BLM

EIS

Draft
Environmental Impact Statement

PIT 14

Coal Lease-by-Application

(Federal Coal Lease Application WYW160394)

March 2006

Wyoming State Office - Rock Springs Field Office

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of the present and future generations.

BLM/WY/PL-06/005+1320

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

In Reply Refer To:

1790/3425(LBA)
(922BJanssen)
WYW160394
Phone No: 307-775-6206
Fax No. 307-775-6203

Dear Reader:

This Draft Environmental Impact Statement (DEIS) for the Pit 14 Coal Lease-By-Application project is submitted for your review and comment. The DEIS has been prepared to provide a basis for the Bureau of Land Management (BLM) to decide whether to lease Federal coal to Black Butte Coal Company (BBCC) to support further surface mining operations at the Black Butte Coal Mine in Sweetwater County, Wyoming. This document has been prepared to analyze the potential impacts of mining Federal coal adjacent to the Black Butte Mine as described in a lease application submitted by BBCC.

The DEIS is available for review at the BLM offices listed below. The Draft EIS is available for review and downloading from the BLM website at: http://www.wy.blm.gov.

BLM
Wyoming State Office
5353 Yellowstone Road
Cheyenne, WY 82009

BLM
Rock Springs Field Office
280 Highway 191 North
Rock Springs, WY 82901

A formal public hearing on the application to lease the tract of Federal coal will be held at 2:00 p.m. May 10, 2006, in the Pilot Butte Conference Room, Rock Springs Field Office at the above address. The purpose of the public hearing is to receive comments on the proposed coal lease sale, and on the fair market value and maximum economic recovery of the Federal coal resource in the tract.

Two alternatives have been analyzed in detail in this DEIS. The Proposed Action Alternative proposes to accept the proponent's lease-by-application and offer the tract of coal specified for lease sale, and assumes that the successful bidder would be BBCC. If the Proposed Action Alternative is selected then BBCC would expand its operations at the Black Butte Mine. Under the No Action Alternative, the proposal as described in the coal lease application would be rejected and the Federal coal applied for would not be leased. The BLM's preferred alternative is the Proposed Action.

If you wish to submit comments on the DEIS, we request that you make them as specific as possible. Comments are more helpful if they include suggested changes, sources, or methodologies. Comments that contain only opinions or preferences will not receive a formal response from the BLM. However, they will be considered and included as part of the BLM decision-making process.

Comments will be accepted for sixty (60) days following the Environmental Protection Agency's (EPA) publication of its Notice of Availability in the Federal Register. Please send written comments to:

Pit 14 Coal LBA
Attention: Teri Deakins
Bureau of Land Management
Rock Springs Field Office
280 Highway 191 North
Rock Springs, Wyoming 82901

This DEIS was prepared pursuant to the National Environmental Policy Act (NEPA) and other regulations and statutes to address the environmental and socio-economic impacts which could result if this project is implemented. This DEIS is not a decision document. Its purpose is to inform the public and interested parties of impacts associated with implementing the proponent's coal mining proposal of leasing Federal coal to an existing mine, to evaluate alternatives to leasing the coal and to solicit comments. This DEIS also provides information to other regulatory agencies for use in their decision-making process for other permits required for implementation of the project.

A copy of this DEIS has been sent to affected federal, state and local government agencies, and to those persons who have indicated that they wish to receive a copy of the DEIS. Copies of the DEIS are available for public inspection at the BLM offices listed above.

If you have any questions or need additional information regarding the proposal, please contact Joanna Nara-Kloepper at (307) 352-0321. Please direct questions regarding the NEPA process used to prepare the DEIS to Teri Deakins at (307) 352-0211. Ms Nara-Kloepper and Ms. Deakins may also be contacted by visiting the Rock Springs Field Office at the address shown above.

