BLM's framework to inventory, plan and manage recreational opportunities on public lands. The ROS classifies BLM-administered lands into six classes, based on three principal components: the environmental setting, the activities possible, and the experiences that can be achieved. For the BCPA, ROS classes were identified under the Lander RMP and fall within two of the six ROS classes. A portion of the area is classified as Semi-Primitive Motorized (SPM). This area is described as a predominantly natural or natural-appearing environment of moderate to large size wherein motorized recreation is permitted. The remaining area is classified as Roaded Natural (RN) where the environment is predominantly natural-appearing with moderate evidence of the sights and sounds of humans (C. Breckenridge, BLM, personal communication, 2006).

The BCPA is located just south of the WRIR in west-central Wyoming and is comprised entirely of lands managed by the BLM, Lander FO. Access to the BCPA is on Beaver Creek Road from Highway 135 to the east. Although it is not considered a recreation destination, the public lands within the BCPA are open for recreational pursuits. The network of roads, along with existing oil and gas facilities and associated development in the area reduce the primitive character of the BCPA for visitors seeking solitude and relatively pristine landscapes. Accordingly, recreation use of the BCPA can best be described as dispersed and consists primarily of hunting and limited off-road vehicle (ORV) use (C. Breckenridge, BLM, personal communication, 2006). There are no

developed recreation sites within or in close proximity to the BCPA. Numerical data on recreation use in the BCPA is not available.

Hunting within the BCPA is primarily for pronghorn antelope, given the lack of suitable range in the area for other large game species (P. Hnilicka, USFS, personal communication, October 2005). Hunting for mule deer likely occurs within the BCPA in the fall and winter months.

ORV use in the area is permitted and is limited to existing roads and trails. The majority of ORV use in the BCPA is associated with hunting activities.

3.13 VISUAL RESOURCES

3.13.1 VISUAL SETTING

The BCPA consists of a variety of predominately rolling sagebrush plains, interspersed with small hills and rocky ridges. Mountain ranges visible in the background from the BCPA include the Owl Creek Mountains to the North, the Absaroka Mountains to the northwest, and the Wind River Range to the west. There are no substantial drainages within the BCPA. Vegetation within the BCPA consists of short sagebrush and grasses. Although there are no urbanized areas within the BCPA, portions have been modified, primarily through grazing and resource extraction. Twenty-three existing natural gas wells and their associated components, including wellheads, storage tanks, production meters, pipelines, evaporation ponds, well pads, and access roads can be seen throughout the area. The manmade modifications within the BCPA have altered the natural shapes, lines, forms, and colors of the landscape to a moderate extent.

3.13.2 VISUAL RESOURCE MANAGEMENT SYSTEM

The BLM is directed to manage public lands in a manner that will protect the quality of the visual (scenic) values in accordance with section 102(a)(8) of the FLPMA. The BLM Visual Resource Management (VRM) system provides the BLM with a methodological approach to identify visual (scenic) vales; establish objectives through the RMP process or on a case-by-case basis for managing those values; and provide timely input into proposed surface-disturbing projects to ensure that the assigned objectives are met or intrusions are sufficiently mitigated. The VRM process considers the scenic quality of the landscape, the sensitivity of the viewer, and the distance from the viewer to the landscape. Based upon these characteristics, BLM assigns a VRM class to the lands under their jurisdiction, the objectives of which are as follows:

Table 3.13-1. Visual Resource Management, Class Objectives

I	To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
II	To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
III	To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
IV	To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

Source: BLM Handbook H-8410-1, Visual Resource Inventory

The entire BCPA is designated as VRM Class IV lands wherein major modification of the existing landscape can be high. Some modification of the landscape has already occurred in the BCPA in the form of grazing and resource extraction development as described above.

3.14 FUELS/FIRE MANAGEMENT

Western U.S. grasslands and shrublands have experienced changes in vegetation due to prolonged drought conditions and wildfires (BLM 2005). Such conditions have changed the composition and productivity of these lands, replacing desired native vegetation communities with non-native vegetation and noxious weeds, especially in burned areas (BLM 2005). Unwanted annual grasses and forbs cure more quickly and carry fire faster than perennial vegetation and can quickly dominate an area, perpetuating a weed-fire-weed cycle (BLM, 2005). These long-term changes reduce wildlife habitat and water quality. Management actions to reverse or redirect these trends can be very costly and require prolonged/lengthy recovery periods.

FLPMA mandates that the BLM manage public lands under its jurisdiction for a variety of uses. With that responsibility, BLM must limit threats and risks to healthy landscapes, maintain healthy ecosystems, and restore degraded lands. Healthy lands are more resilient to environmental fluctuation and disturbance than degraded lands, so they are better able to provide long-term sustainability of resource outputs, as mandated by FLPMA (BLM, 2005).

In keeping with this goals and objectives, the existing Lander RMP (BLM 1987) divides the Resource Area into separate management units. The Beaver Creek Management Unit has been subdivided into three fire management suppression zones. The BCPA is located within Zone 1. The management objective for this zone is full suppression. Full suppression does not preclude the use of heavy equipment, such as bulldozers, but does limit their use on initial fire response, and requires fire authorities to analyze a fire critically before committing to use heavy equipment as a supplement to other fire-fighting resources.

Full suppression would be used in the BCPA because of the proximity to private, State, and Tribal lands as well as the energy-related infrastructures that could be damaged as a result of wildfires started on BLM-administered lands. Prescribed burns would be used to enhance range and wildlife habitat management goals and objectives.

There are concerns that limited revegetation success following surface disturbance activities would allow the introduction and/or expansion of unwanted, fire-prone noxious plant species, especially annual grasses. This would increase the risk of unwanted, possibly catastrophic, wildfire events in the BCPA that could extend onto surrounding non-BLM administered lands.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

The purpose of Chapter 4 is to determine the potential for significant impacts from the Beaver Creek CBNG Pilot Project on the human environment. The "human environment" is defined by the CEQ regulations, for implementing NEPA, as the natural and physical environment and the relation of people with that environment (40 CFR Section 1508.14).

This chapter analyzes the direct, indirect, and residual impacts in each resource section. Cumulative impacts that may result from the Proposed Action are discussed in Section 4.4 in this chapter.

These terms used in this chapter are defined below.

- Direct impacts are effects that are caused by the federal action and occur at the same time and place (40 CFR 1508.8).
- Indirect impacts are effects that are caused by the federal action, but occur at a later time or are removed in distance but are still reasonably foreseeable and related to the action (40 CFR 1508.8).
- Residual impacts are those impacts remaining after application of appropriate mitigation measures (BLM 1988). These residual impacts to natural resources would be reduced and eliminated over time.
- Cumulative impacts are the impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collective significant actions taking place over a period of time (40 CFR 1508.7).
- Initial disturbance, as used in this EA, refers to the surface disturbance resulting from construction of well pads, pipelines, roads, and electrical lines, and is prior to interim reclamation.
- Residual disturbance, as used in this EA, refers to the surface disturbance remaining after successful interim reclamation of access roads, pipelines, and electrical lines, which will remain for the life of the project (20-30 years).
- Interim reclamation refers to the partial reclamation of well pads, access roads, and electrical lines once construction has been completed. Pipelines are buried and reclaimed immediately after pipeline installation.
- Final reclamation refers to the reclamation that occurs at the end of the life of the project or when a well no longer produces economic quantities of gas.

This chapter also identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

4.2 ALTERNATIVE A – PROPOSED ACTION

4.2.1 GEOLOGY AND MINERAL RESOURCES

4.2.1.1 Geology

Potential impacts to geologic resources from the Proposed Action include changes to the local topography and increased slope instability. Excavation for the construction of well pads, pipelines, and access roads could cause topographic changes including square- or rectangular-shaped cuts and fills in the sandstone and sandy shale bedrock underlying portions of the BCPA.

The potential for mass movements resulting from the Proposed Action is low. Some small slumps may occur in the cuts created for the new access roads, pipelines, and well pads. However, these mass movements would be localized in extent and would likely not affect any existing structures or roads.

4.2.1.2 Mineral Resources

Inventory of mineral resources in the BCPA revealed no major mineral resources that would be potentially impacted by implementation of the Proposed Action other than gas resources and coal. Additional depletion of natural gas resources in the Beaver Creek Field would result from successful drilling and completion of the CBNG exploration wells as described for the Proposed Action.

The Proposed Action would interfere with the possible extraction of coal from beneath the BCPA. However, the great depth to the coal seams underlying the Beaver Creek Field precludes mining of this resource by surface methods. At the present time, underground mining of these coals is also not economically viable. Vast reserves of easily-mined coal are present in other areas of Wyoming, including the Gillette area. Therefore, the impact on coal resources in Wyoming from the Proposed Action is considered to be negligible.

4.2.1.3 Mitigation

Site-specific mitigation for geology and mineral resources could be defined during the onsite process as necessary.

4.2.2 AIR QUALITY

Potential emissions and impacts to ambient air quality were evaluated for the 20 Pilot CBNG well development. Emissions were evaluated for the construction, drilling, completion, and producing of the wells, including emissions resulting from the associated construction of access roads, pipelines, production facilities, electric transmission lines, and evaporation ponds.

4.2.2.1 Proposed Action Emission Inventory

An annual emission inventory was developed for the Proposed Action. Emission inventories for criteria pollutants [nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulates (PM_{10} and $PM_{2.5}$)], volatile organic compounds (VOC), and hazardous air pollutants (HAP) [benzene, toluene, ethylbenzene, xylene (BTEX), n-hexane, and formaldehyde] were completed for development and operational-related oil and gas activities. Emission rates were

calculated using applicable EPA emission factors and anticipated level of operational activities, such as estimated vehicle trips, load factors, and hours of operation. Emissions would result from the following project activities and sources:

- Well pad and road construction: earth-moving equipment fugitive dust, earth-moving equipment exhaust, and mobile source tailpipe emissions on roadways;
- Drilling: mobile source tailpipe emissions, fugitive dust emissions on roadways, and drill rig engine exhaust;
- Completion: mobile source tailpipe emissions, fugitive dust emissions on roadways, well venting emissions, and well fracturing engine emissions;
- Gas processing: central facility natural gas-fired heater emissions; and
- Operation and maintenance: mobile source tailpipe emissions and fugitive dust emissions on roadways.

Total estimated emissions for the Proposed Action are summarized in Table 4.2-1. All temporary development-related emission calculations, which include well location and resource road construction, well drilling, and well completion, are based on a development period of one year. Pad and access road construction fugitive dust emission calculations assumed a 50% watering control efficiency while vehicle-generated fugitive dust calculations incorporated dust reduction factors from precipitation events. Annual emissions which are assumed to continue for the life of project are estimated after all facilities have been constructed and are fully operational.

Once the pilot wells are developed, the produced coal bed natural gas will be compressed at the existing Beaver Creek North Field Compressor site and transferred to the existing Beaver Creek Unit Plant for processing and sales. No additional processing capacity is anticipated at either facility to support production from the pilot wells. Other than emissions from two natural gas-fired heaters to be located at the proposed Coal Bed Natural Gas facility, no additional gas processing emissions are anticipated as a result of the Proposed Action. Therefore, project-related hazardous air pollutant (HAP) emissions would be negligible. Hazardous air pollutants are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects.

Recent concern has been raised by the WDEQ regarding the potential air emissions of methanol, which is one of the 187 HAPs identified by the EPA. Concern surrounds the potential volatilization of methanol to the atmosphere after it becomes entrained in the water produced during the gas extraction process. This volatilization is thought to occur after the produced water is transferred to disposal facilities and stored in evaporation ponds. However, this topic is still currently being studied and as of this writing, methods for accurately quantifying potential methanol emissions via this pathway are still in the process of being developed. Therefore, potential methanol emissions are not quantified for the Proposed Action emission inventory.

Table 4.2-1. Proposed Action Emission Summary

NO_X	42.1	0.9
CO	11.8	1.4
VOC	1.6	0.0
SO_2	0.7	0.0
PM_{10}	114.7	4.8
$PM_{2.5}$	18.6	0.8
Benzene	0.0	0.0
Toluene	0.0	0.0
Ethylbenzene	0.0	0.0
Xylene	0.0	0.0
n-Hexane	0.0	0.0
Formaldehyde	0.0	0.0

[a] Assumes development scenario of 20 wells and pads per year for one year.
[b] Emissions after all 20 pilot wells and pads are developed and operational.

4.2.2.2 Proposed Action Impacts

Project-related emissions have the potential to affect air quality on both a local and a regional scale. Pollutant dispersion modeling was performed using the AERMOD dispersion model (Version 04300) to assess the potential air quality impacts from the Proposed Action activities. As of December 9, 2005, the U.S. EPA AERMOD model has become the recommended replacement for the Industrial Source Complex (ISC3) model for assessing criteria pollutant impacts under the CAA. AERMOD contains significant improvements over ISC3 in its treatment of atmospheric stability, vertical wind profiling, and plume/terrain interaction. Five years of surface and upper air meteorological data available from Lander, Wyoming, were applied in the modeling analysis.

Based on the proposed project schedule, construction and drilling would be completed in approximately 30 days. Well drilling was assumed to occur 24 hours per day, while construction and completion activities were assumed to occur 10 hours per day during daylight hours only. The pollutant emitted in the greatest quantities during well development would be PM_{10} resulting from earthmoving activities and from vehicle travel along unpaved access roads. Additionally, an increase in NO_x emissions would result from drill rig engine exhaust. Maximum hourly emissions of PM_{10}, NO_x, and SO_2 were estimated and used for comparison to applicable short-term and annual ambient air quality standards. Comparison to annual PM_{10}, NO_2, and SO_2 standards is provided for consistency. However, the annual impacts are conservative in that they assume annual emissions allocated to the same locations for the entire development period.

The maximum impacts from well development are shown in Table 4.2-2. The predicted criteria pollutant impacts are compared to applicable WAAQS. Since well development activities are short-term and temporary, a comparison to Prevention of Significant Deterioration (PSD) thresholds is not appropriate. The results show that ambient air concentrations would be below all

standards for the length of the development period. The annual NO_2, SO_2 and PM_{10} results demonstrate that even if the proposed annual pace of development occurred in the same location during a single year, the effects would still be less than all ambient air quality standards.

Table 4.2-2. Proposed Action Air Quality Impacts[a]

SO_2 3-hour	4	93[d]	97	1,300	8 %
SO_2 24-hour[c]	2	32[d]	34	260	13 %
SO_2 Annual[c]	0.1	4[d]	4	60	7 %
NO_2 Annual	6	3.4[e]	9	100	9 %
PM_{10} 24-hour	26	53[f]	79	150	53 %
PM_{10} Annual	2	20[f]	22	50	44 %

[a] Impacts presented are highest results from construction, drilling, and completion
[b] μ/m^3 is micrograms of pollutant per cubic meter of air
[c] Source: Wyoming Air Quality Standards and Regulations, Chapter 2 - Ambient Standards
[d] Data collected Lost Cabin Gas Plant (preconstruction monitoring) Fremont County, Wyoming 1986-1987 (Personal Communication with WDEQ, November 29, 2005).
[e] Data collected at Green River Basin Visibility Study site, Green River, Wyoming during the period January-December 2001 (ARS 2002).
[f] Data collected by WDEQ at Lander, WY, 2004 (Personal Communication with WDEQ, November 29, 2005).

Since the existing infrastructure will be used to transport and process the gas and liquid production generated from the pilot wells, incremental emissions during the well operation phase will be relatively minor and inconsequential compared with emissions generated during the well development phase. Emissions from the operation phase were therefore not directly evaluated with AERMOD but are expected to be well below all applicable standards.

In summary, while an increase in criteria pollutant emissions is expected as a result of the Proposed Action activities, these emissions are not predicted to result in a violation of Wyoming Ambient Air Quality Standards. Hazardous air pollutant health risks are not likely, since typical oil and gas HAPs (BTEX, formaldehyde) will not be emitted in measurable quantities (see Table 4.2-1). Accordingly, air quality impacts that would occur as a result of the Proposed Action would be below Wyoming Air Quality Standards.

4.2.2.3 Far-Field Impacts at Class I Areas

Two Class I airsheds managed by the U.S. Forest Service, the Bridger Wilderness Area and the Fitzpatrick Wilderness Area, are approximately 40 to 45 miles west of the BCPA. No effects to air quality related values (AQRV), i.e., ambient air impacts, visibility, or acid deposition, at these Class I airsheds would be predicted to occur for the following reason. An air quality analysis was recently completed for the Bureau of Indian Affairs Riverton Dome Project Area Draft Environmental Impact Statement (BIA 2007). The Beaver Creek project is immediately south of the Riverton Dome project. No impacts to AQRVs were predicted from the Riverton Dome project that would be above the levels considered significant by the U.S. Forest Service federal land managers. The Riverton Dome annual emissions would be more than double those estimated for the Beaver Creek project. Since the Beaver Creek annual emissions would be half of the Riverton Dome emissions and impacts are approximately proportional to emissions, it follows that no impacts to Class I AQRVs would occur for the Beaver Creek project.

4.2.2.4 Mitigation

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for air quality will be defined during the onsite process as necessary.

Mitigation of air quality impacts would be accomplished through the permitting of all regulated air pollution sources through the WDEQ-AQD. The construction and operating permitting processes will typically require the use of clean burning technologies and other emission controls for larger sources of emissions (such as compressor engines) in order to reduce impacts to ambient air quality.

- Unpaved access roads constructed by Devon would be watered or treated with dust suppressant, as needed, to minimize the release of dust into the air.
- Carpooling of workers would be encouraged, in order to reduce the amount of dust from vehicles during well development.
- Speed limits would be reduced to minimum design speeds for roads as discussed in the Gold Book.
- Burning of waste or oil is prohibited unless authorized by the Surface Management Specialist.
- No hydrocarbons shall be allowed in the reserve pit at any time, should hydrocarbons get into the pit they shall be removed immediately. Burning of waste oil is prohibited without prior authorization from the Authorized Officer.

4.2.2.5 Residual Impacts

Despite application of the above recommended mitigation efforts, implementation of the Proposed Action would result in minor increases in air pollutant emissions, mainly during the short-term and temporary well development period (less than one year). Emissions occurring during normal operations are expected to be insignificant throughout the life of the project. As previously discussed, the increased pollutant concentrations resulting from the Proposed Action are not anticipated to result in a violation of ambient air quality standards.

4.2.3 WATER RESOURCES

Although no water will be discharged to the surface as a result of the proposed CBNG pilot project, public scoping has revealed that among the primary public concerns are the potential for adverse impacts to water resources from the Proposed Action. These impacts could include those related to surface disturbance in the watersheds that lead to Beaver Creek (for example, increased runoff and sedimentation from newly constructed access roads, pipeline corridors, and well pads); the potential for spills of produced water, fracing fluids, and other hazardous constituents to contaminate surface water or groundwater; depletion of river flows from the removal of water for

drilling operations and development of the well fields; and, effects on groundwater aquifers from CBNG well completion, formation fracturing with chemicals, well operations, operation of the evaporation ponds, and injection of wastewater and other fluids into disposal wells.

4.2.3.1 Surface Water

Potential direct and indirect impacts to surface water resources from the Proposed Action include:

- Increased sedimentation and turbidity of surface water, especially Beaver Creek, as a result of ground disturbance and increased erosion into surface waters via runoff;
- Effects on water quality – i.e., potential contamination of surface water resources from spills or discharges of drilling fluids, petroleum, or other chemicals used for natural gas drilling and production activities;
- Potential depletion of river flows from the removal of water for drilling operations and development of the well field.

The potential for adverse impacts to surface water resources would be greatest shortly after the start of construction activities and would likely decrease in time due to natural stabilization, reclamation, and revegetation efforts. The magnitude of these potential impacts depends on several factors, including the proximity of the disturbance to ephemeral surface water drainages and Beaver Creek, slope aspect and gradient, soil type, the duration and timing of the construction activity, and the success or failure of reclamation and mitigation measures.

Increased Sedimentation and Turbidity

Increased erosion and subsequent increased sedimentation to ephemeral drainages within the BCPA is likely, especially during the construction of the project facilities. The increased erosion could also potentially lead to a short-term increase in turbidity in Beaver Creek. Both of these effects could have negative impacts on aquatic habitat within affected drainages.

Soil loss calculations reveal that an estimated 94 tons per year of additional erosion could be expected to occur as a result of the Proposed Action during construction, drilling and completion operations. Over time, precipitation events and snowmelt could cause soil lost from the proposed facilities in the BCPA to reach adjacent ephemeral drainages. This fine sediment could then eventually be transported down these ephemeral drainages to Beaver Creek, and perhaps on to the Little Wind River. In sufficient amounts, the additional sediment from construction activities and operational facilities could:

- Degrade aquatic habitat by covering stream substrates with fine sediment and clogging of the interstitial pores of the substrate.
- Increase the turbidity within Beaver Creek and potentially, the Little Wind River.
- Clog road culverts and cause road damage.
- Transport pollutants (trace metals, herbicides, petroleum constituents, etc).
- Contribute to a degraded sediment regime, which could result in downcutting of the channel, bank destabilization, and increased turbidity, and thus decreased levels of dissolved oxygen in the water, ultimately resulting in degradation of aquatic habitat.

Based on data collected at the USGS gauging station located on the Little Wind River near Riverton (the median of the calculated daily sediment loadings over the period of record), existing sediment loading in the Little Wind River averages about 674 tons/day (246,010 tons/year). The highest sediment loading occurs during the months of May, June and July from snowmelt runoff. Using the very conservative assumption that all available sediment from the construction of the project facilities (94 tons annually) would eventually be transported to the Little Wind River, the increased sediment loading to the Little Wind River at Riverton would be approximately 0.03 percent.

With the application of erosion and runoff control, the actual amount of sediment that would be transported to the ephemeral drainages within the BCPA and on to Beaver Creek and the Little Wind River would be much smaller than the calculated maximum presented above. Sedimentation control devices would also be used along new roads and at drilling locations to minimize the amount of sediment that reaches any ephemeral drainage in the BCPA. The erosion and runoff control devices used would be specified during the APD process for each proposed well pad, access road, and other project facilities. Accordingly, with the application of erosion and runoff control, sediment loading to the Little Wind River from Beaver Creek from construction of the project facilities would increase by less than 0.03%.

Soils compacted on existing roads, new access roads, and well pads generate more runoff than undisturbed sites. The increased runoff could lead to slightly higher peak flows in Beaver Creek, potentially increasing erosion of the channel banks. The increased erosion could potentially increase turbidity in Beaver Creek and the Little Wind River during storm events.