Sincerely,

Robert A. Bennett
State Director

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

FOR THE PIT 14 COAL LEASE-BY-APPLICATION

SWEETWATER COUNTY, WYOMING

As Applied for by Black Butte Coal Company
(Federal Coal Lease Application WYW160394)

Bureau of Land Management

Rock Springs Field Office

Rock Springs, Wyoming

In Cooperation with

Office of Surface Mining Reclamation and Enforcement

Wyoming Department of Environmental Quality - Land Quality Division

Wyoming State Planning Office

March 2006

EXECUTIVE SUMMARY

On March 24, 2004, Black Butte Coal Company (BBCC), a joint venture between Kiewit Coal Properties, Inc., a wholly-owned subsidiary of Level 3 Communications of Louisville, Colorado, and Bitter Creek Coal Company, a wholly-owned subsidiary of Anadarko Petroleum Corp. of Houston, Texas, filed a Lease-by-Application (LBA) with the Rock Springs Field Office of the Bureau of Land Management (BLM), which would allow them to access federal coal reserves located adjacent to the existing Black Butte Mine in Sweetwater County, Wyoming. The existing mine and LBA tract are located approximately 28 miles southeast of Rock Springs (see **Figures ES-1** and **ES-2**). The application was made pursuant to provisions of the Leasing on Application Regulations found in 43 Code of Federal Regulations (CFR) 3425.1. The tract applied for, known as the Pit 14 amendment area under BLM case number WYW-160394, is hereafter referred to as the LBA tract.

This lease application has been received and reviewed by the BLM, Wyoming State Office, Division of Minerals and Lands, and the application and lands involved were determined to meet all requirements of the regulations governing coal leasing on application Title 43 of the Code of Federal Regulations Part 3425.1 (43 CFR 3425.1).

In order to process an LBA, the BLM must evaluate the quantity, quality, maximum economic recovery, and fair market value of the federal coal involved, and fulfill the requirements of the National Environmental Policy Act (NEPA) by evaluating and disclosing the potential environmental consequences of leasing the federal coal.

To evaluate the environmental impacts of leasing the coal, the BLM must prepare an environmental assessment (EA) or environmental impact statement (EIS) in which it must identify the site-specific and cumulative environmental and socioeconomic impacts of leasing, mining, and developing the federal coal in the application area. The BLM made the decision to prepare an EIS for this lease application.

To allow for an early and open process for determining the scope and significance of issues related to the proposed project (40 CFR 1510.7), a public scoping period was provided by BLM. A Notice of Intent to prepare an EIS was published in the Federal Register on January 4, 2005 (Federal Register 70 v5:1464-1465; WY-920-1320-EL; WYW160394). Publication of this notice in the Federal Register initiated a 30-day scoping period that provided for acceptance of comments through February 4, 2005, and BLM held a public meeting on January 26, 2005. Concurrent with these actions, BLM issued a news release regarding proposed project scoping to local media organizations. Scoping comments were received from 11 individuals and organizations during the scoping period.

Following a 60-day review and comment period, the BLM will use the analysis in the Final EIS to decide whether or not to hold a public, competitive sealed-bid coal lease sale for the federal coal tract, and issue a federal coal lease. The LBA sale process is, by law and regulation, an open, public, competitive, sealed-bid process. Bidding at a potential sale would be open to any qualified bidder; it would not be limited to the applicant. A federal coal lease would be issued to the highest bidder at a lease sale if a federal sale panel determines that the high bid at that sale meets or exceeds the fair market value of the coal (as determined by BLM's economic evaluation), and if the U.S. Department of Justice determines that there are no antitrust violations if a lease is issued to the high bidder. The EIS analysis assumes that BBCC will be the successful applicant for this lease; however, should another entity successfully bid, BLM would be required to analyze any new development proposals as mandated by NEPA.

Cooperating agencies, including the Office of Surface Mining Reclamation and Enforcement (OSM), Wyoming Department of Environmental Quality Land Quality Division (WDEQ/LQD), and Wyoming State Planning Office, will use this analysis to make decisions related to leasing and mining the federal coal within this tract.

Figure ES-1 The Black Butte Mine and Project Area

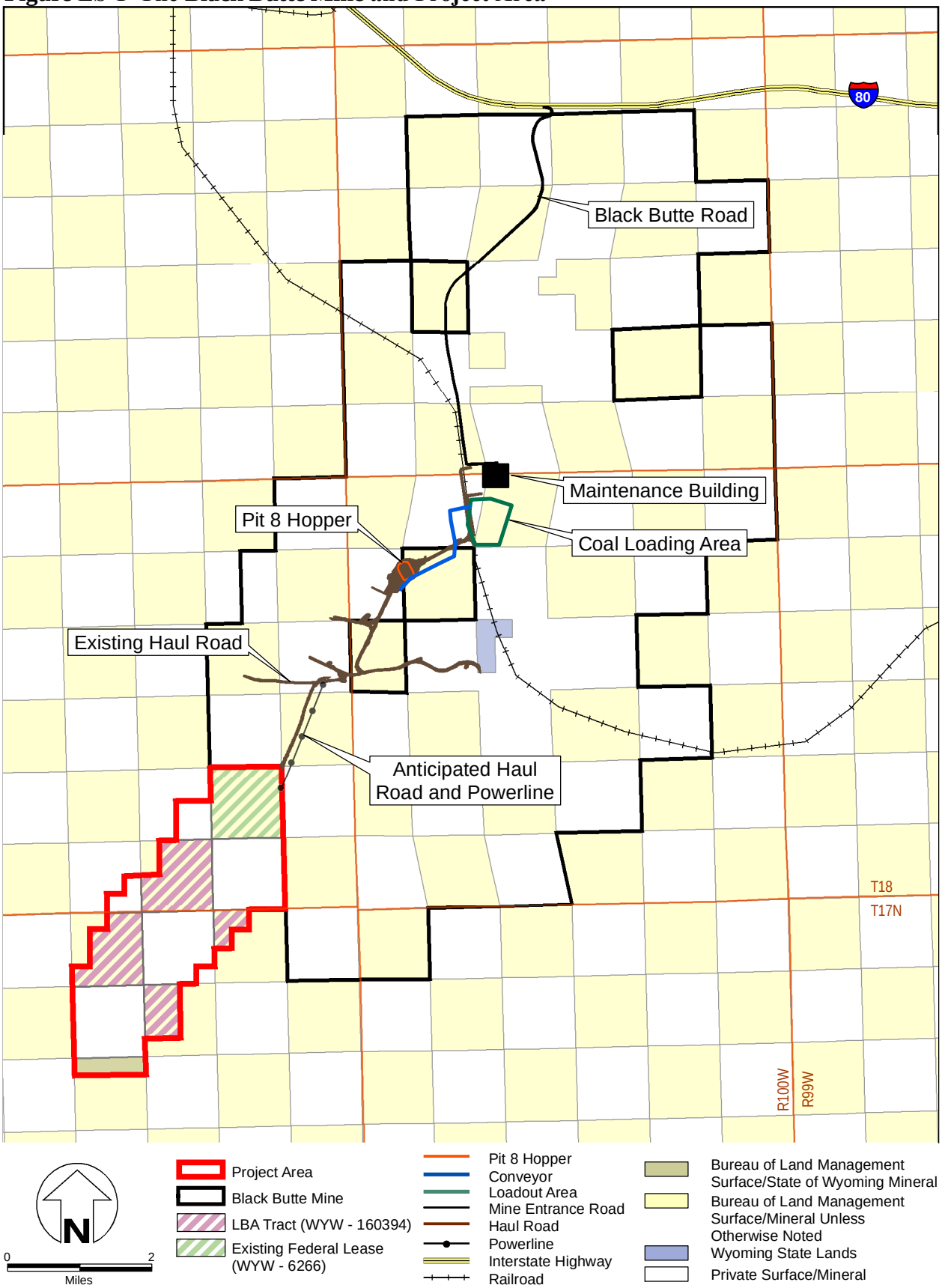
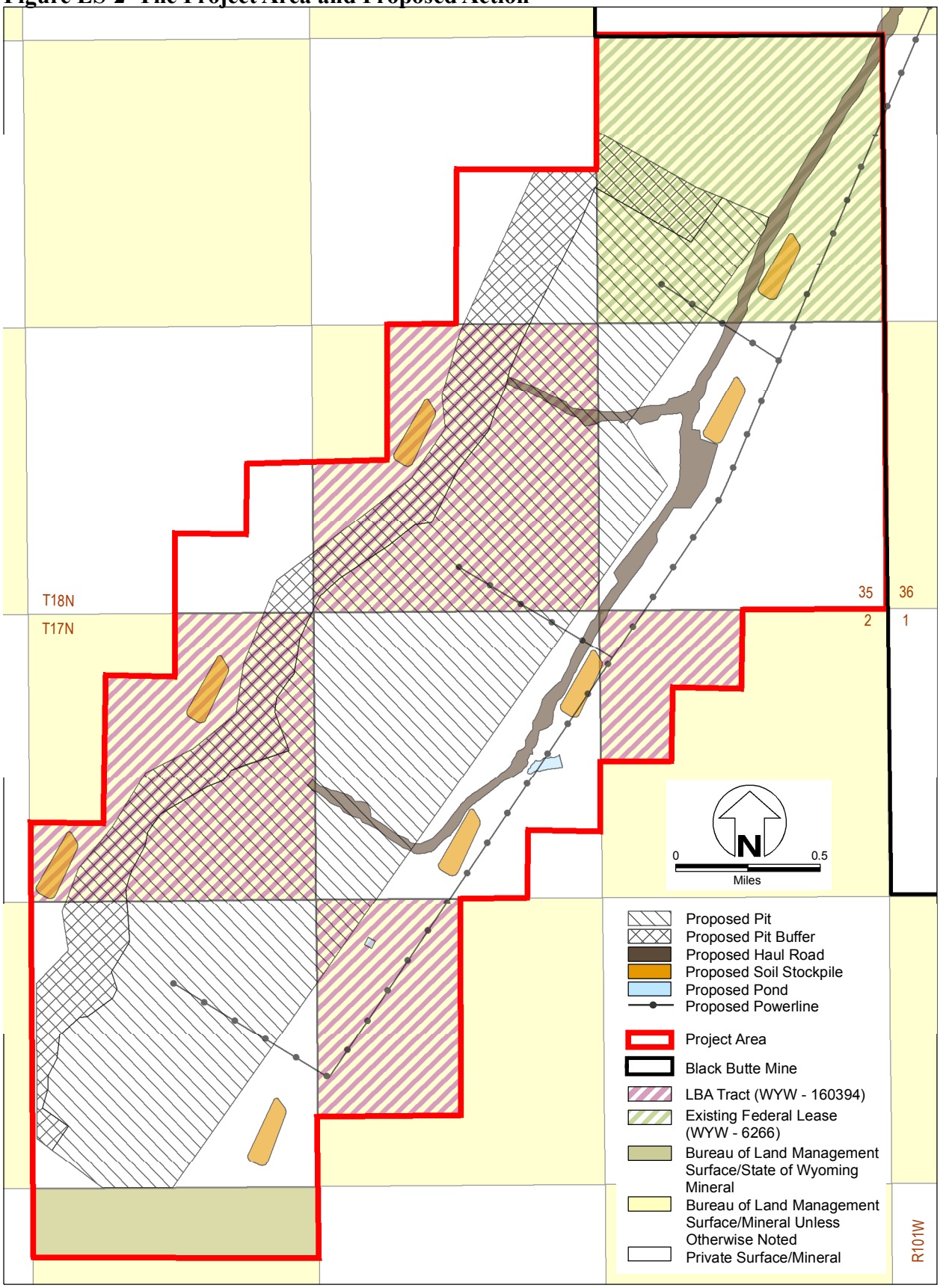