Approximately 3,500 barrels of water would be needed to drill and complete each well, with an additional 1,000 barrels used for dust suppression associated with each well. Therefore, the estimated total water use is about 90,000 barrels, or 11.6 acre-feet for the 20 proposed wells and associated facilities that would be constructed. Water would be obtained from a water well owned by Devon (BCU #118) and permitted with the State Engineer's Office, Permit no. P51107W. The well produces water from the Wind River Formation at a depth of approximately 680 feet. Use of water from this well could reduce flow in Beaver Creek.

Water Quality

Contamination of surface water and groundwater can occur in oil and gas fields. Sources of potential contamination include leaks from wellheads, conveyance pipelines, storage tanks, and tanker trucks, as well as leaching of contaminants from impacted soils near these facilities. In addition, accidental spills of hydrocarbon products, including fuels and petroleum products, or produced water, would have the potential to contaminate surface waters if the spills were to occur when flow was present in the ephemeral drainages of the BCPA.

The handling of produced water is of concern, based on public comments. Each CBNG well is expected to initially produce about 500 barrels of water per day, for a total maximum water production of about 10,000 barrels per day. However, for the Proposed Action, no produced water will be discharged into any stream. Water produced during the operation of the CBNG wells would be disposed of by either: evaporation or deep injection, as discussed in Section 2.3.1.11 in Chapter 2.

Using the combination of the proposed injection well and the existing and proposed evaporation ponds, there would be sufficient water handing capacity for the expected production, with extra capacity for upset conditions (for example, large amounts of rainfall in a short period of time).

Therefore, no impacts to surface water resources in and near the BCPA are expected in association with the routine handling of produced water. However, water quality of the evaporation pond is expected to deteriorate over the life of the project due to an increase in TDS and salinity in the pond due to evaporation.

Since ground-disturbing activities within close proximity to streams have the greatest potential for impacting water resources, rapid and successful reclamation/re-vegetation of temporarily disturbed areas and implementation of erosion-control measures are particularly important in minimizing water quality impacts and to assure maintenance of long-term stream health. Soil-loss estimates show that an additional 94 tons of sediment could be expected to be generated from the disturbed soil surfaces during construction of the proposed project facilities. In addition, over 50 percent of the proposed facilities would be constructed on soils having a poor reclamation source material rating. Erosion and sedimentation would be controlled by revegetating the areas around the well pads in the next fall or spring season, using erosion of sediment control as needed. The exact design of the erosion and sedimentation control measures would be submitted with the APDs for each well pad, pipeline corridor, and new access road in consultation with the BLM. As required by the State of Wyoming, a Storm Water Pollution Prevention Plan (SWPPP) would be prepared and submitted for approval prior to construction that describes the specific construction and revegetation procedures that would be employed.

Hydrofracturing of the Mesaverde Formation for the proposed new wells would be conducted as part of the Proposed Action. Hydrofracturing is commonly used to enhance the recovery of natural gas from relatively impermeable "tight" sandstones, and involves the injection of water or other fluids, which may contain some petroleum constituents, and sand or some other "proppant" into the formation. Studies conducted for a proposed natural gas project targeting the Mesaverde Formation in western Colorado show that the maximum fracture distance would extend approximately 500 feet radially from each well (Wright Water Engineers 2003). Hydrofracturing would occur at depths that are at least 4,000 feet or more below the surface.

4.2.3.2 Groundwater

Potential impacts to groundwater resources from the Proposed Action include contamination of groundwater with produced water, drilling mud, or petroleum constituents.

Groundwater exists in shallow unconsolidated alluvium along ephemeral drainages and in deeper bedrock formations beneath the BCPA. In the BCPA, groundwater is currently used as water for domestic and livestock consumption. The main aquifers of concern are the Quaternary alluvium and the upper portion of the Wind River Formation. Spills of fuels or produced fluids have the potential to contaminate groundwater resources, especially the shallow alluvial groundwater. Spills from facilities located adjacent to ephemeral drainages would have the greatest potential to contaminate groundwater. If a spill is detected, the SPCC Plan would be implemented to minimize, control, and cleanup the affected area. The measures provided in the SPCC Plan would minimize the chance that spilled material enters a surface water feature and subsequently impacts shallow groundwater by providing a rapid response to any spill events.

No produced water would be discharged into surface water drainages or allowed to flow onto the ground surface. There is a slight chance that produced water could be spilled during the loading operations. However, storm water runoff would be controlled at each drilling location as specified in an approved SWPPP. Therefore, a spill of produced water would be unlikely to migrate off of the well pad and there is little chance that produced water would enter and contaminate shallow alluvial aquifers.

Produced water would also be discharged into two evaporation ponds, as needed. These ponds would be lined with a 60-mil liner and leakage from the ponds is not expected. Therefore, operation of the evaporation ponds would have no impacts on groundwater resources.

Under the Proposed Action, hydrofracturing of the Mesaverde Formation would be used to enhance the overall permeability of the formation and enhance the flow of gas into the well bore after drilling is completed. The potential impacts of hydrofracturing on groundwater resources depends largely on two factors: 1) the structural grain of the rocks being hydrofractured and 2) the stress field operating on the rocks at the time of the hydrofracturing. Neither of these factors is well known for the geologic formations in the BCPA. In addition, it is expected that hydrofracturing effects would not extend beyond 500 feet horizontally from the well bore, as discussed by Wright Water Engineers (2003) for the Mesaverde Formation in the Piceance Basin of Colorado. In addition, because hydrofracturing would be conducted at considerable depths (4,000 feet or more below ground surface), and the Wind River Formation and the Mesaverde Formation are separated by several aquicludes, groundwater resources near the surface, such as springs and the shallow alluvium, would not be affected.

4.2.3.3 Mitigation

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for water resources will be defined during the onsite process as necessary.

Mitigation Measures

- Standard industry practices and safety measures associated with the installation of roads, pipelines, and well pad facilities, and the containment of storage tanks in bermed areas would be implemented to minimize the risk of accidental spills or introduction of contaminants to BCPA drainages. All production equipment would be installed and maintained in accordance with existing Notices to Lessees and/or Onshore Oil and Gas Orders pertaining to installation and maintenance of oil and/or gas production facilities on Federal leases. To reduce the potential for hydrocarbon contamination of surface water, pipelines and associated collection piping would be designed to minimize the potential for spills and leaks. Newly constructed pipelines would be hydrostatically tested to evaluate structural soundness. Integrity tests would be conducted in full compliance with the mandatory BLM pipeline stipulations. In the winter months, ethylene glycol would be used for testing to prevent the pipe from freezing. Storage tanks would be surrounded by berms capable of holding at least 110 percent of the volume of the largest tank within the berm. A water-based mud system would be used for the drilling operations. Drilling muds and cuttings would be placed in an earthen reserve pit lined with an impermeable synthetic liner to prevent seepage into the soil. The synthetic liner would be at least 12 mil (0.012 inch) thick, and be resistant to decay from sunlight and hydrocarbons and compatible with the drilling fluids to be retained. Finally, a Spill Prevention, Control, and Countermeasure (SPCC) Plan would be prepared that describes the specific measures that would be employed to prevent petroleum products and other chemicals from leaving the site and contaminating surface water.

- Pipelines would be installed in a manner that utilizes the existing topography to the greatest extent possible in order to ensure the shortest pipeline route possible, while minimizing the amount of surface disturbance associated with pipeline installation.
- Proposed project facilities would be constructed with erosion, and sedimentation controls to reduce erosion rates.
- The erosion and runoff control devices used would be specified during the APD process for each proposed well pad, access road, and other project facilities.
- Erosion and sedimentation would be controlled by revegetating the areas around the well pads in the next fall or spring season, using erosion of sediment control as needed.
- As required by the State of Wyoming, a Storm Pollution Prevention Plan (SWPPP) would be prepared and submitted for approval prior to construction that describes the specific construction and revegetation procedures that would be employed.
- If a spill is detected, the SPCC Plan would be implemented to minimize, control, and cleanup the affected area.
- The reserve pit shall be lined with a 12 mil synthetic liner. When the reserve pit contains fluids or toxic substances the operator will provide effective and proven wildlife deterrents or exclusionary devices such as nets, to insure at all times that wildlife, migratory birds, and other animals are not adversely affected by open pits. Any open pits would be fenced to prevent and deter wildlife, migratory birds, and other animals from entering and/or ingesting substances.

Conditions of Approval

The following are Surface Conditions of Approval and may not apply to every well or area of construction. For a complete list of each individual Condition of Approval, please refer to Appendix C.

- The facilities location shall be constructed in such a manner as to prevent the collection of surface runoff.
- All long term production facilities will be located on existing cut portions of the location.
- All tank batteries and facilities designed to contain fluids shall be surrounded by an impervious dike designed to contain 110% of the contents of the largest vessel. All pipelines and other load lines will terminate within the bermed area.
- The pipeline overburden shall be adequately compacted to minimize subsidence and channelization.
- The operator shall construct the evaporation pond in accordance with the design requirements in Onshore Order No. 7, BLM Manual 9172, and applicable State agency requirements.
- The pond shall be lined with a 60 mil impermeable synthetic liner and shall be resistant to weather, sunlight, hydrocarbons, aqueous acids, alkalies, salt, fungi, or other substances likely to be contained in the produced water.
- The liner shall be installed over smooth subgrade that is devoid of any sharp object that has the potential of damaging the liner.

- Prior to closure of the evaporation pond, a site inspection shall be scheduled between the operator and BLM to determine the appropriate closure procedures.
- Prior to closure of the reserve pit and interim reclamation activities, the operator shall contact the BLM authorized officer to set up an onsite to discuss appropriate procedures for reserve pit closure.
- The well pad shall be constructed in such a manner as to prevent the collection of surface runoff.

4.2.3.4 Residual Impacts

With the completion of construction activities, well pads, roads, pipelines, and auxiliary facilities would be reclaimed using the mitigation measures identified above. This assumes that revegetation efforts will be successful. However, many of the project facilities would be constructed on soils that have a severe erosion potential and/or a poor reclamation source material rating. Therefore, if the reclamation efforts are not successful, then the impacts to water resources described above may persist for the life of the project.

4.2.4 SOIL RESOURCES

Potential impacts to soils from the Proposed Action include the removal of vegetation, mixing of soil horizons, soil compaction, increased susceptibility of the soils to wind and water erosion, and contamination of soils with petroleum products. A total of about 128 acres of soils would be disturbed during the construction of well pads, access roads, and pipelines and co-located electrical lines. This represents about 7.3 percent of the total land surface of about 1,750 acres in the BCPA. After interim reclamation, the acreage disturbed would be reduced to about 91 acres, or 5.2 percent of the total BCPA of 1,750 acres.

The primary effect of surface disturbances on soil resources is increased erosion and the resulting potential increase in sediment yield to ephemeral drainages and Beaver Creek. Two studies conducted on sediment yield from disturbed surfaces provide insight into the amount of increased erosion that could be expected from construction of well pads, access roads, and other project facilities in the BCPA. Lusby and Toy (1976) reported that yields from reclaimed surface mines were initially 300% to 600% higher than from undisturbed surfaces. Frickel et al. (1975) found that yields increased from an average of 1.45 tons/acre to about 2.9 tons/acre/year (a 100% increase) in the Piceance Basin of Colorado after construction of oil shale project facilities. Using these studies as examples, and given the severe erosion potential of many of the soil types in the area as described in Section 3.5, it is assumed that average erosion rates for affected soils in the BCPA would triple during construction and drilling operations. The current average erosion rate for soils within the Wind River Basin is reported to be about 0.36 tons per acre per year. Therefore, for the total land area of 1,750 acres in the BCPA, the current total erosion is about 630 tons per year. During construction and drilling operations, the erosion rate would increase to about 1.08 tons/per acre per year on the disturbed surfaces. This increased erosion rate would generate an additional 94 tons of sediment annually during construction of the proposed project facilities before interim reclamation measures are conducted. Using the standard statistical measure of Relative Percent Difference, the additional erosion would represent a theoretical increase of about 9.2% of the total erosion rate for the BCPA.

Because of the BMPs and construction techniques proposed by Devon, very little of the eroded material is expected to reach Beaver Creek from the disturbed surfaces. For example, construction would not occur during saturated soil conditions when vehicles would leave ruts

greater than four inches deep. In addition, a SWPPP would also be prepared that would provide design details for drainage control at all project facilities. It is also expected that following re-vegetation and two to four growing seasons, the erosion rate and potential sedimentation increases would drop to near baseline conditions from well pads and pipeline corridors, but would remain at higher than current levels for the new access roads.

Compaction due to construction activities at the well pads and along access roads would reduce aeration, permeability, and water-holding capacity of the soils. A slight increase in surface runoff could be expected, potentially causing increased sheet, rill, and gully erosion. The excavation and subsequent reapplication of surface soils could potentially cause the mixing of shallow soil horizons, resulting in a blending of soil characteristics and types. This blending would modify physical characteristics of the soils including structure, texture, and rock content, which could lead to reduced permeability and increased runoff from these areas.

As part of the Proposed Action, topsoil would be conserved. Topsoil excavated from drilling locations and new roads would be stockpiled for interim and final reclamation. After construction, interim reclamation would reduce the disturbed area for each well pad to about 1.15 acres, for a total surface disturbance for the 20 well pads of 23 acres. The well locations would then remain in this condition for 20 or more years. At the completion of the project, or if a well is not productive, the well pads would be completely reclaimed. Reclamation would generally consist of backfilling reserve pits, regrading the area to the approximate natural contours, spreading stockpiled soils over the disturbed area, and reseeding with a BLM-approved seed mixture. The poor reclamation material source ratings given to many of the soil types in the area (see Section 3.5) suggest that revegetation may not be successful in some portions of the BCPA. Therefore, it is possible that the initial impacts associated with soil disturbance (i.e., increased erosion and sedimentation, increased runoff) may remain for longer than 2-4 years or even permanently.

Potential sources of contamination to soils in the BCPA would include leaks or spills of natural gas condensate liquids from wellheads, conveyance pipelines, produced water sumps, and condensate storage tanks, and spills of fuels from vehicles or drill rigs. Depending on the size and type of spill, the effect on soils would primarily consist of the potential loss of soil productivity. To reduce the potential for hydrocarbon contamination of soils, pipelines and associated collection piping would be designed to minimize the potential for spills and leaks. Storage tanks would be surrounded by berms capable of holding at least 110% of the largest single tank volume. Implementation of the SPCC Plan would minimize the risk of such spills by providing safeguards against spills and detailing reporting and cleanup measures to be taken in the event of a spill.

4.2.4.1 Mitigation

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for soil resources will be defined during the onsite process as necessary.

Mitigation

- Pipelines would be installed in a manner that utilizes the existing topography to the greatest extent possible in order to ensure the shortest pipeline route possible, while minimizing the amount of surface disturbance associated with pipeline installation.
- Proposed project facilities would be constructed with erosion and sedimentation controls to reduce erosion rates.

Conditions of Approval

The following are Surface Conditions of Approval and may not apply to every well or area of construction. For a complete list of each individual Condition of Approval, please refer to Appendix C.

- Development would be in compliance wit the NPDES Storm Water Discharge Permit for large construction activities.
- No vehicle travel, construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support vehicles and/or construction equipment. If such equipment creates ruts in excess of four inches deep, the soil shall be deemed too wet to adequately support such equipment. Vehicle travel must be confined to the approved access road and well pad at all times.
- If the access road and well site is dry during construction, drilling, and completion activities, the disturbed areas must be watered to help road compaction and minimize soil loss due to wind erosion.
- The operator shall ensure adequate drainage structures are installed so as not to impede drainage on the access road.
- If the access road and well site is dry during construction, drilling, and completion activities, the disturbed areas must be watered to help road compaction and minimize soil loss due to wind erosion.
- Sediment control structures such as silt fencing or wing ditches shall be placed on all cut and fill slopes and maintained in working condition until interim reclamation takes place.
- All long term production facilities will be located on existing cut portions of the location.
- All tank batteries and facilities designed to contain fluids shall be surrounded by an impervious dike designed to contain 110% of the contents of the largest vessel. All pipelines and other load lines will terminate within the bermed area.
- The pipeline overburden shall be adequately compacted to minimize subsidence and channelization.
- Topsoil shall be respread at a depth of 8 inches along the backslopes of the pond containment dikes to the edge of the pond liner. Excess topsoil shall be spread over the spoil pile around the northwest and southwest edges of the pond at a depth of no greater than 16 inches. All topsoil shall be hydroseeded utilizing the seed mix provided above (Surface Use Condition of Approval No. 1) and a hyrdromulch applied after seeding.

4.2.4.2 Residual Impacts

The Proposed Action would add about 91 acres of long-term surface disturbance and 4.2 miles of unpaved roadways to the Beaver Creek Field. These disturbed areas would incrementally add to the long-term erosion rate for soils of the area.

4.2.5 PALEONTOLOGY

Construction of access roads, well pads, and other facilities has the potential to destroy or damage scientifically important fossil resources. This type of work also frequently leads to the discovery of fossils, which would be considered a beneficial impact.

The Wind River Formation is known to produce scientifically significant fossils throughout its extent. Fossil vertebrates, plants and invertebrates are known from a great number of widely dispersed localities in the formation throughout the Wind River Basin. However, field evaluation of the Wind River Formation for paleontological resources completed for this Proposed Action (Winterfeld 2006) did not lead to the discovery of any fossil vertebrate localities within the BCPA. The Wind River Formation is poorly exposed in most of the BCPA, and the Halfway Draw Tuff, which is the main unit exposed in the area, appears to be unfossiliferous. In addition, the proposed facilities would primarily be constructed over colluvium and alluvium, which are too young to contain fossils. Therefore, the potential for destruction (or discovery) of scientifically important fossils due to the construction of the project facilities appears to be minor.

4.2.5.1 Mitigation

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for paleontological resources would be defined during the onsite process as necessary.

- Pre-disturbance surveys would be conducted to reduce the likelihood that significant fossil resources would be damaged or destroyed.
- If fossils are discovered, construction activities would be immediately halted and the BLM AO informed. A qualified paleontologist would then inspect the site and make recommendations for avoidance or recovery of the fossil resources, if warranted by the scientific value of the resource.

4.2.5.2 Residual Impacts

Since the potential for unearthing fossils in the area is small, no residual impacts are anticipated.

4.2.6 VEGETATION (INCLUDING INVASIVE AND NOXIOUS WEEDS, AND SPECIAL STATUS PLANTS)

4.2.6.1 Vegetation Communities

The Proposed Action would remove vegetation from an estimated total of 128 acres (or 7.5 percent) of the BCPA (based on GIS calculations). After interim reclamation of well pads, roads, and pipelines, about 91 acres could be devoid of desired vegetation at any one time during the production phase of the project. Although interim reclamation of disturbed sites would be attempted, the semi-desert climatic regime and site-specific soil types do likely not favor successful reclamation in the BCPA.

Currently the BCPA is grazed by livestock from May until mid November. This period includes the active growing season for the majority of rangeland vegetation. Uncontrolled livestock grazing on revegetated sites during this period could reduce and prolong the ability of these sites to successfully revegetate.

Another factor that could affect reclamation potential would be removal of topsoil that would be stored for future reclamation and revegetation actions (refer to 2.3.1.2, well pad design and construction). Maintaining the continued integrity of the topsoil layer over time is crucial to enhance reclamation and revegetation success on disturbed areas. Topsoil's organic material and soil structure support soil microbes, which enhance soil function and sustain vegetation production. Should the biological viability of the topsoil layer be changed or compromised over time, including being inadvertently mixed with the subsoil layers, the effectiveness of the soil used to successfully reclaim a site could be directly affected.

Naturally occurring wind-borne dust settles on vegetation and is usually washed off or blown off by either precipitation or wind. If appreciable amounts of dust settle on vegetation, the plant's pores can become clogged, affecting its ability to function properly. Increased vehicle traffic on existing and proposed new road access routes, especially during dry periods, would be the primary source of fugitive dust settling on roadside vegetation. However, implementation of mitigation measures identified in Section 2.5 in Chapter 2, Conditions of Approval in the APDs (Appendix C), and Wyoming standard mitigation guidelines (Appendix D), lease stipulations, decisions in the Lander RMP (BLM 1987) associated with air quality, soils, surface and groundwater, and vegetation involving interim reclamation and dust abatement (Section 2.5, in Chapter 2) could effectively minimize the these impacts to vegetation.

Special Status Plants

Given that sensitive plant species were not identified during field surveys conducted in Spring 2006 (Buys & Associates, Inc. 2006), impacts to special status plant species under the Proposed Action would likely be limited to the loss of potential habitats for Porter's sagebrush and Nelson's milkvetch (i.e., alkaline, often seleniferous, clay soils and sparsely vegetated badlands) within the BCPA due to surface disturbance, increased fugitive dust, and soil compaction. Furthermore, if Porter's sagebrush and Nelson's milkvetch are found during the on-site process, surface disturbance to occupied habitats for these species would be avoided. Therefore, direct impacts to occupied habitats and individual plants would not occur under the Proposed Action. Thus, the Proposed Action could not likely result in a trend towards Federal listing of the Porter's sagebrush or Nelson's milkvetch.

Invasive and Noxious Weeds

Overall, the Proposed Action could increase the transport and establishment of noxious weeds throughout the BCPA. These impacts could be minimized through the implementation of mitigation measures described in Section 4.2.6.2, below.

4.2.6.2 Mitigation and Monitoring

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for vegetative resources would be defined during the onsite process as necessary.

Mitigation

- To further reduce possible impacts to roadside vegetation from dust coming from roads in the BCPA during dry periods, the access roads would be treated with water or magnesium chloride. This action would further minimize but not completely mitigate refuge dust from affecting roadside vegetation.
- To completely mitigate possible impacts to Porter's sagebrush and or Nelson's milkvetch from possible dust and/or unintentional disturbance to either suitable habitat or individual plants, a 100-foot buffer between occupied habitat and any surface disturbing activities and/or along roadways would be considered.
- Existing roads, corridors, and open areas would be used for construction and development operations to the extent possible to minimize disturbance to vegetation.
- Fencing the revegetated areas would be considered, where appropriate to keep cattle from feeding on the newly reclaimed areas. Fencing could involve the installation of a temporary fence, such as an electric, fence, or a more permanent three-strand barbed wire fence, suitable for cattle and antelope.
- Weed infestations would be treated with herbicides specified by the BLM AO, to prevent spread of weeds. The method of weed treatment would be determined by the BLM AO.
- To enhance successful revegetation following surface disturbance, mixing of topsoil and soil substrate would be avoided. In addition, the site would be assessed prior to disturbance to determine topsoil depth, and ensure that only topsoil is removed. To ensure stockpiled topsoils' continued viability, periodic inspections and tests of topsoil would occur to ensure presence of microbial activity.
- Reclamation of well pads, pipelines, and other disturbed areas would be monitored to ensure that native plants are re-colonizing the disturbed area and noxious weeds are controlled.
- Wash all vehicles that are not resident in the BCPA, those coming in from outside the Riverton area, to help prevent the introduction of invasive species. High pressure wash all vehicles, graders, caterpillars, scrapers, backhoes, entrenching machines, and self-propelled construction/drilling equipment before it reaches the area of the proposed action; preferably at a commercial facility.