Figure ES-2 The Project Area and Proposed Action



The Proposed Action and No Action Alternative are analyzed in detail in this Draft EIS. Other alternatives were considered but eliminated from detailed analysis. These alternatives are summarized below. **Table ES-1** follows the summarized alternatives, and provides a comparison of coal production, surface disturbance, and mine life for the Proposed Action and No Action Alternative.

Proposed Action (BLM's Preferred Alternative)

The Proposed Action is to hold a competitive lease sale for 1,399 acres of unleased federal coal and issue a lease to extract these federal coal reserves from the LBA tract. Implementation of the Proposed Action would likely result in extraction of previously leased federal coal reserves (WYW-6266), and private coal reserves within the approximately 4,359-acre project area in Sweetwater County, Wyoming (see **Figure ES-2**). Under the Proposed Action, BBCC's current estimates are that the average annual coal production would be 1.5 to three million tons, the life of operations within the LBA tract would be approximately 20 years, and employment would be approximately 171 persons. It is estimated that 34.6 million tons of in-place coal reserves are present within the project area.

No Action Alternative

The proposed action as submitted by BBCC in the Pit 14 Coal LBA would be rejected. Current mining operations may continue as previously approved, BBCC could be required to re-evaluate future mining operations based upon known reserves within the leases currently held.

Alternatives Considered But Eliminated from Detailed Analysis

The BLM reviewed three potential alternatives during the course of alternative development. Based on technical, economic, and/or environmental factors, none of these alternatives were determined to be a reasonable alternative to the Proposed Action. None of these alternatives were carried forward for detailed analysis in this EIS. The rationale for eliminating each alternative from further analysis is discussed below.

1. Accessing Federal Coal Reserves by Underground Mining Methods

An alternative suggested during public scoping identified mining of coal reserves in the project area by use of underground recovery methods. BLM reviewed the technical feasibility aspects and determined that regional geology and anticipated surface cover within the project area would not facilitate this mining method. The coal seams of the Almond Formation underlying the project area are very different from those of the Fort Union Formation currently being mined via underground techniques by the Bridger Coal Company north of the project area. Although some of these seams may be minable using underground methods, there are three primary considerations that preclude underground mining for the proposed lease, and include the following: 1) the main coal seams are highly variable in thickness and tend to split into a number of thin, discontinuous seams that would make underground mining more difficult; 2) in typical underground mining operations with splitting seams, operators must wash the coal (BBCC does not currently have a coal washing operation, nor have they proposed one); and 3) the grade of the seams progresses downward to the east from a western outcrop/subcrop at about a 10 percent slope, and most longwall mining systems used in underground mining require a slope no greater than three to six percent.

2. Non-BBCC Coal Lease

This alternative assumes that the BLM would award the lease to a bidder other than the current applicant. Because there are no adjacent mines that could incorporate the coal reserves into an existing operation, a successful bidder other than BBCC would have to establish a new stand-alone mine and associated facilities and infrastructure. A new stand-alone mine would require considerable initial capital expenses, and would compete for customers with established mining operations, not only in the immediate area (i.e., Bridger Mine, Leucite Hills Mine, and Black Butte Mine), but also in the region

(e.g., P&M Kemmerer Mine). No other companies have expressed an interest to the BLM in coal exploration or development activity in the LBA tract. Furthermore, the size of the LBA tract and the small amount of estimated federal coal reserves within would not be sufficient to make a new, stand-alone mine economically practical. For these reasons, it is unlikely that the LBA tract would attract additional bidders interested in starting a new mine.

3. Postpone Competitive Lease Sales

Under this alternative, the sale of the federal coal reserves within the LBA tract would be postponed more than five years. Postponement would be based on the assumption that coal prices would rise in the future, thus increasing the fair market value of the area resulting in a higher bonus bid when the coal is sold. Unless coal prices are both increased and sustained, it is in the government's best financial interest to lease the coal tract today rather than waiting an unspecified period of time in hopes that the price of coal would increase in the future.

Table ES-1 Comparison of Coal Production, Surface Disturbance, and Mine Life

Item	No Action Alternative (Existing Black Butte Mine)	Added By The Proposed Action
Coal Reserves[1] (as of 1/1/06)	8.9 million tons	34.6 million tons
Federal Lease Acres[2]	14, 902 acres	1,399 acres
Total area to be disturbed[3]	14,920 acres	2,250 acres
Permit Area[4]	38,053 acres	4,359 acres
Average annual post 2005 coal production	2.2 million tons	0[5]
Remaining life of mine (as of 1/1/06)	4 years	20 years
Average number of employees	171	0[6]
Total projected federal, state, and local revenues from existing coal reserves (as of 1/1/05)	$30 million to $76 million	$160 million to $300 million

[1] No Action Alternative coal quantities shown are the estimated remaining production quantity. Proposed Action coal quantity represents in-place minable coal.
[2] Under the Proposed Action, acreage includes the LBA tract only. Under the No Action Alternative acreage does not include state and private coal within the permit area.
[3] Includes areas reclaimed at the existing Black Butte Mine and anticipated disturbance over life of mine
[4] The permit area encompasses all federal, state, and private lands to be mined or otherwise containing ancillary facilities used to support mining activities.
[5] The amount of production would remain unchanged from current mining.
[6] No additional employment is expected by Proposed Action.

The proposed project could potentially affect critical elements of the human environment as listed in the BLM's NEPA Handbook H-1790-1 (USDI-BLM 1988) and subsequent Executive Orders. These critical elements are listed in **Table ES-2**, along with other resource elements discussed in this EIS. For each resource element, an assessment area has been identified in order to analyze potential, project-related impacts on the resource. The assessment area, or impact assessment area, is defined as the outermost boundary of an area that encompasses potential direct, indirect, and cumulative impacts that may affect the resources identified for analysis.

Table ES-2 Critical and Resource Elements Discussed in the Pit 14 Coal LBA DEIS

Element	Status In The Project Area
Critical Elements[1]	
Air Quality Issues	Potentially affected
Cultural Resources	Potentially affected
Environmental Justice	Potentially affected
Invasive/Non-Native Species	Potentially affected
Native American Religious Concerns	Potentially affected
Threatened or Endangered Species	Potentially affected
Water Quality Drinking/Ground	Potentially affected
Wetlands/Riparian Zones	None present
Wilderness (study area)	None present
Other Resource Elements	
Geology and Minerals	Potentially affected
Soils	Potentially affected
Surface Water Resources	Potentially affected
Vegetation	Potentially affected
Wildlife and Fisheries	Potentially affected
Wild Horses	Potentially affected
Land Use	Potentially affected
Visual Resources	Potentially affected
Social and Economic Values	Potentially affected

[1] BLM National Environmental Policy Act Handbook H-1790-1 (BLM 1988b) and subsequent Executive Orders.

Access to the project area is via Interstate 80 and the Black Butte Mine access road (see **Figure ES-1**). The project area encompasses 4,359 acres, of which 1,399 acres are federal surface and mineral estate (the LBA tract, WYW-160394), 640 acres are previously leased federal surface and mineral estate (WYW-6266), 160 acres are state mineral and federal surface estate, and 2,159 acres are private surface and mineral estate.

The project area is located on the eastern limb of the Rock Springs Anticline. The anticline structure has an axis that trends north-south. The anticline is asymmetrical with the eastern limb dipping less steeply than the western (Love and Christiansen 1985). The target coal-bearing geologic formation at the project area is the Cretaceous-aged Almond Formation. Relatively thin deposits of Quaternary alluvium, colluvium, and aeolian sediments overlie the Almond Formation where outcrops are not present. The Almond Formation is also overlain by the Cretaceous-aged Lewis Shale, Fox Hills Sandstone, and the Lance Formation to the east of the project area (Roehler 1979). Tertiary-aged formations overlie these formations further to the east.

Outcrops of the Almond Formation have a bedding dip between three and 10 degrees to the east-southeast in the project area. The Almond Formation thickness averages 325 feet consisting of three distinct units, based on differing lithology. The lower unit is a dark gray shale interbedded with a similarly-colored fine, grained sandstone approximately 100 feet thick. The middle unit is made of 75 feet of dark gray shale and interbedded gray siltstone, gray, fine-grained sandstone, gray and brown carbonaceous shale, and coal. The upper unit is 150 feet of dark-gray shale, light-gray sandstone, and siltstone (BBCC 2004a).

The topography of the project area reflects the interbedded lithologies and is composed of ridges of resistant sandstone separated by swales of less resistant shale and coal. A large, high-angle reverse fault, the Brady Fault, is present five miles east of the project area. With the exception of the Rock Springs Anticline, no substantial structural features are present within the project area.

If the action as proposed was implemented, coal mining operations would increase emissions of air pollutants which may increase concentrations of particulate matter, as well as CO, NO_2, and SO_2. Indirect impacts include emissions from coal combustion (electrical power production).

Geology and minerals would be affected by mining. The topography following reclamation would be gentler and more uniform. Coal, overburden and interburden would be removed; overburden and interburden would be replaced. Replaced interburden and overburden would contain similar lithologies, but dissimilar physical characteristics from pre-mining material. Unsuitable overburden and interburden material would be placed in areas where it would not affect groundwater quality or revegetation success. No loss of the coal bed natural gas is anticipated. Conventional oil, gas, and coal bed natural gas resources could not be developed in active mining areas.