Conditions of Approval

The following are Surface Conditions of Approval and may not apply to every well or area of construction. For a complete list of each individual Condition of Approval, please refer to Appendix C.

- All disturbed areas shall be seeded with the seed mixture listed below. Seed shall be certified weed free and contain no primary or secondary noxious weed seeds in the seed mix. The seed shall be applied by a drill equipped with a regulator. Planting depth shall not exceed one-half inch. Where drilling is not possible, seed shall be broadcast and the area shall be raked or chained to cover the seed. It is recommended that the seeding be done during the months of September or October following construction completion. The seeding will be repeated until a satisfactory stand, as determined by the Authorized Officer, is obtained. Evaluation of growth will not be made before completion of the first growing season after seeding.

- The following seed mix will be used for interim reclamation activities. Prior to starting final reclamation and/or relinquishment, the operator will contact the Authorized Officer for a final approved seed mix.

Seed mixture:	
Western wheatgrass	3 lbs/acre
Slender wheatgrass	3 lbs/acre
Needle and Thread	3 lbs/acre
Bottlebrush squirreltail	3 lbs/acre
American Vetch	2 lbs/acre
Scarlet Globemallow	2 lbs/acre
Evening Primrose	1.5 lbs/acre
Total	16.5 lbs/acre PLS (Pure Live Seed)

*If broadcast method is utilized, the seed mixture shall be doubled.
**Should any of the above prescribed seed species be unavailable at the time of seeding operations the Authorized Officer shall be contacted to allow for the approval of a change in seed mixture.

- All weeds shall be controlled on all disturbed areas within the exterior limits of this authorization. The control methods shall be in accordance with guidelines established by applicable EPA, BLM, State and local authorities. Prior to the use of any herbicide on Federal lands, the applicator must have a valid certified applicators license and have a valid Pesticide Use Proposal (PUP) for the chemical being applied, submitted to and approved by BLM.

- Construction related activity shall be restricted to approved routes. Cross-country vehicle travel shall not be permitted.

- All surface disturbance associated with construction of the pipeline must be confined to the 50 foot ROW.

- Prior to starting final reclamation and/or relinquishment, the operator will contact the Authorized Officer for a final approved seed mix.

- The operator shall fence off and reclaim the existing two-track road to the north of the #28-41 well pad utilizing the seed mix stated above.

Monitoring

Devon would establish a monitoring protocol and conduct the monitoring in coordination with the BLM to assess the effectiveness of measures used to control invasive and weedy plant species. The protocol would include a pre-disturbance inventory of noxious weeds within the BCPA as well as annual inventory, with a focus on existing and proposed road access routes. This would establish a baseline from which treatment/control actions would be measured and evaluated. The annual inventory would also monitor the effectiveness of the rates/kinds of herbicides, mechanical, or cultural treatments used in relation to the target species. Should monitoring reveal that revegetation measures are ineffective or not achieving the desired results, the Pesticide Use Proposal would be redesigned. A monitoring protocol would be implemented to monitor the effectiveness of interim and final reclamation actions. Successful reclamation and revegetation would have, as a foundation for success, ground cover of at least 70 percent, compared to a similar adjacent ecological site, and consist of vegetation appropriate to that site. Additional reclamation measures would include hydro-mulching, inoculated seeds, and chemical soil additives, such as nitrogen, to further enhance reclamation success.

4.2.6.3 Residual Impacts

The Proposed Action would result in unavoidable residual impacts to vegetation from fugitive dust, primarily from roadways and from the potential for noxious and weedy plant species resulting from unsuccessful revegetation on disturbed areas. The ability of each vegetation community to successfully recover to pre-disturbance production levels would depend on the disturbed site's specific characteristics, e.g., topography, soil texture, soil depth, micro-climate and effective precipitation. Revegetated areas may not be exactly the same as pre-disturbed vegetative communities but would be required to have a uniform vegetative cover with density of at least 70 percent of the native background cover as required by the WDEQ's WYPDES Permit.

Due to the semi-arid climatic regime and associated soil development within the BCPA, disturbed soils would not easily respond to reclamation and revegetation actions, and long-term or even permanent surface disturbance may remain even after interim and final reclamation efforts are implemented. Residual impact include those that would still occur after mitigation.

4.2.7 WILDLIFE AND FISHERIES

Numerous species of wildlife are present within the BCPA and may potentially be impacted by the Proposed Action. The wildlife species that will be analyzed in this section include big game species, upland game birds, raptors, migratory bird species, reptiles, and special status wildlife species.

Potential direct and indirect impacts to wildlife that may be associated with the Proposed Action include the following:

- Loss of foraging, nesting and breeding habitat
- Temporary or permanent displacement of some wildlife species due to visual and noise-related impacts
- Potential for collisions between wildlife and motor vehicles

- Increased habitat fragmentation
- Exposure to contaminants
- Changes in wildlife behavior, such as, avoidance or predation patterns
- Reduced reproduction and mortality of juveniles

The severity of direct and indirect impacts to wildlife could depend on factors such as exposure time, sensitivity of the species, seasonal use patterns, topography, vegetation cover, food type, and season. The severity of impacts could also vary depending on the phase of development (i.e., by the type and timing of project activity). Generally, impacts resulting from construction, drilling, and completion activities would be greater in magnitude and more intense due to heavy human activity, while impacts resulting from production activities (e.g., maintenance and monitoring) would be similar in nature but less intense due to reduced human activity. However, these impacts would continue to occur for the LOP. For example, construction, drilling, and completion activities could result in temporary displacement from affected habitats during the entire construction period of wells, roads, or pipelines; however, production activities could result in displacement only during well visits.

4.2.7.1 Big Game

Many of the impacts associated with the Proposed Action would be similar among all big game species utilizing habitats in the BCPA. These impacts could include:

- Decreased habitat values and reduced habitat use within and/or near disturbed areas due to habitat loss (including foraging areas) and habitat fragmentation from construction and operational activities;
- Temporary displacement and disruption of migratory routes within and/or near disturbed areas due to avoidance of surface disturbance and areas with human activity;
- Increased stress from intra- and inter-specific competition for resources due to increased animal densities in adjoining or unsuitable habitats
- Decreased reproductive success and nutritional conditions from increased energy expenditure as a physical response to disturbance
- Increased potential for collisions between vehicles and big game; and
- Increased harassment and/or poaching of big game species.

Species-specific analyses for big game species are discussed in the sections that follow.

Pronghorn Antelope

Several direct and indirect impacts to pronghorn antelope could occur under the Proposed Action due to the direct removal of habitat and habitat fragmentation, and may include the following: decreased use and reduced habitat values by pronghorn within and/or near disturbed areas, temporary displacement, increased stress from competition for resources, and reduced reproductive success. Estimated habitat losses for WGFD-designated pronghorn ranges associated with the Proposed Action are listed below in Table 4.2-3.

Table 4.2-3. Approximate Surface Disturbances to WGFD-designated Pronghorn Antelope Habitats within the BCPA under the Proposed Action

Pronghorn Antelope	Crucial Value Winter/Yearlong	347	20	14
	Winter/Yearlong	803	62	49
	Yearlong	600	40	27

[1]Disturbance estimates are approximate, based on GIS calculations.
[2]Based on WGFD GIS maps.
[3]Initial disturbance is the surface disturbance after construction, drilling and completion operations.
[4]Residual disturbance is the disturbance after interim reclamation has been implemented and continues for the life of the project.

Visual and noise disturbance from human activity could also reduce relative habitat value for pronghorn, especially during periods of heavy snow cover and cold weather. Pronghorn are likely to experience physiological stress during winter, particularly gestating females, because they require higher energy levels for survival and successful reproduction. The increased presence of vehicles, equipment, and workers in the BCPA, combined with the potential for insufficient winter forage, could exacerbate natural levels of winter stress among pronghorn that occupy the BCPA, resulting in increased energy expenditures during severe winter periods (BLM 2003). The ability of pronghorn to survive the winter and a female's ability to produce viable offspring depends on fat reserves. Increased stress could cause fat reserves to be used more quickly and could reduce the survival of female pronghorn and their fetuses (BLM 2003). Where wintering pronghorn are able to vacate areas surrounding construction operations, they could move to adjacent habitats, where competition for resources may increase. Increased vehicular traffic on new and existing access roads would increase potential for vehicle collisions with pronghorn.

The Wildlife Conservation Society is currently conducting a five-year study, which began in January 2005, in the Upper Green River Basin of western Wyoming (i.e., in the Jonah Field and the Mesa Field) to evaluate how the footprint of gas field infrastructure and development affects pronghorn antelope. Preliminary findings from the first year of the five-year study suggest that a growing array of gas fields, roads, and attendant human infrastructure is altering the suitability of habitat for wildlife. Data from 48 GPS collared females indicated that some pronghorn may have structured their movements to avoid areas of high density infrastructure on the Mesa and Jonah Fields. Specifically, 90 percent of the experimental pronghorn were not in the immediate vicinity of well pads and avoided areas within 100m of gas wells. Notably, of the 56,992 points retrieved from the GPS collars, none were recorded in the Jonah Field, an area documented to contain more than 600 pronghorn during the winter of 2002-2003. Additionally, statistical modeling indicated that continual habitat fragmentation of previously undisturbed lands is leading to reduced usage and abandonment of habitat parcels, particularly in fragments smaller than 600 acres in size (Berger et al. 2006).

Since the BCPA occurs within an area where natural gas exploration and production has been on-going for decades, pronghorn occupying the BCPA may have adapted to oil and gas development. Therefore, while individual pronghorn may be negatively affected by direct and indirect impacts

of the project, the Proposed Action is not likely to impact the Beaver Rim herd unit, which is currently above population objective.

The Conditions of Approval in each APD and Wildlife Seasonal Restrictions attached to the COAs (Appendix C) provide seasonal protection of crucial winter range of the pronghorn antelope. If a location in the BCPA is identified as being in crucial winter range of the pronghorn, development activities could not occur between November 15th and April 30th, unless approved by the Authorized Officer prior to any disturbance activities. In addition, best management practices and voluntary mitigation measures initiated by Devon (see Section 2.5 in Chapter 2), would further reduce the impact of the Proposed Action on the pronghorn antelope.

Mule Deer

Since no identified herd units for mule deer have been identified by WGFD in the BCPA, disturbance estimates for the specific ranges of these species cannot be calculated. However, it would be expected that impacts to mule deer resulting from initial surface disturbance, traffic, human presence, and noise levels could be similar to impacts as described above for the pronghorn antelope.

Mitigation measures identified in the Lander RMP (BLM 1987), stipulations attached to each lease, Conditions of Approval attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), and BMPs and voluntary mitigation measures implemented by Devon (see Section 2.5 in Chapter 2), would reduce the impact to the mule deer.

4.2.7.2 Raptors

Implementation of the Proposed Action could affect nesting, breeding, and foraging raptors that may utilize portions of the BCPA. Potential direct and indirect impacts to raptors could include the following: 1) temporary displacement from suitable habitats during the breeding season due to increased noise levels and visual disturbances on the landscape; 2) a reduction in habitat for prey species due to clearing of vegetation; and 3) electrocution caused by or collisions with surface power lines.

Raptor nests have not been identified in the BCPA, however; should they be established within the BCPA in the future, surface disturbing activities or areas with concentrated human activity in close proximity (e.g., ½-mile) of an active raptor nest could lead to temporary displacement from nesting sites, avoidance of affected areas, and deterrence from establishing other nesting sites. Displacement could lead to nest failure or nest abandonment, thereby affecting the breeding pair and their annual productivity. Steidl and Anthony (2000) suggest that the greatest energetic costs from disturbance occur in nestlings, potentially decreasing overall reproductive success. Displacement could also lead to increased use of adjacent habitats, which could lead to increased inter- and intra-specific competitions for resources. However, as increased noise levels and visual disturbances associated with construction, drilling, and completion activities would be localized and short-term as compared to the LOP, displacement of raptors to adjacent habitats would likely be temporary in nature and would not likely alter the productivity of current raptor populations within the BCPA. In addition, impacts resulting from increased noise levels and visual disturbances during the production phase (including maintenance and monitoring) would be much less intense than impacts associated with the development phase (i.e., construction, drilling, and completion). As such, temporary displacement during the production phase would not likely alter current productivity levels.

In addition to reducing suitable nesting habitat, surface disturbances associated with the Proposed Action would result in the direct, initial loss of approximately 128 acres of habitat for raptor prey species such as mammals, songbirds, and reptiles. Following interim reclamation, long-term loss of habitat for raptor prey species in the BCPA would be approximately 91 acres. Rodriguez-Estrella et al. (1998) identify loss or fragmentation of habitat of prey species as a contributor to raptor population declines.

Another potential impact to raptors includes the increased potential for electrocution by and collisions with proposed surface power lines constructed for CBNG well sites. Although utility poles can benefit raptors by providing perching and/or nesting structures, these structures also pose threats to raptors that could result in serious injury or mortality. Several guidelines have been prepared that provide methods to utilize in order to protect raptors from collision with and electrocution by surface power lines. The most recent guidelines are included in the following documents: "*Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*" (APLIC 2006) and "*Avian Protection Plan (APP) Guidelines*" (APLIC and USFWS 2005). Implementation of these measures has been committed to by Devon in Section 2.5 of this EA. Therefore, the potential for electrocution by or collisions with the proposed power lines would be effectively reduced or eliminated.

Furthermore, if an active raptor nest is identified during the on-site process, other site-specific mitigation (e.g., seasonal and spatial buffers) would be determined by the Authorized Officer of the BLM to reduce the potential for adverse impacts to raptors. As such, although the Proposed Action could affect individual raptors that potentially nest, breed, or forage within the BCPA, the impacts discussed above would not result in a loss of local raptor populations or reduced densities within the BCPA and surrounding areas."

4.2.7.3 Upland Game Birds

Implementation of the Proposed Action could result in both direct and indirect impacts on the mourning dove, gray partridge, chukar and ring-necked pheasant. Direct impacts would include the loss of potential nesting and foraging habitats. If construction, drilling, and completion were to occur during the spring/summer months, the Proposed Action could result in reproductive failure, nest abandonment, and/or mortality of eggs, nestlings or fledglings.

Construction, drilling, and completion noise and human presence could also cause displacement from foraging or nesting habitats. Displacement may cause these species to move into less suitable habitats or into habitats where inter- and intra-specific competition may occur. However, given the abundance of these species and its habitat throughout Wyoming, the Proposed Action is not likely to cause a decline in the species at a population level.

Other impacts to individual upland game birds could include contact with petroleum-based products in reserve pits and water management facilities. In addition, raptors perching on overhead power lines could increase predation levels on game birds. However, based on the mitigation measures outlined in Section 4.2.7.7, which would require the operators to install bird scare devices or implement other protective measures around reserve pits and water management facilities, as well as installing raptor deterrent devices, impacts to migratory birds from reserve pits, water management facilities, and raptor perching would be eliminated or reduced.

4.2.7.4 Neotropical Migratory Bird Species

Numerous species of migratory birds, including passerines and waterfowl, may forage or nest in or near the BCPA. Impacts to migratory birds in the BCPA would be dependent upon the season of construction, drilling, and completion activities. If these activities are completed in the late fall, many of the migratory species would have left the BCPA for southern wintering grounds. Surface disturbance and noise impacts during this time would be temporary, and project-related impacts would not likely have a measurable impact on migratory bird populations as a whole or individual species, in general. However, if construction, drilling, and completion were to occur during the spring or summer months, the Proposed Action could result in reproductive failure of breeding individuals, nest abandonment, and/or mortality of eggs, nestlings, or fledglings through accidental nest destruction. For example, ground-nesting bird species, such as mountain plovers, would be susceptible to nest destruction and mortality by construction vehicles and heavy equipment. Shrub nesting species may also be directly affected due to removal of some shrub vegetation.

Direct impacts would also include initial and residual surface disturbance of approximately 128 acres and initial 91 acres, respectively, of potential nesting and foraging habitats. Noise from construction, drilling, and completion activities could also cause displacement from foraging habitats. Displacement from the BCPA could cause the birds to move into less suitable habitats or to habitats where inter- and intra-specific competition may occur. Migratory bird contact with water in the reserve pits and evaporation ponds could also result in mortality of individual birds. However, a bird deterrent system, referred to as "Bird Avert," would be installed to keep birds away from the evaporation ponds. In addition, treatment of the produced water, prior to entering the evaporation pond, would be implemented if birds manage to reach the water. Details on the Bird Avert system and the water treatment are described in Chapter 2, Section 2.3.1.11.

4.2.7.5 Reptiles

Direct impacts to reptiles under the Proposed Action could include the initial loss of approximately 128 and the residual loss of approximately 91 acres of potential breeding and foraging habitats. In addition, noise and soil compaction from construction, drilling, and completion activities could displace or deter reptiles from utilizing suitable habitats. These impacts would be more detrimental to species that have a relatively small home range. However, given the abundance of similar vegetative communities within and surrounding the BCPA, impacts to reptiles under the Proposed Action would likely be negligible.

4.2.7.6 Fisheries

As there are no streams or water bodies within the BCPA that support fish populations, there would be no direct impacts to fish populations or habitats as a result of the Proposed Action. Indirect impacts to fish habitats downstream of the BCPA could potentially occur as a result of soil erosion and sedimentation from construction activities and increased traffic levels (and subsequent erosion and fugitive dust) under the Proposed Action. Sediments could be yielded to Beaver Creek, either directly from stormwater runoff or from ephemeral drainages within the BCPA that drain to Beaver Creek during storm events. If sediment-rich water enters Beaver Creek, it could flow to the Little Wind River. Similarly, if any spills occurred during a storm event, hydrocarbons could potentially reach Beaver Creek and could subsequently reach downstream areas. Since surface discharge of water is not proposed, impacts to fish in the Little Wind River from produced water would not occur under the Proposed Action. Furthermore,

based on extensive applicant-proposed and BLM required mitigation measures (see Appendices C and D) to reduce erosion and sedimentation, the potential for the above-discussed impacts to fish habitats and populations downstream of the BCPA would be greatly reduced or negated.

4.2.7.7 Special Status Species

Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that are proposed or listed as endangered or threatened, and their critical habitat, if any has been formally designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to "*adversely affect*" or "*jeopardize the continued existence*" of a federally listed species or result in the adverse modification or destruction of its critical habitat. If a Federal action "*is likely to adversely affect*" a federally listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate species for listing under the ESA and BLM sensitive species are also managed to prevent future listing as threatened or endangered. The potential impacts of the Proposed Action on threatened, endangered and BLM and State sensitive species are discussed below.

Mammals

Black-Footed Ferret

The Proposed Action would have "*no effect*" on the black-footed ferret, since this species is not known to be present in Township 34N, Range 96W, based on a "clearance" provided in a letter from the USFWS, dated February 2, 2004 (USFWS 2004).

Pygmy Rabbit

Suitable habitat for the pygmy rabbit was not observed in the BCPA by the BLM wildlife specialist during site visits (G. Morgan, BLM, personal communication, December 2006). Therefore, the Proposed Action would have no impact on this species.

White-Tailed Prairie Dog

Active white-tailed prairie dog colonies were observed in the BCPA during the Spring 2006 wildlife survey (Buys & Associates 2006). The construction and operation of new access roads, wells, facilities and pipelines from the proposed project could result in fragmentation of white-tailed prairie dog habitat used for feeding and shelter. Increased numbers of motorized vehicles and heavy equipment within the BCPA could potentially increase prairie dog mortality. In addition, habitat quality could be degraded by the introduction of noxious and invasive weeds as a result of the Proposed Action, resulting in decreased visibility, forage quality, and burrow development. To minimize impact from the Proposed Action, white-tailed prairie dog colonies would be avoided, where possible.

The Proposed Action may also produce beneficial effects to prairie dogs, since blading and grading of vegetation would produce numerous tracts of open areas that could potentially create new habitat for the prairie dogs. When the disturbed areas are reclaimed, regrowth of native vegetation would provide high-quality forage for the prairie dog.

Birds

Bald Eagle

The Proposed Action would have "*no effect*" on the bald eagle because the BCPA is not suitable for nesting, foraging or roosting for the bald eagle, due to the lack of open water and existing disturbance from oil and gas development (see T&E Section 7 Consultation, October 2006 in Appendix F).

Burrowing Owl

The western burrowing owl is typically associated with prairie dog burrows. Although prairie dog colonies were observed in the BCPA during the raptor survey conducted in May 2006, no burrowing owls were seen (Buys & Associates, Inc. 2006). If nesting burrowing owls occurred in the vicinity of construction activities, the Proposed Action could result in disturbances to breeding, nesting, and fledgling success. However, the BLM seasonal wildlife restrictions prohibit construction or other surface disturbing activities within burrowing owl nesting areas between May 1st to September 30th, unless approved by the BLM Authorized Officer (Appendix C).

Ferruginous Hawk

Implementation of the Proposed Action could affect nesting, breeding, and foraging ferruginous hawks that may utilize portions of the BCPA. Potential direct and indirect impacts to ferruginous hawks could include the following: 1) temporary displacement from suitable habitats during the breeding season due to increased noise levels and visual disturbances on the landscape; 2) a reduction in habitat for prey species due to clearing of vegetation; and 3) electrocution cause by or collisions with surface power lines.

Ferruginous hawk nests have not been identified in the BCPA, however; should they be established within the BCPA in the future, surface disturbing activities or areas with concentrated human activity in close proximity (e.g., ½-mile) of an active ferruginous hawk nest could lead to temporary displacement from nesting sites, avoidance of affected areas, and deterrence from establishing other nesting sites. Displacement could lead to nest failure or nest abandonment, thereby affecting the breeding pair and their annual productivity. Steidl and Anthony (2000) suggest that the greatest energetic costs from disturbance occur in nestlings, potentially decreasing overall reproductive success. Displacement could also lead to increased use of adjacent habitats, which could lead to increased inter- and intra-specific competitions for resources. However, as increased noise levels and visual disturbances associated with construction, drilling, and completion activities would be localized and short-term as compared to the LOP, displacement of ferruginous hawks to adjacent habitats would likely be temporary in nature and would not likely alter the productivity of current ferruginous hawk populations within the BCPA. In addition, impacts resulting from increased noise levels and visual disturbances during the production phase (including maintenance and monitoring) would be much less intense than impacts associated with the development phase (i.e., construction, drilling, and completion). As such, temporary displacement during the production phase would not likely alter current productivity levels.

In addition to reducing suitable nesting habitat, surface disturbances associated with the Proposed Action would result in the direct, initial loss of approximately 128 acres of habitat for ferruginous hawk prey species such as mammals, songbirds, and reptiles. Following interim reclamation,

long-term loss of habitat for ferruginous hawk prey species in the BCPA would be approximately 91 acres. Rodriguez-Estrella et al. (1998) identify loss or fragmentation of habitat of prey species as a contributor to ferruginous hawk population declines.

Another potential impact to ferruginous hawks includes the increased potential for electrocution by and collisions with proposed surface power lines constructed for CBNG well sites. Although utility poles can benefit ferruginous hawks by providing perching and/or nesting structures, these structures also pose threats to ferruginous hawks that could result in serious injury or mortality. Several guidelines have been prepared that provide methods to utilize in order to protect ferruginous hawks from collision with and electrocution by surface power lines. The most recent guidelines are included in the following documents: "*Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*" (APLIC 2006) and "*Avian Protection Plan (APP) Guidelines*" (APLIC and USFWS 2005). Implementation of these measures has been committed to by Devon in Section 2.5 of this EA. Therefore, the potential for electrocution by or collisions with the proposed power lines would be effectively reduced or eliminated.

Furthermore, if an active ferruginous hawk nest is identified during the on-site process, other site-specific mitigation (e.g., seasonal and spatial buffers) would be determined by the Authorized Officer of the BLM to reduce the potential for adverse impacts to ferruginous hawks. As such, although the Proposed Action could affect individual ferruginous hawks that potentially nest, breed, or forage within the BCPA, the impacts discussed above would not result in a loss of local ferruginous hawk populations or reduced densities within the BCPA and surrounding areas."

Golden Eagle

Golden eagle nests have not been identified in the BCPA, however; should they be established within the BCPA in the future, implementation of the Proposed Action could affect nesting, breeding, and foraging golden eagles that may utilize portions of the BCPA. Potential direct and indirect impacts to golden eagles could include the following: 1) temporary displacement from suitable habitats during the breeding season due to increased noise levels and visual disturbances on the landscape; 2) a reduction in habitat for prey species due to clearing of vegetation; and 3) electrocution caused by or collisions with surface power lines.

Other impacts to golden eagles could be related to increased human activity, surface disturbance, and increased vehicle traffic, as described below. As golden eagles are sensitive to human activity, they may avoid hunting grounds, during construction activities. Approximately 128 acres of habitat for prey species would be initially disturbed as a result of the Proposed Action. In the winter, roadside carrion is one of the golden eagle's primary food sources. The higher traffic levels in the proposed BCPA could increase the potential for mortality of carrion-feeding golden eagles.

To minimize impacts to golden eagles using nesting habitats within the BCPA, the BLM has imposed restrictions on construction and other surface-disturbing activities between February 1st and July 31st near active golden eagle nests. Any exceptions to this stipulation must be submitted in writing to the BLM and approved by the BLM Authorized Officer (Appendix C).

Another effect on golden eagles includes the potential for electrocution by and collisions with proposed surface power lines constructed for CBNG well sites. Although utility poles can benefit golden eagles by providing perching and/or nesting structures, these structures also pose threats to golden eagles that could result in serious injury or mortality. Several guidelines have been prepared that provide methods to utilize in order to protect golden eagles from collision with and

electrocution by surface power lines. The most recent guidelines are included in the following document: *"Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006"* (APLIC 2006) and *"Avian Protection Plan (APP) Guidelines"* (APLIC and USFWS 2005). Implementation of these measures has been committed to by Devon in Section 2.5 of this EA. Therefore, the potential for electrocution by or collision with proposed power lines would be effectively reduced or eliminated.

Greater Sage-Grouse

As discussed in Chapter 3 of this EA, suitable sagebrush habitat for the greater sage-grouse occurs within the BCPA. While no leks have been documented, nesting and brood-rearing activities have the potential to occur within the BCPA and thus, could be affected by the Proposed Action. Direct impacts to potential nesting and brood-rearing activities and habitats would include the initial loss of 122 acres of the sagebrush community. Visual and noise-related impacts from construction, drilling and completion activities could cause temporary or permanent displacement of nesting and brooding sage-grouse from affected habitats. While these potential impacts could affect individual sage grouse, they are not likely to result in a trend towards Federal listing of the species.

If sage-grouse nesting is documented within the BCPA or associated with a new lek found within two miles of the BCPA, new surface disturbing activities would be prohibited from March 15th to July 15th unless the BLM AO approves the activities, in writing. No surface disturbance will be allowed within ¼ mile of a sage grouse lek if discovered within the BCPA.

Mountain Plover

Although no mountain plovers were observed in the BCPA during the 2006 field survey (Buys & Associates, Inc. 2006), suitable mountain plover nesting habitat, consisting of short-grass prairie with sparse vegetation, areas of bare ground and cactus, is present. Should the species occur there, direct impacts to the mountain plover could include destruction of nests, loss of habitat, and mortality. Indirect impacts could include reduction in reproductive potential, avoidance resulting from noise from construction activities and heavy equipment, and reduction in food availability.

Beneficial effects may also result from construction activities, since the creation of bare ground could be used by the plover as nesting sites.

To minimize the impact to potential mountain plover nesting habitat, the BLM has imposed seasonal restrictions on new surface-disturbing activities between April 10th and July 10th within ¼ mile of suitable nesting habitat. Any requests for exceptions to this restriction must be submitted to the Lander Field Office in writing ten days prior to initiating any surface-disturbing activities. Any variances to this Condition of Approval must be approved in writing by the BLM Authorized Officer prior to any surface-disturbing activity.

Fish

Sauger and Burbot

Implementation of the Proposed Action could potentially degrade water quality downstream of the BCPA by increasing erosion and sediment deposition to Beaver Creek from well pads, roads, or surface-water runoff within the BCPA. Potential impacts to the water quality in the Little Wind River and Wind River could subsequently reduce habitat values for the sauger.

Implementation of the Proposed Action could also increase the potential for exposure of sauger to hazardous substances in the event of an accidental spill. If a spill were to occur during a storm event, hydrocarbons could potentially enter area drainages, including Beaver Creek. This could potentially result in mortality of sauger and/or loss of sauger habitat due to degraded water quality. Degradation of sauger habitat could also affect spawning, which occurs just downstream of the confluence of Beaver Creek with the Little Wind River. However, based on extensive applicant-proposed and BLM required mitigation measures (see Appendices C and D) to reduce erosion and sedimentation, the potential for the above-discussed impacts to sauger habitats and populations downstream of the BCPA would be greatly reduced or negated.

4.2.7.7 Mitigation and Monitoring

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for wildlife resources would be defined during the onsite process as necessary.

Mitigation Measures

- A field survey for sensitive plant species would be conducted prior to surface disturbance, and locations of these species would be identified, so that occupied habitat would be avoided.
- A raptor nest survey would be conducted in the spring prior to surface disturbance so that active raptor nests would be avoided by the proposed development.
- Raptor deterrents would be installed on overhead powerlines in accordance with the *"Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006"* (APLIC 2006) and *"Avian Protection Plan (APP) Guidelines"* (APLIC and USFWS 2005).
- Project activities would avoid white-tailed prairie dog colonies to protect the habitat for future reintroduction of the black-footed ferret.
- If burrowing owls are documented, the seasonal protection period would be May 1 to September 30.
- Reserve pits would be fenced on three sides during drilling and on four sides after completion operations. A bird deterrent system, referred to as "Bird Avert," would be installed to keep birds away from the evaporation ponds.
- Devon would work closely with the BLM to develop the most effective ways to reduce collisions and electrocutions from the proposed power lines using the "Avian Protection Plan (APP) Guidelines" (2005) prepared jointly by the Avian Power Line Interaction Committee and USFWS; "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996" (APLIC 1996); and "Mitigating Bird Collisions with Lower Lines: the State of the Art in 1994" (APLIC 1994).
- All drivers would be informed about the types of wildlife in the area that are susceptible to vehicular collisions and the measures that would be taken to minimize collisions.

- In the unlikely event that an animal is killed by vehicular traffic the carcasses would be removed from the access roads or road shoulders or ROWs to minimize collisions between vehicles and scavenger wildlife species.
- Project employees and contractors would be prohibited from collecting plants, since BLM sensitive plant species may be present in the BCPA.
- Reclamation of disturbed sites will include seeding native species suitable for each range site.
- Seeds planted as part of reclamation would include sagebrush and other vegetation species, as specified by the BLM Authorized Officer, to restore disturbed habitat of sensitive species, including the greater sage-grouse.
- In addition, a wildlife monitoring and protection plan will be prepared to evaluate the impact of the Proposed Action on wildlife populations and special status wildlife species within the proposed BCPA. Implementation of the proposed Plan would enable the BLM wildlife specialists to evaluate the health of the wildlife populations in the BCPA while development is underway. The effectiveness of the Wildlife Monitoring will be evaluated periodically to determine the success in wildlife protection methods.

Conditions of Approval

- The following are Surface Conditions of Approval and may not apply to every well or area of construction. For a complete list of each individual Condition of Approval, please refer to Appendix C.
- This project has been identified as being in potential sage grouse nesting habitat. According to 43 CFR 3101.1-2, new surface disturbing activities may be prohibited during the lease year to minimize adverse impacts where resource values were previously unrecognized (e.g., sage grouse nesting). During the period from March 15th to July 15th, the operator shall notify the Lander Field Office, in writing, ten (10) days prior to initiating any surface disturbing activities. An evaluation will be conducted of the area and a decision will be made by the Authorized Officer to either proceed, require surveys, or delay activities. Any variances to this Condition of Approval must be approved in writing by the Authorized Officer prior to any surface disturbing activities.
- If sage-grouse nesting is documented within the BCPA or associated with a new lek found within two miles of the BCPA, new surface disturbing activities would be prohibited from March 15th to July 15th unless the BLM Authorized Officer approves the activities, in writing. No surface disturbance will be allowed within ¼ mile of a sage grouse lek if discovered within the BCPA.
- This project has been identified as being in potential mountain plover nesting habitat. According to 43 CFR 3101.1-2, new surface disturbing activities may be prohibited during the lease year to minimize adverse impacts where resource values were previously unrecognized (e.g., mountain plover nesting). During the period from April 10th to July 10th, the operator shall notify the Lander Field Office, in writing, ten (10) days prior to initiating any surface disturbing activities. An evaluation will be conducted of the area and a decision will be made by the Authorized Officer to either proceed, require surveys, or delay activities. Any variances to this Condition of Approval must be approved in writing by the Authorized Officer prior to any surface disturbing activities.
- Seasonal restrictions on new surface-disturbing activities between April 10th and July 10th within ¼ mile of suitable nesting habitat for mountain plover exist.

- The proposed project is located within potential raptor nesting habitat. No construction or other surface disturbance activities are authorized during the raptor nesting time period of February 1st through July 31st. Any exceptions to this stipulation must be submitted in writing to this office and approved by the authorized officer prior to disturbance activities. If an exception is requested, one or more surveys will be required according to the most current Fish and Wildlife Service (FWS) guidelines. Completion of multiple surveys may take a minimum of 45 days. The project proponent should contact this BLM office early in the planning stages to allow time for consultation with the FWS.
- This location has been identified as being in crucial winter range for antelope/mule deer. According to 43 CFR 3101.1-2, new surface disturbing activities may be prohibited during the lease year to minimize adverse impacts where resource values were previously unrecognized (e.g., crucial winter range for antelope). During the period of November 15th to April 30th, the operator will be required to notify the Lander Field Office, in writing, ten (10) days prior to initiating any surface disturbance. An evaluation will be conducted of the area and a decision will be made by the Authorized Officer to either proceed or delay work. Any variances to this Condition of Approval must be approved in writing by the Authorized Officer prior to any disturbance activities.
- The reserve pit shall be lined with a 12 mil synthetic liner. When the reserve pit contains fluids or toxic substances the operator will provide effective and proven wildlife deterrents or exclusionary devices such as nets, to insure at all times that wildlife, migratory birds, and other animals are not adversely affected by open pits. Any open pits would be fenced to prevent and deter wildlife, migratory birds, and other animals from entering and/or ingesting substances.
- Prior to closure of the reserve pit and interim reclamation activities, the operator shall contact the BLM authorized officer to set up an onsite to discuss appropriate procedures for reserve pit closure.
- To prevent raptors from gaining a predatory advantage, the operator shall install anti-perching devices on all power poles, and maintain these devices for the life of the electric lines in accordance with the guidelines set forth in the Avian Protection Plan approved in April 2005.
- The operator shall construct the evaporation pond in accordance with the design requirements in Onshore Order No. 7, BLM Manual 9172, and applicable State agency requirements.
- The operator shall ensure adequate protection of migratory birds in accordance with the Migratory Bird Treaty Act as amended.

4.2.7.8 Residual Impacts

Residual impacts may include the following:

- Areas not reclaimed (e.g., access roads, surface facilities, and evaporation ponds) for the LOP would result in continued habitat loss, habitat fragmentation, and decreased habitat values or reduced habitat use for wildlife species.
- Reclaimed habitat utilized by mountain plovers prior to disturbance from the Proposed Action could be less suitable and could result in decreased reproductive success.
- Reclaimed shrub utilized by obligate species (e.g., sage-grouse) prior to disturbance from the Proposed Action could be less suitable, which could result in reduced habitat use and habitat values for foraging, shelter, and reproductive areas.

- Avoidance of disturbed areas and human activity could deter the use of seasonal migration routes by wildlife."

4.2.8 RANGE RESOURCES

The Proposed Action would remove existing vegetation on about 128 acres during the development phase, with about 91 acres of disturbance remaining during the life of the project. This project would directly involve a total of about 11 AUMs (128 acres of disturbance/11 acres/AUM) on about 2 percent of the East Beaver Common grazing allotment. The total estimated AUMs lost as a result of the Proposed Action would be less than one percent of the total 8,029 permitted AUMs.

Other direct impacts to livestock management and operations within the BCPA include the increased possibility of service vehicle and livestock collisions and increased possibility for cattle to become trapped in or become ill from drinking water in reserve pits and evaporation ponds. Authorized free-ranging cattle could be struck and injured or killed by the support vehicle activity related to the proposed development and production activities. This potential impact would be greatest during the night or during work shift changes. Strict compliance with posted speed limits along roads would minimize such impacts. The BLM's Gold Book sets a generalized requirement that oil and gas roads be designed for speeds between 10 and 30 mph (p. 25).

Indirect effects to rangeland resources would include disruption of grazing animal's free movement from increased energy development infrastructure (e.g., pipelines, roads, etc.). Currently the BCPA does not have any livestock water wells. Thus, there would be no impacts to ground water providing water to livestock.

4.2.8.1 Mitigation and Monitoring

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for range resources would be defined during the onsite process as necessary.

Mitigation

Fencing to control livestock grazing on revegetated sites would be utilized to enhance the recovery potential of vegetation. It would involve the installation of a temporary fence, such as an electric fence, or a more permanent three-strand barbed wire fence, suitable for cattle and antelope. Control of livestock grazing on revegetated sites would continue until BLM determines that such reclamation actions are successful. However, fencing also has negative impacts. Fencing along revegetated pipeline ROWs could result in reduction of AUMs, and over-utilization and degradation of rangeland elsewhere in the BCPA and the allotment as a whole, unless livestock grazing is reduced to compensate for the reduced AUMs during interim reclamation. Depending on where the protective fencing was installed, portions of the allotment could be made unavailable for livestock grazing.

BLM, Devon, and the grazing permittees will work together to come to a workable solution to livestock watering.

In addition, the following best management practices and voluntary mitigation measures would be implemented by Devon:

- The size of access roads, wells and production facilities would be the minimum acreage necessary for drilling and production, to minimize impacts to rangeland operations.
- Disturbed areas would be stabilized and seeded with native species appropriate for each specific range site where disturbance has occurred and to minimize the loss of livestock AUM.

Monitoring

Continued regular monitoring of livestock utilization of and distribution on the allotment within the BCPA would be valuable to assist in monitoring the effects of existing development activities on livestock use in the BCPA and identify areas of possible overuse. Continued monitoring of well sites and evaporation pits, ensuring functionality of exclosure fences around reserve pits and evaporation ponds would further reduce the likelihood of cattle becoming trapped or affected from drinking water from these sources.

4.2.8.2 Residual Impacts

The Proposed Action would result in unavoidable residual impacts to rangeland resources, including livestock management. Although the applicant proposes additional measures to minimize or offset impacts affecting livestock forage production, some level of reduced forage production and livestock movement on the East Beaver Common grazing allotment would occur.

Due to the semi-arid climatic regime and associated soil types within the BCPA, disturbed soils within the BCPA do not easily respond to reclamation and revegetation actions. This situation is likely to prolong the recovery period following surface disturbance associated with the Proposed Action.

4.2.9 CULTURAL RESOURCES

Direct impacts to cultural resources could include destruction or damage of archaeological and historical resources as a result of surface disturbance during preparation, construction, operation, or reclamation of well locations, supporting facilities, pipelines, access roads, and electrical transmission lines. Direct impacts could also include erosion of cultural resource properties, siltation resulting in burying or degradation of cultural resource sites, chemical degradation of sites and structures, and visual impacts to historic structures and prehistoric rock art sites. Direct impacts are often avoidable during location of well sites, because the well sites occupy a relatively small area and can often be offset to avoid archaeological sites. Direct impacts from pipeline and road construction are often more difficult to avoid because of the linear nature of these features and constraints imposed by topography and other factors.

Based on the implementation of recommended avoidance measures for the 83 identified sites in the BCPA, a determination of “no historic properties affected” is proposed for this project pursuant to the Wyoming State Protocol and the Section 106 Regulations, as amended (36 CFR 800) of the NHPA.

In the event that cultural resources are discovered during construction, all operations at the site would be suspended and the discovery would be reported to the AO. Potential impacts could be mitigated by preparation and execution of a mitigation plan approved by BLM in consultation with the SHPO. Furthermore, following the COAs listed below would ensure that adverse effects on discoveries in high potential areas would be minimized and that an acceptable mitigation strategy would be implemented. The Wyoming State Protocol lays out the process in the following manner:

> "If the historic property is eligible for inclusion in the National Register under Criterion D only, and the adverse effect will be minimized by data recovery, then the BLM will prepare a data recovery plan and follow the procedures in Section VH.A of this Protocol. A Memorandum of Agreement is not required to implement the data recovery plan." (Section VI.C.1.)……. "Data Recovery plans will be consistent with the *Secretary of Interior' s Standards and Guidelines for Archeological Documentation* (48 FR 44734-37). The plan will include, at a minimum, the items in BLM Manual 8140.26A-I. Compliance with the approved data recovery plan will be included in the project Conditions of Approval. Objection to or failure to comply with the approved data recovery plan by the project proponent will require consultation with SHPO and negotiation of an MOA." (Section VII.A.1)

Indirect impacts could include damage or destruction of cultural resources as a result of increased visitation to otherwise remote areas during installation and operation of well development areas and pipelines, and as a result of improved public access to these areas provided by well field access roads. The proposed BCPA is remote; located a considerable distance from population centers; has limited public access; and is monitored for safety reasons by Devon Energy personnel. Erosion and deposition are unlikely to occur due to the limited nature of disturbance and the institution of standard soil and runoff management practices. The Proposed Action is therefore unlikely to result in indirect impacts to eligible cultural resources.

4.2.9.1 Mitigation and Monitoring

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for cultural resources will be defined during the onsite process as necessary.

Mitigation Measures

- The operator is responsible for informing all persons associated with this project that they shall be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects or site. If archaeological, historical, or vertebrate fossil materials are discovered, the operator is to suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Operations are not to resume until written authorization to proceed is issued by the Authorized Officer.

- Within five working days, the Authorized Officer will evaluate the discovery and inform the operator of actions that will be necessary to prevent loss of significant cultural or scientific values.
- The operator is responsible for the cost of any mitigation required by the Authorized Officer. The Surface Management Agency will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, the operator will be allowed to resume operations.

Conditions of Approval

The following are Surface Conditions of Approval and may not apply to every well or area of construction. For a complete list of each individual Condition of Approval, please refer to Appendix C.

Cultural Resources, Construction Monitoring. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations at the following locations:

T.34N., R.96W. Section 27 (well pad and access road)

The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***, and the ***Beaver Creek Oil and Gas Unit Programmatic Agreement, and Research Design.***

The holder shall be responsible for the cost of monitoring and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Site Avoidance. Prior to any surface disturbing activities, the holder shall install protective fencing along the southeast side of the well pad within specific legal locations.

To protect site 48FR5972, a BLM-permitted archeologist shall determine the location of the fence. The type of fencing shall be determined by the authorized officer after consulting with

the holder. The fencing shall be left in place until all work under this authorization is completed. Violation of this stipulation may result in the holder being subject to the penalties and actions contained in the 43CFR7 Regulations, which are on file at all BLM offices.

Cultural Resources, Monitoring Inspection. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations at the following locations:

T.34N., R.96W. Section 28 (well pad and access road)

The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***, and the ***Beaver Creek Oil and Gas Unit Programmatic Agreement, and Research Design.***

The holder shall be responsible for the cost of monitoring and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural and Paleontological Resources Stipulation. Any cultural and/or paleontological resource (historic or prehistoric site or object or fossil) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures shall be made by the authorized officer after consulting with the holder.

Cultural Resources, Site Avoidance. The holder shall install temporary protective fencing along the ROW within specific legal locations.

Locations and types of fencing shall be determined by the authorized officer after consulting with the holder. The fencing shall be left in place until all work under this

authorization is completed. Violation of this stipulation may result in the holder being subject to the penalties and actions contained in the 43CFR7 Regulations, which are on file at all BLM offices.

Cultural Resources, Construction Monitoring. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations at the following locations:

T.34N., R.96W. Section 27 (well pad and access road)

The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the attached *Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement*. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the attached *Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement*, and the *Beaver Creek Oil and Gas Unit Programmatic Agreement, and Research Design.*

The holder shall be responsible for the cost of monitoring and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Monitoring/Trench Inspection. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations and inspect the open pipeline trench at the following locations:

T.34N., R.96W. Section 28 all (well pad, access road, and pipeline)

Blade Monitoring: The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations

will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Trench Inspection: The archeologist shall notify the authorized officer prior to beginning the open pipeline trench inspection. Soil stratigraphy shall be recorded whether or not cultural resources are discovered. If cultural resources are discovered in the trench, the authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***, and the ***Beaver Creek Oil and Gas Unit Programmatic Agreement***, and ***Research Design.***

The holder shall be responsible for the cost of monitoring, inspections, and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Monitoring Inspection. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations at the following locations:

T.34N., R.96W. Section 33 (access road only)

The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***, and the ***Beaver Creek Oil and Gas Unit Programmatic Agreement, and Research Design.***

The holder shall be responsible for the cost of monitoring and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Monitoring Inspection. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations at the following locations:

T.34N., R.96W. Section 34 (well pad and access road)

The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***, and the ***Beaver Creek Oil and Gas Unit Programmatic Agreement, and Research Design.***

The holder shall be responsible for the cost of monitoring, inspections, and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Site Avoidance. The holder shall adhere to the proposed project reroute delineated on the attached map within specific legal locations.