Following reclamation activities, changes in physical soil properties would include increased near-surface bulk density and more uniformity in soil type, thickness, and texture. Changes in chemical soil properties would include more uniform soil nutrient distribution. Changes in biological properties would include a reduction in organic matter and microorganism populations. The existing plant habitat in stockpiled soils would be reduced. The WDEQ permit requirements would reduce the potential for increased erosion and sedimentation.

Runoff events would carry additional sediment loads from disturbed sites, thereby affecting water quality. Potential increases in runoff, wind and water erosion, and sedimentation within the project area are due to disturbances to vegetation and soil resources. In some cases where pre-mining stream channel function is poor, reclamation may improve the erosion and sedimentation characteristics. Surface water depletion from the Colorado River system would occur due to evaporative losses from retention ponds. Groundwater potentiometric surface drawdown would propagate from the area of coal removal. Groundwater in the backfilled aquifer, following mining activities, is predicted to exhibit an increase in total dissolved solids concentrations as backfilled materials are saturated. Over time the groundwater quality of the water in the backfill aquifer would return to near pre-mine conditions. It is expected that the water quality of the backfill aquifer would have the same use classification (Class III, livestock) as the groundwater in the area prior to mining.

During mining, progressive removal of native vegetation would result in increased erosion, loss of wildlife and livestock habitat, and loss of wildlife habitat carrying capacity. After reclamation, vegetation patterns would be changed, vegetation diversity would be decreased, shrub density could be reduced and wildlife carrying capacity would potentially be reduced. During mining, wildlife would be displaced, and habitat would be lost in active mining areas. Wildlife movement through the project area would be restricted and shifts in habitat utilization would occur during the life-of-operations. Nesting and foraging habitat for all species would be lost. Suitable habitat for sagebrush-obligate species would be disturbed. Mine related traffic could increase wildlife mortality (where animals are not currently conditioned to remain off utilized roadways). After reclamation, big game habitat carrying capacity on reclaimed lands would be restored, but habitat diversity may decrease. Wildlife use may diminish available forage on reclaimed area and hinder reclamation success.

Direct impacts on breeding raptors could include temporary or permanent displacement, nest abandonment from construction or operations noise and activity; loss of brood (i.e., egg or young); destruction or alteration of nesting or roosting habitat; and/or destruction or alteration of foraging habitat or resources. However, because raptor protection and mitigation measures are built into the Proposed Action, it is unlikely that breeding raptors would incur impacts from implementation of the Proposed Action. Indirect impacts on raptors could include a decrease in available prey, such as small mammals that rely upon sagebrush habitats, and subsequent displacement, nest abandonment, or otherwise failed breeding attempts.

Impacts on BLM-sensitive species could include direct loss of habitat, temporary or permanent displacement, and restriction of movement (caused by mine pit, haul roads, etc). However, to the extent

that suitable, unoccupied habitat is available adjacent to the project area, populations would remain relatively unaffected. If suitable, occupied habitat is available nearby, individuals would likely still be able to utilize the cover and forage resources therein, but could suffer from the effects of competition if the areas became congested by overuse from displaced species. Loss of forage would displace wild horses to nearby suitable habitat. Because necessary resources for wild horses exist throughout the entire HMA, the loss of these acres would not likely impact wild horse populations.

Land use would change in that public access would be eliminated during the life-of-operations (active mining) to ensure public safety, and restricted during post-mine reclamation to assist the establishment of suitable vegetation.

There are no environmental justice populations directly affected by the proposed project.

Livestock grazing use in active mining areas would be restricted during the life of the mine and until adequate reclamation is achieved.

Oil and gas production and transportation facilities would be restricted from development within active mine areas. Hunting and other recreational activity access would be restricted during mining.

Transportation in and around the project area would be altered in that there would be a loss of usable two-track routes within project area boundaries. Railroads would be used to ship coal; employees would travel to and from work on existing roads.