This reroute is necessary to avoid impacts to an archeological site located within the original access route. Violation of this stipulation may result in the holder being subject to the penalties and actions contained in the 43CFR7 Regulations, which are on file at all BLM offices.

Cultural Resources, Monitoring Inspection. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations at the following locations:

T.34N., R.96W. Section 33 (well pad only)

The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the attached ***Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement***, and the ***Beaver Creek Oil and Gas Unit Programmatic Agreement, and Research Design.***

The holder shall be responsible for the cost of monitoring and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

The holder shall be responsible for the cost of monitoring and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Monitoring/Trench Inspection. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations and inspect the open pipeline trench at the following locations:

T.34N., R.96W. Sections 21 all, 28 all (pipeline)

Blade Monitoring: The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries not later than five working days after being notified, and will determine what action shall be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Trench Inspection: The archeologist shall notify the authorized officer prior to beginning the open pipeline trench inspection. Soil stratigraphy shall be recorded whether or not cultural resources are discovered. If cultural resources are discovered in the trench, the authorized officer will evaluate, or will have evaluated, such discoveries not later than five working days after being notified, and will determine what action shall be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Cultural resources discovered during construction (including, but not limited to hearths, bone beds, domestic structural remains, activity areas, occupation layers, etc.) shall be excavated according to instructions from BLM after BLM has consulted with SHPO and the holder. Samples for C-14, pollen, geomorphology, and soils shall be collected and analyzed if feasible and necessary for analysis of the excavated resources. Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in BLM's standard excavation and/or removal permits.

The holder shall be responsible for the cost of monitoring, inspections, and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Site Avoidance. Prior to any surface disturbing activities, the holder shall install protective fencing along the southeast side of the well pad within specific legal locations.

To protect sites 48FR5971 and 48FR6010, a BLM-permitted archeologist shall determine the location of the fence. The type of fencing shall be determined by the authorized officer after consulting with the holder. The fencing shall be left in place until all work under this authorization is completed. Violation of this stipulation may result in the

holder being subject to the penalties and actions contained in the 43CFR7 Regulations, which are on file at all BLM offices.

Cultural Resources, Monitoring/Trench Inspection. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations and inspect the open pipeline trench at the following locations:

T.34N., R.96W. Section 27 NW/SW/NW, Section 28 E1/2SE/NE, E1/2NE/SE (pipeline between 27-12 well pad and CBNG Separation Facility)

T.34N., R.96W. Section 27 NW/SW/SW, W1/2NW/SW, Section 28 NE/NE/SE (pipeline between 27-14 well pad and the turn-off to CBNG Separation Facility)

T.34N., R.96W. Section 27 SW/NE/SW, NE/SW/SW (pipeline between 27-23 well pad and main trunk line)

T.34N., R.96W. Section 27 SW/SW/NE, SE/SE/NW, NE/NE/SW (pipeline between 27-32 well pad and 27-23 well pad)

T.34N., R.96W. Section 28 NE/SW/NW, SE/NW/NW, SW/NE/NW (pipeline between 28-12 well pad and 28-21 well pad)

T.34N., R.96W. Section 28 NE/SW/SW, SE/NW/SW, SW/NE/SW (pipeline between 28-14 well pad and 28-23 well pad)

T.34N., R.96W. Section 28 NE/NE/NW, N1/2NW/NE (pipeline between 28-21 well pad and main trunk line)

T.34N., R.96W. Section 28 NE/NE/SW, SE/SE/NW, SW/SW/NE (pipeline between 28-23 well pad and 28-32 well pad)

T.34N., R.96W. Section 28 N1/2SW/NE, SE/NW/NE (pipeline between 28-32 well pad and main trunk line)

T.34N., R.96W. Section 28 E1/2/SW/SE, W1/2SE/SE (pipeline between 28-34 well pad and evaporation pit)

T.34N., R.96W. Section 28 W1/2NE/NE, SE/NE (pipeline between 28-41well pad and turn-off to Separation Facility from main trunk line)

T.34N., R.96W. Section 33 SE/NE/NW (pipeline between 33-21 well pad and existing BCU 177 well)

T.34N., R.96W. Section 33 NE/SW/NE, NW/SE/NE, SW/NE/NE (pipeline between 33-32 well pad and 33-41 well pad)

T.34N., R.96W. Section 33 W1/2NE/NE, Section 34 NW/NW/NW, Section 27 S1/2SW/SW (pipeline between 33-41 well pad and main trunk line)

T.34N., R.96W. Section 33 N1/2NE/SE, S1/2SE/NE, Section 34 SW/SW/NW (pipeline between 33-43 well pad and 34-12 well pad)

T.34N., R.96W. Section 34 SE/SW/NW, W1/2/SE/NW, SW/NE/NW (pipeline between 34-12 well pad and 34-21 well pad)

T.34N., R.96W. Section 34 NE/NW, N1/2/SE/NW (pipeline between 34-21 well pad and 33-43 access road)

Blade Monitoring: The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries not later than five working days after being notified, and will determine what action shall be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Trench Inspection: The archeologist shall notify the authorized officer prior to beginning the open pipeline trench inspection. Soil stratigraphy shall be recorded whether or not cultural resources are discovered. If cultural resources are discovered in the trench, the authorized officer will evaluate, or will have evaluated, such discoveries not later than five working days after being notified, and will determine what action shall be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Cultural resources discovered during construction (including, but not limited to hearths, bone beds, domestic structural remains, activity areas, occupation layers, etc.) shall be excavated according to instructions from BLM after BLM has consulted with SHPO and the holder. Samples for C-14, pollen, geomorphology, and soils shall be collected and analyzed if feasible and necessary for analysis of the excavated resources. Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in BLM's standard excavation and/or removal permits.

The holder shall be responsible for the cost of monitoring, inspections, and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

Cultural Resources, Construction Monitoring. The holder of this authorization shall provide an archeologist, with a current BLM Cultural Resources Use Permit, to monitor ground clearing operations at the following locations:

T.34N., R.96W. Sections 27,28, 33 (evaporation pit and catch ditch)

The archeologist shall notify the authorized officer prior to beginning blade monitoring. Construction methods shall be utilized which will allow the identification of cultural resources without endangering the personnel monitoring the construction activities. The archeologist shall specify the depths of cuts made by earth-moving equipment, and the holder must comply with the archeologist's requirements. Monitoring shall continue until work is completed or until strata that could possibly contain cultural resources will no longer be disturbed. If potentially significant cultural resources are identified, and the archeologist determines that further operations will affect the resource, the holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer. The authorized officer will evaluate, or will have evaluated, such discoveries in accordance with the attached *Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement*. The decision as to the appropriate measures to mitigate adverse effects to significant cultural resources shall be made by the authorized officer after consulting with the holder.

Treatment of cultural resources discovered during construction: Excavations, methods, analysis, results, and report write-up shall follow guidelines as outlined in the attached *Discovery Plan and Research Orientation for the Beaver Creek Unit, with supplement*, and the *Beaver Creek Oil and Gas Unit Programmatic Agreement and Research Design.* The holder shall be responsible for the cost of monitoring and mitigative measures.

A report of all archeological activities shall be submitted to the authorized officer within 30 days of completion of the field work. If the report is authorized as preliminary, a final report shall be submitted to the authorized officer within 6 months of completion of field work.

4.2.9.2 Residual Impacts

Development under the Proposed Action or the No Action Alternative is not expected to result in impacts to cultural resources. Destruction or damage to significant archaeological resources sites is permanent, and the cultural information contained in those sites is usually lost. Any impacts to cultural resources sites should be considered to be residual.

4.2.10 SOCIOECONOMIC RESOURCES

Impacts to socioeconomic resources are analyzed in terms of direct and indirect effects to employment, personal income, housing, facilities and services, and local, State and Federal government fiscal conditions. Environmental justice is also discussed.

Devon intends to complete all activities identified by the Proposed Action in one year, with drilling, completion and construction of ancillary facilities taking place concurrently. Two rigs would be moved to the BCPA from areas outside of Fremont County. This would increase the total level of drilling activity in the county by a small amount. Devon would use contractors that are already active in Fremont County to construct field-level facilities. The demand created by the Proposed Action would likely sustain activity for another year in the natural gas construction

industry at current levels rather than increase the level of activity. The Proposed Action does not include production estimates; however, Devon's plan is to add one person for operations as a result of the Proposed Action.

As specified in Section 2.3.1.10, drilling and completion would require 135 total workers, with 25 working full-time on the drill rig. The remainder would perform support tasks as needed during drilling and completion. A total of 135 full and part-time jobs is an increase of less than one percent compared to total employment in Fremont County of 21,116 (Table 3.11-1).

A recent analysis (BIA 2004) of the Wind River Gas Field Development Project in Fremont County estimated direct and indirect employment effects that imply that one new indirect full or part-time job would potentially be created in the local economy for every two direct jobs created during field development. This much of an employment "multiplier effect" could occur, but is not likely because field development activity under the Proposed Action would last for one year and involve 20 wells, compared to 325 wells analyzed in the Wind River EIS (BIA 2004).

Field development activity under the Proposed Action would positively impact sales in Fremont County, but businesses would probably handle additional demand with employee overtime or limited hiring. Personal income would increase in Fremont County because of new direct employment related to drilling and because of the multiplier effects in the county economy, realized as high business receipts and potentially as overtime for existing employees or limited hiring by local businesses. The positive income impacts would be temporary as would any positive employment and sales impacts because field development would last for one year.

The Proposed Action would create some demand in Riverton, the closest community, for temporary housing such as motel rooms and RV spaces during drilling and field development. Temporary housing is available in Riverton, which has historically offered accommodations for the oil and gas industry, for tourism, and for business travel (BIA 2004).

The analysis also identified a potential for the agencies in Fremont County that provide emergency response, fire service and law enforcement to need additional training, specialized equipment or personnel to handle large gas field development (BIA 2004). This kind of need is unlikely to develop because of the limited development under the Proposed Action. However, under certain circumstances (e.g., a large fire caused by the Proposed Action), the proposed project could adversely impact a volunteer organization such as the Riverton Fire Department.

Since no production estimates are available for the Proposed Action, the amount of revenue that could be earned from production royalties and taxes by local, State and Federal governments cannot be estimated. Without revenue estimates, specific monetary impacts to overall fiscal conditions, which consider both revenues and costs, cannot be determined. Experience with natural gas production in Fremont County and estimates from other analyses (BIA 2004) suggest that the fiscal impacts of the Proposed Action would be positive and temporary for local government.

In terms of employment, personal income, housing, facilities and services, and local, state and Federal government fiscal conditions, the analysis indicates that the effect would be small, because the project involves only 20 wells, with little ancillary development proposed.

Environmental Justice

As required by Executive Order 12898, the Proposed Action is analyzed to determine whether Federal approval would pose environmental justice concerns. No impacts to human health or the environment would affect minority or low-income populations as a result of the Proposed Action. Section 3.11 noted that no field development would occur on the WRIR, though water produced during drilling would go to an existing evaporation pond on private land within the jurisdictional boundary of the Reservation. The Proposed Action may create employment opportunities during the one year of field development and potentially one long-term production job.

4.2.10.1 Mitigation

Site-specific mitigation for socioeconomic resources could be defined during the onsite process as necessary.

4.2.10.2 Residual Impacts

There would be no adverse residual socioeconomic impacts associated with the Proposed Action.

4.2.11 RECREATION

The potential adverse effects to recreation from natural gas development would consist primarily of lost recreational opportunities or diminished recreational experience in the BCPA.

Under the Proposed Action, 20 well pads, 4.2 miles of access road, and associated pipeline would be constructed within the BCPA. Surface disturbance associated with the new well pads, associated facilities, roads, and pipelines would be visible to hunters, OHV users, and other dispersed recreational users and would likely diminish the value of the recreational experience. Surface disturbance related to the proposed development is expected on 7.5 percent of the BCPA.

The new roads proposed within the BCPA would provide recreational users with increased access to broader portions of the BCPA. The additional roads and improved access could, therefore, expand trail-related recreational opportunities (e.g., OHV use).

As described in Chapter 3, the primary public recreational use of the BCPA is hunting. In the short-term, project-related construction would generate vehicle traffic, dust, noise and increased human activity in the BCPA causing short-term displacement of wildlife. Because hunting opportunities are contingent upon the presence of wildlife, any loss of wildlife could reduce opportunities for hunting in the BCPA.

4.2.11.1 Mitigation

Site-specific mitigation for recreation could be defined during the onsite process as necessary.

4.2.11.2 Residual Impacts

Residual impacts may result in decreased recreational opportunities (e.g., hunting) in the BCPA.

4.2.12 VISUAL RESOURCES

The existing visual landscape, which already contains oil and gas development, would be further modified by the introduction of additional well pads, facilities, roads, and pipelines that would introduce new lines, colors, forms, and textures into the BCPA. In addition, intrusions caused by increased human activity (e.g., drilling rigs, truck traffic, heavy equipment, dust, lights, etc.) would change the visual landscape by creating a more industrialized setting. Landscape contrasts that would result from the presence of well pads, facilities, pipelines, and roads would last for the life of the project.

The entire BCPA falls within a larger landscape area designated as VRM Class IV. The objective of Class IV areas is to provide for management activities which allow major modification of the existing character of the landscape. The level of change to the characteristic landscape can, therefore, be high. Under the Proposed Action, approximately 20 CBNG wells and associated roads and pipelines would be constructed within the BCPA. This proposed development would result in approximately 128 acres of land being disturbed initially within these VRM Class IV areas, or approximately 7.5 percent of the BCPA. There would be a high level of contrast with the natural landscape for those disturbance sites. However, the proposed development in the VRM Class IV areas would meet BLM VRM objectives.

4.2.12.1 Mitigation Measures

This section identifies mitigation measures to be considered, which include those identified in the Lander RMP (BLM 1987), stipulations attached to each lease, COAs attached to each APD (Appendix C), standard Wyoming BLM mitigation guidelines (Appendix D), best management practices and voluntary mitigation measures committed to by Devon (see Section 2.5 in Chapter 2), and additional mitigation measures identified during the analysis of individual resources.

Additional site-specific mitigation for visual resources will be defined during the onsite process as necessary.

Mitigation Measures

Effects to visual resource would be reduced by adherence to standards discussed in the Gold Book including, using vegetative and topographic screening when selecting well locations, avoiding steep slopes, feathering straight edges, and reclamation.

- Wells and facilities would be painted with flat colors, as specified by the BLM AO, that blend with the adjacent surrounding undisturbed terrain.
- During night drilling operations, lights would be mounted at the lowest possible height in order to minimize visual impacts.

Conditions of Approval

The following is a Surface Condition of Approval and may not apply to every well or area of construction. For a complete list of each individual Condition of Approval, please refer to Appendix C

All permanent OSHA exempt above ground production facilities will be painted the color Covert Green (Pantone 18-0617 TPX).

4.2.12.2 Residual impacts

Residual visual impacts of the Proposed Action would consist of reduced visual harmony within the overall landscape.

4.2.13 FIRE MANAGEMENT

The Proposed Action would result in the initial loss of approximately 128 acres, or 7.5 percent of the BCPA. The disturbance of native vegetation and possible limited success of revegetation actions in the BCPA could result in the introduction and expansion of invasive and noxious weeds, especially annual grasses such as cheatgrass. Such a situation would increase the risk of unwanted wildfire events. Annual grass and forb species, cure more quickly than perennial vegetation and can create "flash fuels" (easily burned) that could carry and spread wildfire through the BCPA and onto surrounding non-BLM-administered lands, such as State, private, or Tribal lands. Such a situation would be counter to current fire management goals and objectives to reduce or eliminate the threat of unwanted wildfire events. This direct impact would be offset by BLM's commitment to full fire suppression (BLM 1987), coupled with Devon's commitment to control noxious and invasive weed species and to ensure successful interim and final revegetation.

4.2.13.1 Mitigation and Monitoring

- All project related personnel would be trained in fire prevention and control.
- Brush and dry wood would be removed from work areas.
- All project-related vehicles would be equipped with fire extinguishers.
- Pre-emergent herbicides would be used to prevent establishment of annual noxious weed species, such as cheatgrass to reduce the risk of fire-tolerant and flammable vegetative fuels.
- To minimize undue exposure to hazardous situations, warning signs and fencing would be installed around facilities, as required by regulations, to prevent unauthorized access and alert the public to potential hazards in the area.
- Pipeline markers would be posted at frequent intervals along existing gas pipelines and other areas likely to be disturbed by construction activities, to warn excavators and to reduce the risk of accidental rupture.
- All employees and subcontractors would receive training in H_2S awareness, fire prevention and control, incident reporting and response, first aid, general emergency response, and spill prevention and response for chemical spills and releases.
- To minimize the risks of fires and their severity, suppression equipment (fire extinguishers, fire water and hoses) would be available during construction and maintained on-site at various facilities.
- The operator shall be responsible for the prevention and suppression of fires on Federal lands caused by its employees, contractors or subcontractors. During conditions of extreme fire danger, surface use operations may be limited or suspended in specific areas.

Additional site-specific mitigation for fire resources will be defined during the onsite process as necessary.

4.2.13.2 Residual Impacts

Even with successful interim and final revegetation and noxious weed treatment actions, there would be the potential threat of unplanned wildfire events in the vicinity of the BCPA that could affect the energy-related infrastructure as well as non-BLM-administered lands.

4.3 ALTERNATIVE B – NO ACTION

4.3.1 GEOLOGY AND MINERAL RESOURCES

Under the No Action Alternative, no CBNG wells will be drilled within the proposed BCPA. Therefore, the No Action Alternative would have no impacts on geology and mineral resources.

4.3.2 AIR QUALITY

Under the No Action Alternative, current management plans would continue to guide management of the BCPA, and the proposed CBNG pilot program, including the construction, drilling, completion, and producing of 20 pilot wells and associated construction of access roads, pipelines, production facilities, electric transmission lines, and evaporation pond, would not be implemented. Existing roads within the BCPA would continue to be used for current oil and gas operations and other land use activities. No further natural gas development would occur on Federal lands in the BCPA beyond that which has already been approved.

Since no construction, drilling, completion operations would occur there would be no air quality impacts from the proposed project. In addition, production activities, such as gas processing and operation and maintenance would not occur. Any air quality impacts that might occur would be associated with current activities within the proposed BCPA.

4.3.3 WATER RESOURCES

Under the No Action Alternative, the proposed wells would not be drilled and the proposed well pads, access roads, pipeline corridors, and evaporation pond would not be built. Therefore, no additional impacts to surface and groundwater resources, beyond those currently associated with the operation of the Beaver Creek field, would occur.

4.3.4 SOIL RESOURCES

Under the No Action Alternative, the Proposed Action would not be implemented, no new CBNG wells would be drilled, and the proposed well pads, access roads, pipeline corridors, and the evaporation pond would not be built. Therefore, the existing erosion rates for soils in the area would continue, and no additional impacts to soil resources, beyond those currently associated with the operation of the Beaver Creek field, would occur.

4.3.5 PALEONTOLOGY

Under the No Action Alternative, the Proposed Action would not occur and no new CBNG wells would be drilled. Therefore, no damage to (or discoveries of) fossils would occur.

4.3.6 VEGETATION (INCLUDING INVASIVE AND NOXIOUS WEEDS, AND SPECIAL STATUS PLANTS)

Under the No Action Alternative, the Proposed Action would not occur and no new CBNG wells would be drilled. Therefore, no additional vegetation disturbance would occur.

4.3.7 WILDLIFE AND FISHERIES

Under the No Action Alternative, the BLM would reject Devon's proposal to conduct a 20-well CBNG pilot project. Therefore, no well pads, access roads, pipelines, electrical lines or evaporation ponds would be constructed. Under the No Action Alternative, there would be no new disturbance from the proposed project to wildlife and special status wildlife species, and other resources. A total of 128 acres of initial disturbance and 91 acres of residual disturbance would not occur if the Proposed Action is rejected. Thus, existing oil and gas development, grazing, and other land uses would continue in the BCPA and impacts to wildlife and fish from existing activities would continue at current levels.

4.3.8 RANGE RESOURCES

The No Action Alternative would involve no further natural gas development. However, impacts from existing development and infrastructure and noxious weed infestation would continue.

4.3.9 CULTURAL RESOURCES

The No Action Alternative would result in no surface or subsurface disturbance within the BCPA, and therefore, no direct or indirect impacts would occur to cultural resources that are eligible for the NRHP.

4.3.10 SOCIOECONOMIC RESOURCES

Under the No Action Alternative, the BLM would deny the Proposed Action and additional employment, tax revenues, and royalties to the Federal government would not be realized.

4.3.11 RECREATION

Under the No Action alternative, no wells would be drilled on Federal leases within the BCPA. As a result, there would be no effects on recreational activities and experiences.

4.3.12 VISUAL RESOURCES

Under the No Action Alternative, no wells would be permitted on Federal leases. Therefore, no impacts to visual resources on BLM lands would occur.

4.3.13 FIRE MANAGEMENT

Under the No Action Alternative, the BLM would reject Devon's proposal to conduct a 20-well pilot project to explore and develop coal bed natural gas in the BCPA. Thus, the No Action Alternative would result in a reduced risk of a catastrophic wildfire event in the BCPA. The BLM would continue its commitment to full fire suppression in accordance with the management guidelines contained in the Lander RMP/FEIS (BLM 1986).

4.4 CUMULATIVE IMPACTS

4.4.1 Introduction

The NEPA requires an assessment of the potential cumulative impacts of the proposed project. Cumulative impacts evaluate the incremental impact of the Proposed Action when added to other past, present and reasonably foreseeable future activities (RFFA). Cumulative impacts can result from individually minor, but collectively significant actions occurring over a period of time.

The cumulative impact analysis area (CIAA) varies with the resource. The CIAA for analysis of cumulative impacts to air is the northwestern portion of Wyoming. For water, the CIAA is the Wind River watershed; for soil and vegetation it is the BCPA and a one mile buffer outside of the project area to capture surrounding plant communities and soil variation; for wildlife it is the BCPA and a 10-mile radius buffer around the project area; for range it is the entire East Creek Grazing Allotment; and for socioeconomics the CIAA is Fremont County. Table 4.4.1 illustrates the number of existing wells and estimated acres of surface disturbance within specific CIAAs.

Table 4.4.1 Number of Existing Wells and Acres of Surface Disturbance within Individual CIAAs

Cumulative Impact Analysis Area	Number of Existing Wells	Acres of Surface Disturbance
Project Area	31	186
Soil and Vegetation	68	408
Wildlife	443	2,658
Range	208	1,248

1 Surface Disturbance is based off of six acres per well

2 Source: Wyoming Oil and Gas Commission, July 18, 2007

Past, present, and RFFA associated with the Proposed Action include cattle grazing, oil and gas development, dispersed recreation, and housing development. Large-scale oil and gas field development projects that are within the immediate vicinity of the BCPA include the ongoing Riverton Dome EIS which is analyzing a proposal for 335 wells, and the existing Wind River EIS which analyzed the development of 325 wells. Pending outcome of the Proposed Action of this EA, further development is expected in and around the BCPA.

There are 443 existing well pads, as identified by the WOGC, that occur within a 10-mile radius buffer around the BCPA (the largest CIAA). Of these 443 wells, 209 are producing, 190 are abandoned and 28 have been approved for future development. In addition, Devon is proposing to construct and operate a 47-mile, 8-inch buried CO_2 distribution pipeline that would transport CO_2 as a dense-phase fluid for purposes of enhanced oil recovery (EOR) from the ExxonMobil Shute Creek-LaBarge facility to the Baroil metering facility located in Section 4, T27N R92W. From there, the proposed CO_2 pipeline would extend north from Baroil to the Beaver Creek Gas Plant located south of Riverton, Wyoming. The EA for the proposed project is currently being prepared by the BLM, Lander FO.

4.4.2 Resource-Specific Cumulative Impacts

4.4.2.1 Geology and Minerals

The Proposed Action, when combined with other oil and gas projects, would contribute to the depletion of oil and gas resources in the area. In addition, construction of well pads and access roads for the Proposed Action, combined with the disturbances from future oil and gas projects, road-building, and construction of agricultural projects, would incrementally alter the topographic character of the area. If the pilot CBNG wells prove to be productive, additional wells would likely be proposed. Extraction of these resources is consistent with land use plans for the area and is therefore not considered to be an adverse impact.

4.4.2.2 Air Quality

Cumulative air quality impacts are defined as the combination of emissions resulting from the Proposed Action, existing nearby permitted sources, and RFD within the region. Areas of concern include nearby mandatory federal PSD Class I areas such as Bridges and Fitzpatrick Wilderness, as well as nearby sensitive Tribal areas. Potential Air Quality Related Value (AQRV) impacts to sensitive areas include regional impacts on visibility, total nitrogen and sulfur deposition, and Acid Neutralization Capacity (ANC).

It is anticipated that the pace and level of natural gas development within this region of the State will continue over the next few years. The Proposed Action would cumulatively contribute to disturbances occurring immediately adjacent to the BCPA and within the region. Several ongoing or recently proposed oil and gas exploration and development projects are underway or proposed within the general area and include the projects identified in Table 4.4-2. In addition to oil and gas activities, other cumulative sources of emissions in the region include coal-fired power plants, vehicle tailpipe and fugitive dust emissions, natural forest fires, and forest management activities such as prescribed burns. Long-range transport of emissions from distant sources can also influence the cumulative air quality of the region.

Table 4.4-2. Recent NEPA Oil and Gas Development Projects Conducted in Central Wyoming

Wind River EIS	325 wells	Natural Gas	Wind River Agency, Bureau of Indian Affairs	2005
Riverton Dome EIS	336 wells	CBNG and conventional gas	Wind River Agency, Bureau of Indian Affairs	2007
Atlantic Rim EIS	1,800 gas wells; 200 oil wells	Oil and Natural Gas	BLM, Rawlins Field Office	2005
Jonah Infill Drilling Project EIS	3,100 wells	Oil and Natural Gas	BLM, Pinedale Field Office	2005
Pappy Draw CBNG Expanded Project	15 CBNG wells	CBNG	BLM, Lander Field Office	2002
Cave Gulch-Bullfrog-Whitman Infill Natural Gas Development Project EA	160 gas wells	Natural Gas	BLM, Casper Field Office	2005
Seminoe Road Gas Development Project	1,240 wells	Natural Gas	BLM, Rawlins Field Office	2003
Hay Reservoir CBNG Pilot Project	8 wells	CBNG	BLM Rawlins	2005
Beaver Creek Pilot Project EA	20 wells	CBNG	BLM, Lander	2007
Madden Deep	Unknown	Natural Gas	BLM	Unknown
Gunbarrel EIS	Unknown	Natural Gas	BLM	Unknown

To assess the impact of cumulative emissions on regional air quality, a cumulative air quality assessment was performed for a number of cumulative source categories as part of the FEIS for the Wind River Gas Field Development Project (BIA 2004). The cumulative air quality assessment focused on potential impacts that could occur within areas of special concern (i.e., Federal designated Class I areas and areas identified as important to the Tribes and the U.S. Forest Service). Specifically, the cumulative assessment estimated impacts from the following source groups:

- Wind River Gas Field Development Project Sources – Emissions resulting from the Proposed Action and Alternatives.
- Permitted Sources – Sources permitted by State agencies that are currently operating.
- Reasonable Foreseeable Future Actions – Sources permitted by State Agencies that have yet to initiate operations.
- Tribal Sources – Sources located on Tribal lands permitted by the EPA.
- Well Emissions – Sources of emissions related to oil and gas wells.
- Reasonable Foreseeable Development – Sources associated with NEPA projects that are not yet fully developed.

Results from this analysis demonstrated that predicted cumulative impacts would not exceed the ambient standards or PSD Class I increments. Impacts to SO_2 concentrations would be negligible. However, moderate impacts to NO_2 and PM_{10} concentrations would be observed. The duration of the PM_{10} impacts would be short-term, occurring predominately during the development phase of the Wind River Gas Field Development. Following the completion of construction activities, PM_{10} impacts would be reduced to minor levels. The moderate NO_2 impacts would be long-term, i.e., existing for the duration of the Wind River Gas Field Development.

Total nitrogen and sulfur deposition rates resulting from cumulative sources were found to be below acceptable thresholds for all sensitive areas. However, impacts to lake Acid Neutralization Capacity (ANC) would be observed at two lakes located in Cloud Peak Wilderness. Moderate long-term impacts are predicted to occur at Florence Lake, where changes in ANC are predicted to exceed the level of acceptable change. Minor long-term impacts would occur at Emerald Lake where changes in ANC levels would be detectable. Impacts to ANC at the remaining lakes of special concern would be negligible.

Cumulative source emissions are predicted to contribute to visibility impacts at several sensitive areas. Moderate long-term visibility impacts are predicted to occur at Cloud Peak Wilderness. Moderate short-term visibility impacts are predicted to occur at Wind River Canyon and the Owl Creek Range. However, impacts at these areas would be reduced to minor levels following the completion of Wind River Gas Field Development construction activities. Minor long-term visibility impacts would also occur at Bridger Wilderness, Popo Agie Wilderness, and the Wind River Roadless Area.

In general, the increase in emissions associated with the Proposed Action will be localized, mainly temporary (majority of emissions occurring during the well development phase), and on a limited scale in comparison with regional emissions. Therefore, it is unlikely that the project would significantly impact the cumulative air quality of the region.

4.4.2.3 Water Resources

No surface discharge of water would occur under the Proposed Action. All water would be re-injected into an existing well or stored in an eight-acre evaporation pond, as back-up. Water quality in the evaporation pond is expected to decrease over time due to an increase in TDS and salinity from the evaporating water.

In addition, the Proposed Action, when combined with other actions (cattle grazing, other oil and gas development, dispersed recreation, and housing development) that are likely to occur in the CIAA in the future, would increase sedimentation and runoff rates. Sediment yield from active roadways could occur at rates two to three times above background rates into the indefinite future. Soil loss calculations show that an estimated 94 tons per year of additional erosion could occur during the construction of the project facilities. If all available sediment were transported to the Beaver Creek and on to the Little Wind River, the increased sediment loading to the Little Wind River would be about 0.03 percent of the current loading of about 246,010 tons per year. Thus, the Proposed Action would incrementally add to existing and future sources of water quality degradation in the Beaver Creek and Little Wind River watersheds.

4.4.2.4 Soil Resources

Increase in sediment yield must be acknowledged as incrementally and cumulatively adding to soil disturbance within the CIAA. Additional actions (cattle grazing, other oil and gas development, dispersed recreation, and housing development) that could result in increased erosion and sediment yield within the CIAA are likely to occur. Soil is generally disturbed as a result of construction activities associated with these land uses. Of these potential soil-disturbing activities, existing and proposed roads are the features of highest concern. Unlike well pads and surface and buried pipelines, active roadways are not typically reclaimed, thus sediment yield from roads can continue at rates two to three times above background rates into the indefinite future. The Proposed Action would create an additional 4 miles of unpaved roadway in the CIAA. Thus, the Proposed Action would incrementally add to existing and future impacts to soil resources in the CIAA.

4.4.2.5 Paleontological Resources

Based on field surveys, the Proposed Action is anticipated to result in negligible loss of paleontological resources. However, the Proposed Action, when combined with past present and reasonably foreseeable future activities in the CIAA could incrementally add to existing and future impacts to paleontological resources.

4.4.2.6 Vegetation (including special status plant species)

Vegetation resources across the CIAA would be affected by numerous activities. Additional energy development could occur throughout the CIAA, including the WRIR effects to vegetation would primarily occur in the form of surface disturbance associated with development activities and other authorized uses of public lands, including animal grazing and utilization, and vegetation manipulation. These actions affect rangeland plant productivity and plant community structure and composition and long-term health and sustainability. Vegetation manipulation treatments and any subsequent range improvement projects would be designed to effect beneficial changes to the vegetation resources over the long-term, and adverse effects in the short term due to surface disturbance. These activities alter plant communities and could eventually change the community's successional direction and long-term productivity. Indirect impacts to vegetation associated with surface disturbance activities would also occur through processes, such as soil loss and compaction and the increased encroachment of invasive weed species. Thus, the Proposed Action would incrementally add to existing and future impacts to vegetation resources in the CIAA.

4.4.2.7 Wildlife (including special status species)

Past, present, and reasonably foreseeable future activities within the CIAA have reduced and will likely continue to reduce carrying capacities as characterized by the amount of available cover, foraging, and breeding areas for wildlife species. Implementation of the Proposed Action with a direct, initial disturbance of approximately 128 acres and a residual disturbance of 91 acres would likely have a local effect on individual wildlife species but would not likely affect species on a population-level or herd unit basis, or population densities within respective wildlife CIAAs.

While surface disturbance does somewhat correspond to associated wildlife habitat loss, accurate calculations of cumulative wildlife habitat loss are not determinable because the direct impacts of habitat disturbance are species-specific and dependent upon the following: 1) the status and

condition of the population(s) or individual animals being affected; 2) seasonal timing of disturbances; 3) value or quality of the disturbed sites; 4) physical parameters of the affected and nearby habitats (e.g., extent of topographical relief and vegetative cover); 5) value or quality of adjacent habitats; 6) the type of surface disturbance; and 7) other variables that are difficult to quantify. However, surface disturbance calculations are a useful indicator of habitat loss because as foraging and/or hunting habitats, and breeding, nesting, and rearing habitats are removed to support oil and gas, mining, and other development activities, the wildlife carrying capacity of an area would be reduced.

Indirect cumulative impacts on wildlife from ongoing activities and oil and gas development could include the following:

· Long-term surface disturbance would incrementally add to wildlife habitat losses and overall habitat fragmentation. Where oil and gas development and its associated infrastructure have occurred, habitat fragmentation might lead to a disruption of seasonal migration routes, and may prevent access to foraging areas and sufficient water resources.

· Displaced individuals of any wildlife species, including avian species, could be forced into less suitable habitats, possibly resulting in subsequent effects of deteriorated physical condition, reduced productivity, and general distress as critical habitat is reduced. Displacement due to loss of habitat and foraging areas could also result in increased intra- and inter-specific competition for resources;

· A decrease in reproductive success and nutritional condition from increased energy expenditure due to physical responses to disturbance;

· An increase in the potential for collisions between big game or slow-moving wildlife and motor vehicles due to increased traffic levels; and

· Easier access to some areas of wildlife CIAAs, resulting from the construction and upgrades of area roads, could promote an increase in illegal poaching and harassment of wildlife.

Based on these direct and indirect cumulative impacts, ongoing and future well development in wildlife CIAAs would cumulatively and incrementally reduce the ability of wildlife habitats in the these CIAAs to support wildlife species at their current levels for the lifetime of oil and gas development and production (potentially 50 years or more). It should be noted that cumulative impacts to special status wildlife species would be similar in nature to those discussed above for wildlife. However, given their ongoing habitat losses, sensitivity to disturbance, and declining population numbers, special status wildlife species would likely be more sensitive than other, more common species to impacts related to development within the CIAA.

4.4.2.8 Range Resources

Range resources across the BCU in Fremont County are directly tied to the vegetation resources. Thus cumulative impacts to range resources will directly reflect cumulative impacts to vegetation resources. Direct cumulative effects to vegetation could result in further temporary or long-term reduction in livestock use in the East Beaver common grazing allotment and surrounding area. Vegetation manipulation treatments and any subsequent range improvement projects designed for the area would effect beneficial changes to the vegetation resources in the long term, and adverse

effect in the short term due to surface disturbance and the likelihood of increased noxious and weedy species lowering forage production for livestock.

4.4.2.9 Cultural Resources

Significant archaeological resources are irreplaceable and often unique, and any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. Some such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action or the No Action Alternative, but will be minimized because extensive surface and subsurface investigations have been conducted for the purpose of allowing avoidance of significant archaeological resources. In the event of an unanticipated discovery of a significant archaeological resource that cannot be avoided or that has been inadvertently damaged, Devon or its consultant will prepare and execute a mitigation plan in consultation with BLM. Such mitigation will usually include recovery of scientific and cultural information inherent in the archaeological resource, so that cumulative impact to the archaeological record as a whole will be minimal.

4.4.2.10 Socioeconomics

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the CIAA. Although the Proposed Action consists of only 20 wells, it would be another source of tax revenue for the municipal, county, State, and Federal governments and benefit the economy. This would enable more money to be available for the educational system and county infrastructure. Increases in employment would be temporary, during the construction, drilling, and completion phases of the proposed project. Therefore, little change in employment would be expected over the long term. There may be additional demands on services, such as medical and housing, during the construction phase of the proposed project. However, as the Beaver Creek Field is an existing field, much of the services and infrastructure are already in place.

4.4.2.11 Recreation

The CIAA for recreational resources is the Lander FO planning area. As discussed in Section 4.4.1, 7,200 oil and gas wells are presently producing or will be producing oil, natural gas, or coal bed natural gas in the near future. In addition, to oil and gas development, cumulative impacts to recreation could occur as a result of other resource management decisions made by the BLM, the Tribes on the WRIR, or Fremont County.

As discussed in Chapters 3 and 4, the primary public recreational use of the BCPA hunting. Since hunting relies on the presence of wildlife, any impacts to wildlife from surface disturbance and human activity (e.g., habitat loss, fragmentation, and degradation) as a result of the Proposed Action would e incrementally add to the disruption of hunting in the CIAA.

4.4.2.12 Visual Resources

The CIAA for visual resources is the Lander FO planning area. Oil and gas activities are the predominant source of modification to the visual landscape in the CIAA. As discussed in Section 4.4.1, 7,200 oil and gas wells are presently producing or will be producing oil, natural gas, or coal bed natural gas in the near future. Visual impact that would occur as a result of the Proposed Action would incrementally add to visual contrasts in the CIAA. However, as discussed in

Chapter 4, the Proposed Action is consistent with VRM Class objectives established for Federally-managed lands in the CIAA.

4.4.2.13 Fire Management

The proposed project would cumulatively add to past, present, and reasonably foreseeable activities within the CIAA and impact fire management in the CIAA. Specifically, the effects of increased oil and gas development, livestock grazing, and other activities in the Lander RMP planning area could negatively affect fire management activities, including fire suppression and prescribed burns, as directed by the Lander RMP (BLM 1987). Although voluntary fire prevention measures by Devon would minimize the potential of fires within the BCPA, these potential accidental fires would incrementally and cumulatively add to natural and human-induced loss from fires in the CIAA.

5.0 CONSULTATION AND COORDINATION

5.1 CONSULTATION

Tribal consultation was initiated with tribal elders of the Shoshone and Northern Arapahoe Tribes by the BLM's cultural resource specialist prior to a subsurface archaeological survey in the BCPA. Formal consultation with the Tribes has been ongoing throughout the EA process and was completed in September 2007 upon signing of the Decision Record.

The cultural resource inventories for the Beaver Creek project were conducted in compliance with Federal and State legislation including Section 106 of the National Historic Preservation Act of 1966 (as amended) (NHPA), the NEPA of 1969, the Archaeological and Historic Preservation Act of 1974, the Archaeological Resources Protection Act of 1979 (ARPA), and the American Indian Religious Freedom Act of 1978. The NHPA sets forth national policy and procedures regarding "historic properties"—that is, regions, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places (NRHP). Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on such properties, following regulations issued by the Advisory Council on Historic Preservation (ACHP) (36 CFR 800).

Section 7(a) of the ESA requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to adversely affect or jeopardize the continued existence of a Federally listed species, or result in the adverse modification or destruction of its designated critical habitat. If a Federal action "may affect, is likely to adversely affect" a Federally-listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the USFWS. Candidate and BLM Sensitive species are also managed to prevent future Federal listing as threatened or endangered. Informal Section 7 Consultation with the USFWS was initiated by the BLM during the public scoping process and completed in September 2007

5.2 PUBLIC INVOLVEMENT PROCESS

A Scoping Notice for the *Beaver Creek Coal Bed Natural Gas Pilot Project Environmental Assessment* was mailed on June 16, 2006 to a total of 153 government agencies, government officials, public land user groups, private landowners, newspapers, radio stations.

The notice of the availability of the scoping notice and the date of the public scoping meeting appeared in the Casper Star-Tribune, Lander Journal, Riverton Ranger, and Wind River News. The original comment period was 30 days, which ended on July 21, 2006. A public scoping meeting was held on July 6, 2006. Several comments were received requesting an extension of the comment period and a second scoping meeting. A second scoping meeting was held at the Lander Public Library on August 23, 2006, and the comment period was extended until September 8, 2006. A total of 14 comment letters were received from individuals, agencies and organizations during the public scoping period in 2006. A summary of the comments and responses to the comments are provided in Appendix B.

The Draft EA was posted on the BLM's online source for NEPA documents (http://www.blm.gov/wy/st/en/info/NEPA/lfodocs.html) on August 23, 2007. Postcards notifying the public of the availability of the Draft EA on BLM's website and at the Lander Field Office for

a 15-day public review period were also mailed to 163 agencies, organizations, individuals on August 24, 2007, which initiated a 15-day comment period. Within a few days of the first mailing, several postcards were returned to BLM from the U.S. Postal Service as undeliverable. To provide notification to those interested parties whose mailing addresses had changed on BLM's NEPA recipient mailing list, the BLM made a diligent effort to track down updated mailing addresses for those interested parties and then sent out a second postcard which also extended the comment period by an additional 7 days.

A total of 7 comment letters were received by the BLM during the Draft EA comment period. Substantive comments and BLM's responses to those comments (including disclosure of any changes made to the attached as a result of public comments) are summarized in Table 5-1.

Table 5-1. Beaver Creek Draft EA Comments and Responses

USFWS I. The EA should address the reclamation of the produced water impoundment and the impacts of reclamation on the environment and groundwater over the long-term.	The following text was added to Section 2.3.1.5 of the EA: "Closure of the evaporation pond would be conducted in accordance with BLM procedures. Prior to closure, a site inspection would be conducted between the operator and the BLM to determine the appropriate closure procedures. The closure procedures would include testing of the pit solids remaining after evaporation of the pit liquids to evaluate whether excavation and disposal of these materials would be necessary." Discussion of the potential impacts of the evaporation ponds on groundwater resources has been added to Section 4.2.3.2 of the EA.
USFWS I i. With regard to the evaporation pond, the EA should specify what closure options would be considered and implemented.	The BLM Conditions of Approval for the evaporation pond, contained in Appendix C, states that, "Prior to closure of the evaporation pond, a site inspection will be scheduled between the operator and the BLM to determine the appropriate closure procedures." The following text was added to Section 2.3.1.5 of the EA: "Closure of the evaporation pond would be conducted in accordance with BLM procedures. Prior to closure, a site inspection would be conducted between the operator and the BLM to determine the appropriate closure procedures. The closure procedures would include testing of the pit solids remaining after evaporation of the pit liquids to evaluate whether excavation and disposal of these materials would be necessary."
USFWS I ii. Salts remaining at the bottom of the evaporation pond at the end of the project could contain inorganic contaminants such as arsenic, barium, boron, cadmium, copper, lead, selenium, and zinc. These contaminants should be properly disposed of to prevent groundwater and soil contamination.	Closure procedures would include testing of the pit solids to evaluate proper disposal.
USFWS I iii. The EA should provide an estimate of what the elevated concentrations of inorganic contaminants would be at the end of the project and if concentrations would constitute a hazardous waste.	This would require a modeling effort that is beyond the reasonable scope of the EA. Closure procedures would include testing of the pit solids to evaluate proper disposal.
USFWS I iv. Hazardous waste under RCRA would require stricter disposal and monitoring.	Anticipated wastes from the project would be RCRA-exempt (i.e., oil-field exploration and production wastes).

Comment	Response
USFWS II. USFWS recommends a series of smaller ponds with wastewater flowing form one pond to another in the series. The terminal pond.	The primary method of produced water disposal will be injection into the disposal well. The evaporation pond will serve as a secondary disposal option. The volume of water that might be diverted to the evaporation pond or the frequency of such diversions is unknown. The BLM has considered but rejected the USFWS' suggestion to construct a series of smaller ponds with water moving from one pond to another for the following reasons: • The combined area of multiple ponds would result in an area of disturbance greater surface than a single pond. In addition to the area needed for multiple ponds, additional roadway, powerlines, and pipeline would be required to access and service the additional ponds. • Under a gravity-based pond system, if the appropriate slope to allow water to flow from one pond to another is not present, creating the required slope to facilitate movement from one pond to the next would further increase the disturbance area. • If a system of pumps were used to move water from pond to pond instead of gravity flow, there would be an increase in the number of points at which leaks could occur. • Because the evaporation pond is intended for evaporation not separation, each pond within the suggested multiple ponds would be a terminal pond. That is, the water would evaporate from each pond independently thereby creating concentrations of total dissolved solids in multiple ponds.
USFWS III. The last sentence of the third paragraph on page 2-9 should be deleted. USFWS does not endorse or recommend specific vendors or manufactures.	The sentence has been deleted.
USFWS III i. It should be noted that although radar activated deterrent systems have been demonstrated to reduce bird mortality, they are not 100 percent effective.	A sentence has been added to the section entitled "Birdavert System" that states that the system is not 100% effective.

Comment	Response
USFWS IV. Surfactants used in hydraulic fracturing could be brought back up to the surface in the CBNG produced water and eventually into the evaporation pond. If the evaporation pond contains surfactants the pond could pose a risk to migratory birds.	Surfactants, if they are present in the produced water, would be removed by the five-phase oil/water separation system that is proposed.
USFWS IV i. The operators should be required to remove oil, if it is present, from the produced water prior to discharging the water into the impoundment.	The EA describes a five-phase oil separation process on page 2-10 that would be employed to remove oil from the produced water prior to discharge to the evaporation ponds. Fluids recovered after a hydraulic frac of a well will not be placed in the evaporation pond. This fluid would flow back into the reserve pit at each well site as provided in the APD.
WGFD I. Riparian and canopy stabilizing vegetation should not be removed if possible. Crushing or shearing streamside woody vegetation is preferable to complete removal.	Comment noted. No development is proposed along riparian corridors.
WGFD I i. Any riparian or canopy vegetation that is removed in conjunction with stream crossings should be reestablished immediately following completion of the crossing.	No stream crossings are proposed for this development.
WGFD II. Hydrostatic test waters released during pipeline construction could cause alternations of stream channels, increased sediment loads and introduction of potentially toxic chemicals into drainages, thereby resulting in adverse impacts to aquatic biota.	Water used for testing of pipelines would not be discharged to the surface. As stated in Section 2.3.1.7, this water would be transported by truck to one or more nearby reserve pits for evaporation.
WGFD II i. Discharge should occur into the source drainage in a manner that does not increase erosion or alter stream channels.	Water used for testing of pipelines would not be discharged to stream channels.
WGFD II ii. Discharge should occur into temporary sedimentation basins and the dewatering of the temporary sediment basin should then be done in a manner that precludes erosion.	Water used for testing of pipelines would not be discharged to stream channels. As stated in Section 2.3.1.7, this water would be transported by truck to one or more nearby reserve pits for evaporation.

Comment	Response
WGFD II iii. If the discharge point is more than 0.5 miles from a perennial stream and the discharge flow is less than 0.5 cfs, operators should construct a series of hay bales instead of a temporary sedimentation basin.	See previous responses.
WGFD III. Release of water into drainages can result in an unacceptable risk of introducing aquatic nuisance species (e.g., New Zealand mud snail, European ear snail, whirling disease spores).	See previous responses.
WGFD III i. To minimize impacts Wyoming WGFD recommends direct discharge of hydrostatic test waters to streams other than the source water be avoided.	See previous responses.
LWR I. Our name was changed in 2004 from the Lower Wind River Natural Resource District to the Lower Wind River Conservation District. Please change your records.	Table 5-1, List of Agencies and Organizations that Received the Scoping Notice, has been updated to reflect this name change.
LWR II. Why were the Popo Agie and Dubois/Crowheart Conservation Districts not sent the scoping notice? You included conservation districts outside Fremont County (Hot Springs, Sweetwater County and Natrona County) but not all within Fremont County.	The BLM's distribution list for the scoping notice and Draft EA notification includes those organizations, agencies, and individuals who have requested to be notified of public land projects in the Lander Field Office. The Popo Agie Conservation District and the Crowheart Conservation District were sent a postcard notifying them of the availability of the Draft EA for public comment.
LWR III. The BLM permit holders were not included in the list of those receiving a scoping notice. These people are directly impacted by the proposed project yet they were not notified of the opportunity to comment on the project. Permit holders need to be included in this planning process.	The BLM's distribution list for the scoping notice and Draft EA notification includes those organizations, agencies, and individuals who have formally requested to be notified of public land projects in the Lander Field Office. The Double G Ranch, one of three grazing permittees in the BCPA, requested notification and were sent a postcard notifying them of the availability of the Draft EA for public comment. While not on BLM's list of people wishing to be notified of such projects, the BLM contacted the remaining two grazing permittees, Elk Mountain, LLC and Bill and Duveene Hamilton LLC via telephone regarding the availability of the EA for public comment.
LWR IV. In Section 2, there is no mention of reseeding a reserve evaporation pit once it is closed. Is there a	As described in the Conditions of Approval for the Evaporation Pond (see Appendix C of the EA), closure of the evaporation pond would be conducted in accordance with

Comment	Response
plan to reclaim and reseed the evaporation pit?	BLM procedures. Prior to closure, a site inspection would be conducted between the operator and the BLM to determine the appropriate closure procedures.
LWR V. Section 2--where is the water well owned by Devon (BCU #118) located?	The BCU 118 well is located in the SE/4 NE/4 Sec. 16-T33N-R96W.
LWR VI i. In Section 2, there is a lengthy discussion of the 5-phase separation treatment of produced water. Section 2.4.1 indicates that produced water can "potentially cause mortality to wildlife, especially birds" yet Section 2.4.2 indicates that some produced water would be suitable for livestock use. Which is it?	The commenter has misinterpreted Section 2.4.1. The text in question refers to a concern brought up by the public regarding the use of evaporation ponds for water disposal. The commenter has also misinterpreted Section 2.4.2 which does not suggest the produced water from the Beaver Creek project would be suitable for livestock use, but cites a more general finding by the Wyoming DEQ on produced water and its general suitability for livestock use. Specifically, Section 2.4.2 states that "a comparison of major ion chemistry with Wyoming DEQ standards for groundwater suitability indicates that produced water is generally suitable for livestock use, but is unsuitable for domestic supply or irrigation without treatment or dilution." Section 2.4.2 goes on to dismiss surface discharge of produced water from the Beaver Creek project as the costs of treatment to bring the water up to a suitability standard would be too high, and the public concerns with surface discharge too great.
LWR VI ii. Has consideration been given to further treating the produced water to make it suitable for livestock and wildlife?	As indicated in Section 2.4.2, the BLM and Devon briefly considered treating the produced water and discharging it into a surface drainage for beneficial use as a possible disposal method. However, surface discharge of produced water from the Beaver Creek project was dismissed as the costs of treatment to bring the water up to a suitability standard would be too high, and the public concerns with surface discharge too great.
LWR VII. Section 2 mentions that if oil accumulations were noted in the evaporation pit, they would be removed. Please include information on the disposal of the oil accumulations.	The following text has been added to the evaporation pond discussion in Section 2.3.1.11: Any oil removed from the evaporation pit would be sold with other oil produced from the Beaver Creek Field.
LWR VIII. Section 4.4.1 discusses reasonable	The BLM disagrees with the calculations presented by the commenter. For example,

Comment	Response
foreseeable future activities. From the numbers, it appears that there is a potential for 1,103 wells to be located within the East Beaver Creek Allotment. At an estimated 85.5 acres per well (1,750 acres divided by 20 wells), the total acres involved (96,512.5) would be more than those within the East Beaver Creek Allotment. This would definitely have an economic impact on the permit holders within that allotment.	the EA does not assume that all 1,750 acres of the BCPA area would be removed from the East Beaver Creek Allotment as a result of the 20 proposed wells; there would not be a loss of 85.5 acres per well. Furthermore, there would not likely be a loss of 85.5 acres, direct or indirect, per well on any reasonably foreseeable oil and gas project.
LWR IX. Section 4.4.2.8 mentions that the cumulative impacts may include temporary or long-term reduction in livestock use. Any reduction in AUMs has a direct impact on the lives and livelihoods of permit holders. RFFA have the potential to eliminate livestock grazing in the East Beaver Creek Allotment.	The cumulative impact assessment in Section 4.4.2.8 does acknowledge that cumulative effects of past, present and reasonably foreseeable oil and gas, recreation, and other public land uses could result in further temporary or long-term reduction in livestock use in the East Beaver common grazing allotment and surrounding area. However, detailed analysis of the potential for reasonably foreseeable development impacts on livestock and grazing is beyond the scope of this project.
LWR XI. Consideration needs to be given to water development. This project appears to be an opportunity to develop water for livestock and wildlife either through treated produced water or through drilling of strategically placed water wells. This would be one way to reduce the impact to permit holders.	As indicated in Section 2.4.2, the BLM and Devon briefly considered treating the produced water and discharging it into a surface drainage for beneficial use as a possible disposal method. However, surface discharge of produced water from the Beaver Creek project was dismissed as the costs of treatment to bring the water up to a suitability standard would be too high, and the public concerns with surface discharge too great.
WOC I. The BLM failed to give notice of the availability of the Beaver Creek EA. The BLM failed to post a notice of availability in any newspaper, and failed to solicit comments from the public beyond a small group of scoping participants. Availability of the Draft EA	The BLM has satisfied both the statutory requirements under 40 CFR 1506.6(a) and the spirit of NEPA and the CEQ regulations to make diligent efforts to involve the public in preparing and implementing their NEPA procedures, which for the Beaver Creek project, began with an intensive public scoping effort in 2006. As discussed in Section 5.1 of the EA, a Scoping Notice for the Beaver Creek Coal Bed Natural Gas Pilot Project Environmental Assessment was mailed on June 16, 2006 to a total of 153 government agencies, government officials, public land user groups, private landowners, newspapers, radio stations. The notice of the availability of the scoping notice and the date of the public scoping meeting appeared in the Casper Star-Tribune, Lander Journal, Riverton Ranger, and Wind River News. The original comment period

Comment	Response
	was 30 days, which ended on July 21, 2006. A public scoping meeting was held on July 6, 2006. Several comments were received requesting an extension of the comment period and a second scoping meeting. A second scoping meeting was held at the Lander Public Library on August 23, 2006, and the comment period was extended until September 8, 2006. The commenter is incorrect in stating that the BLM failed to solicit comments from the public beyond a small group of scoping participants. The Draft EA was posted on the BLM's online source for NEPA documents (http://www.blm.gov/wy/st/en/info/NEPA/lfodocs.html) on August 23, 2007. The BLM's website on Public Participation & NEPA Compliance on Public Lands in Wyoming (http://www.blm.gov/wy/st/en/info/NEPA.html) clearly states that it is the public's "responsibility to frequently check this site to ensure that you have the maximum time allowed for comment on a specific NEPA document. Or you may contact the Field Office initiating the NEPA document and request to have your name added to a mailing list to ensure that you receive copies of NEPA documents in a timely manner." Postcards notifying the public of the availability of the Draft EA on BLM's website and at the Lander Field Office for a 15-day public review period were also mailed to 163 agencies, organizations, individuals on August 24, 2007, which initiated a 15-day comment period. Within a few days of the first mailing, several postcards were returned to BLM from the U.S. Postal Service as undeliverable. To provide notification to those interested parties whose mailing addresses had changed on BLM's NEPA recipient mailing list (*and BLM had not received notification of those address changes*), the BLM made a diligent effort to track down updated mailing addresses for those interested parties and then sent out a second postcard which also extended the comment period by an additional 7 days. Of the 13 agencies, organizations, and individuals that submitted scoping comments in 2006 (for a total of 14 scoping comment letters) all but two were sent notification of the Draft EA. The National Wildlife Federation and Wind River Environmental Quality Commission were inadvertently left off of the EA notification mailing list, however, they were made aware of the EA's availability via review of the BLM's website and/or personal communications with the BLM or other interested parties.

Comment	Response
WOC II. The BLM failed to consider a reasonable range of alternatives.	The CEQ regulations require that NEPA documents contain a purpose and need statement "that shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 CFR § 1502.13. The purpose and need for a project "defines the range of alternatives" that the BLM should consider.[1] Courts afford "agencies considerable discretion to define the purpose and need of a project."[2] In addition, "[w]here the action subject to NEPA review is triggered by a proposal or application from a private party, it is appropriate for the agency to give substantial weight to the goals and objectives of that private actor."[3] Thus, "[a]lternatives that do not accomplish the purpose of an action are not reasonable."[4] The CEQ regulations state that the discussion of alternatives forms "the heart of an environmental impact statement." 40 CFR § 1502.14. Federal agencies shall explore and evaluate all reasonable alternatives and briefly discuss the reasons for eliminating other alternatives from detailed analysis. *Id.* at § 1502.14(a). Simply stated, the CEQ

[1] *Fuel Safe Wash. v. FERC*, 389 F.3d 1313, 1323 (10th Cir. 2004) ("In deciding whether an agency has adequately considered reasonable alternatives, 'courts look closely at the objectives identified in an EIS's purpose and need statement.'") (quoting *Citizens Comm. to Save Our Canyons v. U.S. Forest Service*, 297 F.3d 1012, 1031 (10th Cir. 2002)); s*ee also City of Caramel-by-the-Sea v. U.S. Dept. of Trans*., 123 F.3d 1142, 1155 (9th Cir. 1997).

[2] *Friends of the Southeast's Future v. Morrison*, 153 F.3d 1059, 1066 (9th Cir. 1998).

[3] *Save Our Canyons*, 297 F.3d at 1030.

[4] *Custer County Action Assoc. v. Garvey,* 256 F.3d 1024, 1041 (10th Cir. 2001) (*citing Colo. Envtl. Coalition*, 185 F.3d at 1174-76); *see Citizens Against Burlington, Inc. v*. *Busey*, 938 F.2d 190, 196 (10th Cir. 1991)("When the purpose is to accomplish one thing, it makes no sense to consider alternative ways by which another thing might be achieved."). Recently, the court in *Northwest Ecosystem Alliance v. Rey* noted that it is not aware of any Ninth Circuit case holding a purpose and need statement to be unreasonable. 380 F.Supp. 2d 1175 (W.D. Wash. 2005); *see also Kettle Range Conservation Group v. U.S. Forest Service*, 148 F. Supp. 2d 1107, 1117 (E.D. Wash 2001).

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	regulations do not require a detailed study and discussion of eliminated alternatives. For an agency to be obliged to consider an alternative, the alternative must be technically and economically feasible.[5] "Alternatives that 'do not accomplish the purpose of an action are not reasonable' and need not be studied in detail by the agency."[6] Thus, NEPA "does not . . . require agencies to analyze the environmental consequences of alternatives it has in good faith rejected as too remote, speculative, . . . impractical or ineffective."[7] The CEQ regulations impart "a rule of reason [that] governs both the alternatives which an agency must discuss and the extent to which it must discuss them."[8] "Under [the] rule of reason, as long as the BLM makes these choices reasonably in light of the goals, needs, and purposes that it has set for the project, its discussion of the alternatives is upheld."[9] The Interior Board of Land Appeals ("Board") also employs the "rule of reason" to determine both the range of alternatives and the extent to which each alternative must be

[5] *See Vt. Yankee Nuclear Power Corp. v. National Res. Defense Council*, 435 U.S. 519, 551 (1978); *Busey*, 938 F.2d at 195 (The "CEQ regulations oblige agencies to discuss only alternatives that are feasible, or (much the same thing) reasonable.").

[6] *Save Our Canyons,* 297 F.3d at 1031 (quoting *Custer County,* 256 F.3d at 1041).

[7] *Custer County*, 256 F.3d at 1039 (*citing Colo. Envtl. Coalition v. Dombeck*, 185 F.3d 1162, 1174 (10th Cir. 1999)).

[8] *City of Grapevine, Texas v. U.S. Dep't of Transp.*, 17 F.3d 1502, 1506 (D.C. Cir. 1994), *cert. denied*, 513 U.S. 1043 (1994) (citation omitted).

[9] *Corridor H Alternatives, Inc. v. Slater*, 982 F. Supp. 24, 29-30 (D.D.C. 1997); *Busey*, 938 F.2d at 195 ("the rule of reason governs 'both which alternatives the agency must discuss, and the extent to which it must discuss them'").

[10] *See, e.g., In re Stratton Hog Timber Sale*, 160 IBLA 329, 337 (2004).

[11] *Powder River Basin Res. Council*, 124 IBLA 83, 95 (1992).

[12] *Great Basin Mine Watch*, 159 IBLA 324, 326 (2003).

[13] *Laguna Greenbelt*, 42 F.3d at 524; *see Tongass*, 924 F.2d at 1140-42 (EIS upheld where Navy eliminated 13 of 14 proposed sites for a submarine testing facility because they were not reasonable alternatives).

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	considered.[10] Alternatives that are speculative or not feasible need not be considered.[11] Similarly, "if an alternative does not achieve the purpose of the proposed action or would not have lesser or no impact, BLM does not err in failing to consider that alternative."[12] Furthermore, NEPA does not mandate a "minimum number of alternatives that must be discussed."[13] The CEQ regulations have no requirement on the number of alternatives that shall be analyzed. *See* 40 CFR 1502.14. The regulations merely require the inclusion of the no-action alternative. 40 CFR §1502.14(d). The key point of analysis for a court is not the number of alternatives that are considered, but whether the agency considered a range of alternatives reasonably related to the purpose and need of the project.
WOC II i. Directional drilling is a reasonable alternative that should have been fully considered in the EA.	See response to WOC II: As now clearly stated in Section 2.4.3, the technical risks of directional drilling of the exploratory wells could prohibit Devon from developing their Federal leases as intended for the project, thus preventing them from meeting the purpose for their project.
WOC II ii. Drilling fewer than twenty wells is a reasonable alternative that should have been analyzed in the EA.	See response to WOC II: As stated in Section 2.4.5, Devon has determined, based on experience with CBNG development in other fields in Wyoming and other states, that 20 CBNG wells is a statistically significant minimum number of pilot wells necessary to obtain the above information and to meet the purpose for the project. Based on this information, an alternative analyzing the development of fewer wells was dismissed from analysis. Section 2.4.5 has been revised to also state that during preliminary review and discussion of the project, Devon determined that a pilot project of more than 20 wells is not necessary to meet the purpose for the project, and thus was dismissed from analysis.
WOC III. The BLM should prepare an EIS.	As defined at 40 CFR 1508.27, "significantly" as used in NEPA requires considerations of both context and intensity:

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	(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. (b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity: 1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. 2) The degree to which the proposed action affects public health or safety. 3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. 4) The degree to which the effects on the quality of the human environment are likely to be highly controversial. 5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. 6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. 7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. 8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

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	9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. 10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. As noted in the FONSI for the Beaver Creek project, the BLM's Decision Maker has satisfied requirements under NEPA and CEQ regulations by carefully considering and making an informed decision on the project based upon the information in the EA and the significance criteria listed above. The rationale for the FONSI is provided in detail.
WOC III i. The BLM should prepare an EIS because the EA is not clear to what degree the project would affect human health from the potential air emissions of methanol.	The EA in Section 4.2.2.2 does acknowledge that recent concern has been raised by the WDEQ regarding the potential air emissions of methanol, which is one of the 187 HAPs identified by the EPA. Concern surrounds the potential volatilization of methanol to the atmosphere after it becomes entrained in the water produced during the gas extraction process. This volatilization is thought to occur after the produced water is transferred to disposal facilities and stored in evaporation ponds. However, the EA goes on to say that this topic is still currently being studied and as of the Draft EA, and that methods for accurately quantifying potential methanol emissions via this pathway are still in the process of being developed. Therefore, potential methanol emissions were not quantified for the Proposed Action emission inventory and potential impacts on human health from methanol emissions from this project or many others are not yet determinable. However, national and Wyoming Ambient Air Quality Standards (NAAQS and WAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. Pollutants for which standards have been set include sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$). The air quality analysis in Section 4.2.2.2 discloses that ambient air concentrations would be below all standards for the length of the development period. The annual NO_2, SO_2 and PM_{10} results demonstrate that even if the proposed annual pace of development occurred in the same location during a single

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	year, the effects would still be less than all ambient air quality standards.
WOC III ii. The BLM should prepare an EIS because the project threatens to harm cultural and historic resources.	Section 3.10.3 of the EA discloses that a Class III cultural resource inventory was conducted for all proposed well locations and associated access/pipeline corridors on public lands administered by the BLM Lander Field Office. The objectives of the inventories were to locate, document, and evaluate any cultural resources within the BCPA. This information was used to predict possible impacts to historic and archaeological resources from development of the area for oil and gas exploration. The analysis in Section 4.2.9 recognizes that despite Class III surveys having been completed for all proposed areas if surface disturbance in the BCPA, there is a risk that sub-surface cultural resources could be inadvertently damaged or destroyed during surface-disturbing activities. In order to minimize potential impacts to cultural and historic properties that were not documented during pre-construction Class III cultural resource inventories, the EA in section 4.2.9 clearly states that in the event that cultural resources are discovered during construction, all operations at the site would be suspended and the discovery would be reported to the AO. Potential impacts would be mitigated by preparation and execution of a mitigation plan approved by BLM in consultation with the SHPO. Furthermore, the COAs listed in the EA would ensure that adverse effects on cultural resource discoveries in high potential areas would be minimized and an acceptable mitigation strategy would be implemented. These measures would ensure that no significant impact to cultural and historic properties would occur as a result of the Proposed Action. All Class III cultural resource inventories and any subsequent monitoring needed have been and would be completed by qualified, professional archaeologists permitted by the State of Wyoming and approved by BLM.
WOC III iii. The BLM should prepare an EIS because the project is controversial.	See response to WOC III. Public land uses are inherently controversial given the varying values and needs of public land users. Oil and gas exploration and development on public lands proves to be a contentious issue throughout the oil and gas-producing states. Regardless of the scope of the project (e.g., 20-well pilot project or full-field development project) the public generally voices numerous and conflicting opinions

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	about whether or not oil and gas development is an appropriate use of public lands. But conflicting opinions regarding appropriate of uses of public lands and impacts to those lands do not necessarily equate to significant impacts that would necessitate the preparation of an EIS. Furthermore, the BLM made a diligent effort to involve the public and identify concerns related to the Beaver Creek project, began with an intensive public scoping effort in 2006. As discussed in Section 5.1 of the EA, a Scoping Notice for the Beaver Creek Coal Bed Natural Gas Pilot Project Environmental Assessment was mailed on June 16, 2006 to a total of 153 government agencies, government officials, public land user groups, private landowners, newspapers, radio stations. The notice of the availability of the scoping notice and the date of the public scoping meeting appeared in the Casper Star-Tribune, Lander Journal, Riverton Ranger, and Wind River News. The original comment period was 30 days, which ended on July 21, 2006. A public scoping meeting was held on July 6, 2006. Several comments were received requesting an extension of the comment period and a second scoping meeting. A second scoping meeting was held at the Lander Public Library on August 23, 2006, and the comment period was extended until September 8, 2006. The comment letters received during the scoping period were used to identify public concerns, issues, and controversy. Substantive comments and concerns identified during scoping were analyzed in the Draft EA.
WOC IV. The BLM should consider its rights and responsibilities as mineral lesser and surface management agency prior to authorizing surface disturbance relative to oil and gas exploration and development.	Comment noted. The BLM is fully aware of its regulatory and statutory requirements as mineral lesser and surface management agency for the Beaver Creek project and other oil and gas projects and public land uses.
NWF I. The EA must address whether coalbed methane extraction and produced water disposal is consistent with the Lander RMP's decision to make improvement of aquatic and riparian habitats top priority in the Beaver Creek Management Unit.	The Lander RMP states that "public lands will be made available for oil and gas leasing and development to the maximum extent possible, while giving due consideration to the protection of other significant resource values." As with all management units open to oil and gas leasing and development, the BLM recognizes that a key component of its responsibility to allow for oil and gas development is to give "due consideration to the protection of other significant resource values", such as aquatic and riparian habitats.

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	The BLM takes very seriously its responsibility to manage public lands within the Beaver Creek Management Unit, including its responsibility to make improvement of aquatic and riparian habitats for fish and other aquatic species a top priority. The BLM also takes potential impacts to aquatic and riparian habitats from the Beaver Creek project very seriously, as evidenced in Sections 4.2.3 and Section 4.2.7.6 of the EA which provided thoughtful analyses of the potential direct and indirect impacts of the project on surface water, water quality, groundwater, and fisheries. Section 4.2.3.3 of the EA summarizes an extensive list of mitigation measures that are designed to prevent or minimize potential impacts to aquatic habitats in and downstream from the BCPA. Appendix C of the EA outlines the site-specific COAs that would be required for each proposed location, including COAs to prevent contamination of surface waters, minimize erosion and sedimentation, and prevent potential impacts to groundwater. The commenter should also note that Section 3.7.4 of the EA discloses that riparian habitats have not been documented within the BCPA. Thus, there would be no direct effect on riparian habitats. Furthermore, should riparian habitats be documented within the BCPA at any time, direct impacts to the resource would be prevented by the Surface Disturbance Mitigation Guideline 1c (see below and in Appendix D of the EA). 1. Surface Disturbance Mitigation Guideline Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer. a. Slopes in excess of 25 percent. b. Within important scenic areas (Class I and II Visual Resource Management Areas). c. Within 500 feet of surface water and/or riparian areas. d. Within either one-quarter mile or the visual horizon (whichever is closer) of historic trails. e. Construction with frozen material or during periods when the soil material is

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	saturated or when watershed damage is likely to occur. Given the extensive mitigation measures required for erosion and sedimentation prevention and since no produced water would be discharged into the Beaver Creek or Little Wind River drainages, aquatic habitats occurring within the BCPA would not be adversely impacted by the Proposed Action Since no produced water would be discharged into the Beaver Creek or Little Wind River drainages, aquatic and riparian habitats occurring downstream of the BCPA would not be adversely impacted by the Proposed Action. Furthermore, the operator would be required to obtain an Underground Injection Control program permit from the Wyoming Oil and Gas Conservation Commission and/or Wyoming Department of Environmental Quality. The WOGCC and WDEQ have strict standards for UIC permits in order to prevent impacts to groundwater from injection of produced water.
NWF II. The EA neglects to note that the project would increase the density of development and ensuing habitat fragmentation within the BCPA for pronghorn, sage grouse, and other wildlife species, and is concerned with the BLM's conclusions that since the BCPA occurs within an area "where natural gas exploration and production has been on-going for decades, pronghorn occupying the BCPA may have adapted to oil and gas development".	The commenter has referred to a single statement within a fairly lengthy discussion on potential impacts to big game species. Section 4.2.7.1 clearly stated the potential direct and indirect impacts of the project on pronghorn and mule deer, which included species-specific discussions on the following general impacts (note that the first bullet acknowledges habitat fragmentation as an impact of the project): • Decreased habitat values and reduced habitat use within and/or near disturbed areas due to habitat loss (including foraging areas) and habitat fragmentation from construction and operational activities; • Temporary displacement and disruption of migratory routes within and/or near disturbed areas due to avoidance of surface disturbance and areas with human activity; • Increased stress from intra- and inter-specific competition for resources due to increased animal densities in adjoining or unsuitable habitats • Decreased reproductive success and nutritional conditions from increased energy expenditure as a physical response to disturbance

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	• Increased potential for collisions between vehicles and big game; and • Increased harassment and/or poaching of big game species. The statement referenced by the commenter was not a dismissive statement on impacts to pronghorn in general but does suggest that since there is existing oil and gas development within the BCPA and surrounding area, since pronghorn from the Beaver Rim herd unit occupy the BCPA on a year-round basis, and since the Beaver Rim herd unit of pronghorn is currently above population objectives, anecdotal evidence does suggest that pronghorn within the area of existing development has exhibited some level of acclimation. The EA specifically stated at Section 4.2.7.1 that "[s]ince the BCPA occurs within an area where natural gas exploration and production has been on-going for decades, pronghorn occupying the BCPA may have adapted to oil and gas development. Therefore, while individual pronghorn may be negatively affected by direct and indirect impacts of the project, the Proposed Action is not likely to impact the Beaver Rim herd unit, which is currently above population objective."
NWF III. The cumulative impact analysis fails to provide the Decision Maker and public with adequate information.	On the contrary, Section 4.4 of the EA provides a detailed description of the past, present, and reasonably foreseeable actions that have and will continue to contribute to cumulative impacts in the resource-specific CIAAs. The introductory material in Section 4.4 has, based on available information, quantified existing, currently proposed, and reasonably foreseeable oil and gas development. These data were then used to provide a more qualitative discussion on resource-specific cumulative impacts, to which the Beaver Creek project would contribute. The NEPA that cumulative impact assessments evaluate the incremental impact of the Proposed Action when added to other past, present and reasonably foreseeable future activities (RFFA). The latter; RFFA, inherently makes the cumulative impact assessment process an inherently speculative process. Furthermore, the Decision Maker's ability to make an informed decision is largely dependent upon the information (e.g., impact analysis) provided for the Proposed Action and alternatives. In the case of the Beaver Creek project, the Proposed Action would not have a significant effect on the human environment (see FONSI), therefore, the Proposed Action would not significantly contribute to cumulative impacts in the BCPA and surrounding area.

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NWF IV. How did BLM determine the extent of the area where natural gas exploration and production have been ongoing and how it relates to the project area?	Data on existing oil and gas development within the BCPA and surrounding region was obtained through the WOGCC database, which is a public domain data source. As stated in the EA in Section 4.4.1, there are 443 existing well pads that occur within a 10-mile radius buffer around the BCPA. There are13 existing, producing wells occur within the BCPA. As evidenced by the WOGCC database, many of the existing wells within the 10-mile radius of the BCPA were drilled and completed more than 20 years ago.
NWF V. Despite our request letter, we have not received any data that proves the effectiveness of the scare tower that was used at the evaporation pond on the Wind River Reservation for the Riverton Dome Coal Bed Natural Gas and Conventional Gas Development Project.	The BLM has no monitoring authority for the evaporation pond on Tribal land. The commenter is encouraged to request data effectiveness of the referenced scare tower from the USFWS, BIA, and/or Devon.
NWF VI. The EA fails to provide any information regarding the efficacy of the Birdavert system in alleviating hazards to birds from the evaporation pits. We would like any and all information available on the Bird Avert system that will be used at the evaporation pond.	Only a few studies have been completed on the effectiveness of radar-activated bird deterrent systems (Stevens et. al. 2000, Ronconi et. el. 2004 and 2006); however, these studies have shown that these systems do reduce bird landings at industrial wastewater ponds and thus reduce mortality. Information on the Peregrine Birdavert System can be found at the manufacturer's website: http://www.birdavert.com/birdavert.html. The website provides substantial information regarding the design of the system, testing that has been used to determine the effectiveness of the system, and results of those tests. Peer-reviewed literature discussing the effectiveness of radar-activated bird deterrent systems such as the Peregrine Birdavert System can be found in the following journal articles: • Ronconi, R.A. and C.C. St. Clair.; P.D. O'Hara; and A.E. Burger. 2004. Waterbird deterrence at oil spills and other hazardous sites: potential applications of a radar-activated on-demand deterrence system. Marine Ornithology. 32:25-33. • Ronconi, R.A. and C.C. St. Clair. 2006. Efficacy of a radar-activated on-demand system for deterring waterfowl from oil sands tailings ponds. Journal

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	of Applied Ecology. 43:111-119 • Stevens, G.R.; J. Rogue; R. Weber; and L. Clark. 2000. Evaluation of a radar-activated demand-performance bird hazing system. International Biodeterioration and Biodegradation. 45:129-137. Section 2.3.1.11 of the EA describes the proposed use of the Peregrine Birdavert System (name has been corrected in the EA). Per a request from the USFWS (see Response to USFWS III i), the EA has been modified at Section 2.3.1.11 as cited below to include a statement that the system is not 100% effective: "To prevent wildlife (especially birds) from entering the ponds, each pond would be equipped with a system of hazing devices called "Peregrine Birdavert System," which is manufactured by Peregrine Systems, Salt Lake City, UT, and is based on emission of sounds, light, or motion at random intervals to deter birds and other wildlife from entering the pond. The Peregrine Birdavert System's radar is used to detect birds in flight. During periods of heavy rain or high wind, the radar-detection equipment becomes dormant, which eliminates false alarms. Once birds are detected by the radar, the computer software activates the remote controller units, consisting of the hazing devices. There are a total of eight hazing devices, consisting of oversized plastic falcons, with five-foot wingspans. They flap their wings violently, when computer commands are issued to deter birds in flight from landing on the ponds. Only a few studies have been done on the effectiveness of radar-activated bird deterrent systems (Stevens et. al. 2000, Ronconi et. el. 2004 and 2006); however, these studies have shown that these systems do reduce bird landings at industrial wastewater ponds and thus reduce mortality. The Birdavert system, which has been in operation for approximately one year in the Riverton Dome field, appears to work very well (B. Skelton, Devon, December 2006). However, the system is not 100% effective."
NWF VII. The EA fails to provide any information regarding the efficacy of the oil-water separation system in alleviating hazards to birds from the	Devon's primary means of preventing birds from coming into contact with oil on the ponds would be to remove the oil from the produced water prior to entering the pond. The EA describes a five-phase oil separation process on page 2-10 that would be

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evaporation pits.	employed to remove oil from the produced water prior to discharge to the evaporation ponds. The Birdavert system described in the EA and in the previous Response to Comment, would effectively serve as a backup method of preventing bird mortality due to oil exposure; for any oil that is not effectively removed the 5-phase system, the Birdavert system would be in place to prevent bird contact with the evaporation pit.
NWF IX. The EA does not explain to what extent Tribal consultation has taken place or if the Wind River Tribes were offered Cooperating Agency status on the project.	Tribal consultation was initiated with Shoshone and Northern Arapahoe tribal elders by the BLM's cultural resource specialist prior to a subsurface archaeological survey in the BCPA. Formal consultation with the Tribes has been ongoing throughout the EA process and was completed in September 2007 with the signing of the Decision Record. Sections 3.11.3 and 5.1 of the EA have been modified to clarify Tribal consultation. The CEQ regulations do not require cooperating agency status be offered to particular groups for EAs. Under 40 CFR 1508.5, "Cooperating agency" means any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment. The selection and responsibilities of a cooperating agency are described in Sec. 1501.6. A State or local agency of similar qualifications or, when the effects are on a reservation, an Indian Tribe, may by agreement with the lead agency become a cooperating agency. Section 3.11.3 has been corrected. The Shoshone and Northern Arapahoe Tribes did not act as Cooperating Agencies on the Beaver Creek EA.
NWF XI. The NWF was not notified of the availability of the Draft EA.	The BLM and its third-party contractor apologize for this oversight. We are pleased that NWF was made aware of the availability of the project nonetheless, and appreciate your input on the EA.
WPA I. The WPA recommends that the Proposed Action be adopted for the Beaver Creek Pilot Project.	Comment noted.
WDEQ I. The Beaver Creek Pilot Project area overlies	Comment noted. However, shallow groundwater beneath the Beaver Creek field is not

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a "high priority" groundwater resource (see attached map). Areas become a priority area because they contain shallow aquifers that are: used for drinking water sources; are sensitive to contamination; and/or are susceptible to becoming contaminated due to overlying land uses. We urge the BLM and Devon Energy to use all available means to protect this valuable resource.	used for drinking water purposes. The closest municipal wells are located to the northwest of Riverton. The Proposed Action includes measures to protect shallow groundwater resources from contamination. These measures include setting and cementing surface casing during drilling to seal off any shallow groundwater zones encountered and the use of lined reserve pits. The evaporation pits would be lined with a 60-mil plastic liner and a freeboard of at least two feet would be maintained to prevent overtopping. Produced water would be injected into the Madison Formation at a depth of about 12,500 feet. Between the shallow water-bearing Wind River Formation and the Madison Formation are several aquicludes that prevent the vertical migration of groundwater, including the Mowry, Cody, and Thermopolis shales. Therefore, water injected into the Madison Formation would be unlikely to migrate to shallower water-bearing formations.
WDEQ II. On Page 2-8, Section 2.3.1.11, the EA discusses drilling of a new water disposal well. Please be advised that any injection well requires an Underground Injection Control program permit issued by the Wyoming Oil and Gas Commission and/or the WDEQ. This permit should be obtained prior to drilling the well.	Comment noted. The following sentence has been added to Section 2.3.1.11: "In addition, an Underground Injection Control permit would be obtained from the Wyoming Oil and Gas Commission and/or WDEQ prior to drilling of this well."
WDEQ III. On Page 2-9, Section 2.3.1.11, the EA discusses water disposal and the use of evaporation ponds. No mention is made of what will be done with the salt and sludge that will accumulate in these ponds. How will this material be disposed of when the ponds are closed?	The COA for the evaporation ponds, contained in Appendix C, states that closure procedures would be conducted according to BLM procedures and a site inspection would be conducted prior to closure to determine the appropriate procedures. The following text has been added to Section 2.3.1.5, Interim and Final Reclamation: "Closure of the evaporation pond would be conducted in accordance with BLM procedures. Prior to closure, a site inspection would be conducted between the operator and the BLM to determine the appropriate closure procedures. The closure procedures would include testing of the pit solids remaining after evaporation of the pit liquids to evaluate whether excavation and disposal of these materials would be necessary."
WDEQ IV. On Page 3-5, Section 3.4.1, the EA discusses surface water and stream classifications. It states that Beaver Creek is an "effluent-dominated" stream, and the source of the perennial flow is from	Beaver Creek is currently designated as Class 3B. The headwaters of Beaver Creek are in the south part of the Wind River Range and the adjacent Beaver Rim. Beaver Creek does receive a portion of its flow from discharge from an NPDES outfall from current oil and gas operations, and flow does disappear at some point downstream from this

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discharges by current oil and gas operations. The basis for the use of effluent-dominated terminology, more recently changed to "effluent-dependent" rather than "effluent-dominated" is performed by the WDEQ. Beaver Creek in the Beaver Creek field area is currently designated as a Class 3B stream. If the creek were to be designated as effluent-dependent, it would be designated as 3D. Beaver Creek drains a large area of Fremont County and its source is in the Wind River Mountains. Our understanding is that surface water does not disappear until well downstream of the Beaver Creek field area during average stream flow years. Please clarify the current classification of the potentially affected stream segment and clarify the conclusion that the stream is effluent-dominated/ effluent-dependent.	outfall. The text in Section 3.4.1 has been revised to state that Beaver Creek receives a portion of its flow from this discharge and the use of the term "effluent-dominated" has been deleted.
WDEQ V. On Page 4-8, Section 4.2.3.1, the EA states that because water will come from a water well, surface water flows will not be impacted. This may not be entirely accurate. If the well is located near Beaver Creek, and is completed in the alluvial or shallow Wind River aquifers, the water being pulled out of the well may in fact be water in direct communication with the creek, or water that is recharging the creek. This would certainly have the potential to impact flows in the creek. Please address this potential. We would recommend that the facility use deeper, poorer quality water for any drilling or related use to limit impacts to the Class 1, domestic use quality water near the surface.	The BLM appreciates the WDEQ calling attention to this detail. Devon's water well, the BCU #118, is permitted with the State Engineer's Office, Permit no. P51107W. The well produces water from the Wind River Formation at a depth of approximately 680 feet. The EA at Section 4.2.3.1 has been modified to indicate that use of water from this well could reduce flow in Beaver Creek.
WDEQ VI. On Page 4-8, under the Water Quality subheading, the first paragraph discusses the potential impacts to surface water from spills and other	The referenced section discusses impacts to surface water resources. Potential impacts to groundwater resources, including those to shallow groundwater in ephemeral drainages, are discussed in Section 4.2.3.2.

Comment	
accidental releases. Please include the potential to impact groundwater in this discussion. Groundwater can be impacted by releases into ephemeral drainages, perhaps even more easily than surface water depending on hydrogeologic factors.	
WDEQ VII. Page 4-9, Section 4.2.3.2, discusses groundwater and potential for groundwater contamination. As we mentioned in Comment #1 (WDEQ I.), the alluvial and Wind River aquifers in this area are Class I domestic use groundwater and need to be protected as rigorously as possible. As a related point, the EA does not discuss the need to protect these fresh water aquifers during the drilling of the CBNG wells. Please include information (e.g., surface casing programs, use of lined reserve pits, types of drilling mud allowed, etc.) on how the aquifers will be protected.	Comment noted. See the response to WDEQ I above. Information concerning how aquifers would be protected during drilling is provided in several places in the EA. Section 2.3.1.3, Drilling Operations, describes the setting of surface casing, the use of fresh-water based mud, and the use of lined reserve pits. Lining of the evaporation ponds and removal of oil from produced water is discussed in Section 2.3.1.11. Mitigation measures and Conditions of Approval (COAs) for the protection of groundwater resources are discussed in Section 4.2.3.3. Appendix C also provides COAs for each well and evaporation pond proposed.
WDEQ VIII. On Page 10, in the same section referenced in #6 above (WDEQ VI), the EA mentions a study that showed hydrofracing effects do not reach out more than 500 feet from the well bore. It goes on to say that hydrofracing will occur a depths of more than 4,000 feet below the ground surface, and reaching the conclusion that near surface groundwater would not be affected. Please be aware that the 500 foot distance is for horizontal distances, not in the vertical direction. This conclusion should be clarified.	The text has been revised to state that "…it is expected that hydrofracturing effects would not extend beyond 500 feet horizontally from the well bore, as discussed by Wright Water Engineers (2003) for the Mesaverde Formation in the Piceance Basin of Colorado. In addition, because hydrofracturing would be conducted at considerable depths (4,000 feet or more below ground surface), and the Wind River Formation and the Mesaverde Formation are separated by several aquicludes, groundwater resources near the surface, such as springs and the shallow alluvium, would not be affected."
WDEQ IX. There are two Water Quality Division permits that may apply to the project. Any or all of them may apply depending on the eventual scope of the project. Discharge Permit. Any discharges to "waters of the state" must be permitted under the Wyoming	Comment noted. No discharges of water from well drilling, well operations, or hydrostatic testing of pipelines is proposed. A Storm Water Pollution Prevention Plan would be prepared and submitted for approval prior to construction, as described in Section 4.2.3.3 and listed in Table 1-1.

Comment	Response
Pollutant Discharge Elimination System (WYPDES) program. This program is part of the Federal Clean Water Act, but is administered by the WQD. Coverage is required for discharges from cofferdam dewatering, discharges from hydrostatic pipeline testing, or discharge of waste waters to waters of the state. For clarification waters of the state include rivers, streams, dry draws, wetlands, lakes, reservoirs and even stock ponds. This permit will require some sampling and will incorporate effluent limits for any constituents of concern. Roland Peterson (307-777-7090) can provide additional information. Storm Water Associated With Construction Activities. This permit is required any time a project results in clearing, grading, or otherwise disturbing one or more acres. The disturbed area does not need to be contiguous. The permit is required for surface disturbances associated with construction of the project, access roads, construction of wetland mitigation sites, borrow and stockpiling areas, equipment staging and maintenance areas, and any other disturbed areas associated with construction. A general permit has been established for this purpose and either the project sponsor or general contractor is responsible for filing a Notice of Intent (NOI) and complying with the provisions of the general permit. The NOI should be filed no later than 30 days prior to the start of construction activity. Please contact Barb Sahl at 307-777-7570. These are the permits most likely to affect the project.	
WDEQ X. The Department of Environmental Quality would like to see the NEPA analysis and resulting project address any potential effects to surface water	There are no construction activities proposed within riparian areas for this project.

Comment	Response
quality that may occur as a result of existing or proposed construction practices in riparian areas.	
WDEQ XI. Also, every effort to prevent erosion of any kind should be taken. Any sediment created by the project can enter and affect the water quality of the receiving water.	Comment noted. The EA discussed the potential impacts of increased erosion in Section 4.2.3.1 and provides mitigation measures to minimize sedimentation to receiving streams in Section 4.2.3.3.

5.3 PREPARERS AND REVIEWERS OF THE EA

This EA was prepared by Buys & Associates, Inc., a third party contractor, for the BLM. The names and disciplines of the preparers are provided in Table 5-3. The BLM resource specialists who reviewed and approved the Beaver Creek CBNG Pilot Project EA are provided in Table 5-4.

Table 5-3. List of Preparers of this EA

Project Management	Buys & Associates, Inc	Dawn Martin
Water Resources, Soil, Geology	Buys & Associates, Inc	Dave Nicholson, Kristin Muirhead
Vegetation and Special Status Plants; Noxious Weeds; Range Resources	Buys & Associates, Inc	Jean Sinclear
Wildlife and Special Status Wildlife; Biological Assessment	Buys & Associates, Inc	Melissa Bridendall and Colin Mann
Cultural Resources	TEC, Inc.	Kurt Schweigert
Recreation, Visual Resources	Buys & Associates, Inc	Tanja Butler-Melone
Land Use; Socioeconomics; Transportation	Buys & Associates, Inc	Tyler Ashcroft
Special Status Plant Surveys	Buys & Associates, Inc	Nate Jones and Melissa Bridendall
Raptor Survey	Buys & Associates, Inc	Colin Mann
Air Quality	Buys & Associates, Inc	Don Douglas

Table 5-4. List of BLM Reviewers

Curtis Bryan	Project Manager	Lander BLM Field Office
Pam Olson	Assistant Field Office Manager	Lander BLM Field Office
Carol-Anne Murray	NEPA Coordinator	Lander BLM Field Office
Griff Morgan	Wildlife, T/E plants and animals	Lander BLM Field Office
Sue Oberlie	Wildlife	Lander BLM Field Office
Craig Bromley	Cultural Resources	Lander BLM Field Office
Scott Fluer	Range Resources	Lander BLM Field Office
Greg Bautz	Vegetation, Noxious Weeds, Soil	Lander BLM Field Office
Susan Caplan	Air Quality	Wyoming BLM State Office

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