Alterations to line, form, character, and texture would occur, thereby changing the visual resources of the project and surrounding area. Mining in the project area would not be visible from any major travel routes. Portions of the Black Butte Mine area and ancillary facilities proposed for use by this project would be highly visible from Interstate 80 and routes within the project area. As the land is reclaimed, the surface disturbance from mining would be recontoured with re-creations of existing landforms occurring where practical. Revegetation of land surfaces would buffer visual impact. However, until vegetation has matured, the lack of sagebrush would differentiate disturbed areas apart from undisturbed areas. When revegetation maturation is complete it would be difficult to distinguish disturbed areas from undisturbed areas.

Historic and prehistoric sites and isolated artifacts would be disturbed. All sites that meet the eligibility requirements for the NRHP, through the Section 106 (of the National Historic Preservation Act) process that was completed in May of 2005, would be avoided or mitigated through data recovery. Potential for vandalism and unauthorized collection would increase.

Federal, state and local governments would receive revenues from royalties and taxes. Sweetwater County would benefit from economic development, stable employment, and taxes.

Under the No Action Alternative, the coal lease application would be rejected; the area contained in the application would not be offered for sale at this time. The tract could be nominated for lease again in the future. The impacts described in the preceding paragraphs on air quality, geology and minerals, soils, water resources, vegetation (including invasive species), wildlife and fisheries (including special status species), wild horses, land use, grazing, recreation, transportation, visual resources, cultural resources (including Native American concerns), and socioeconomics would occur on the existing BBCC leases. These impacts would not be extended onto the LBA tract.

If impacts are identified during the leasing process that are not mitigated by existing required mitigation measures, the BLM can include additional mitigation measures (in the form of stipulations on the new lease) within the limits of its regulatory authority.

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. **Table ES-3**

identifies projects with similar surface disturbing impacts on that of the Proposed Action that may be included in a resource's cumulative impact assessment area.

Table ES-3 Reasonably Foreseeable Future Actions

Project Name	Type Of Disturbance	Acres Disturbed
Monell Enhanced Oil Recovery Project	126 wells	630 Acres
Creston/Blue Gap II Natural Gas Development Project[1]	1,000 well pads containing 1,250 wells	5,000 Acres
Oil Shale Research, Development, and Demonstration Program Lease (Anadarko Petroleum Corporation)[2]	160 Acres for research, development, and demonstration, 4889 Acres for Preference Right Lease	5,049 Acres within proposed leases
Hiawatha Regional Energy Project[3]	4,100 wells (2,600 wells in RSFO)	13,200 acres (does not account for the existing infrastructure)
Black Butte Mine[4]	Mine pits and roads	4,363 Acres
Bridger Coal Mine[4]	Mine pits and roads	48 Acres

[1] Project is within Rawlins Field Office but portions of the project boundary overlap certain resource values.
[2] BLM officials determined the application was incomplete, and will not be given further consideration. This finding became known after preparation of this document. Although the disturbance associated with the action has been factored into disturbance calculations it is no longer considered a reasonable foreseeable action.
[3] Proposal extends into Colorado; approximately 2/3 of the wells proposed would affect IAAs in the RSFO.
[4] Approved under the existing mine permit but not yet constructed or developed.

Each resource analyzed has its own unique cumulative impact assessment area, with the exception of a few resources that share a common assessment area. Accordingly, cumulative surface disturbance acreages vary by resource.

Far field visibility and atmospheric deposition would cause impacts on the air quality of the Bridger Wilderness Area, and terrestrial ecosystems.

Cumulative impact on geology and minerals would include the removal of coal from the area, and no future use of that coal. Conventional oil and gas development and coal bed natural gas would be postponed.

Changes to physical, chemical, and biological soil properties in the disturbed areas would accumulate, and potential would exist for increased erosion and sedimentation in the assessment area prior to reclamation.

Storm water and snowmelt events that would occur within the project area, in combination with other disturbances in the assessment area with surface water retention systems, would result in decreased contributions to stream flow. Drawdown of the potentiometric water surface in water bearing units would also occur.

Progressive removal of native vegetation would result in increased erosion, loss of wildlife and livestock habitat, and loss of wildlife habitat carrying capacity. After reclamation, vegetation patterns would be changed, vegetation diversity would be decreased, shrub density could be reduced, and wildlife carrying capacity would potentially be reduced.

Wildlife would be displaced from, and habitat would be lost in, surface disturbed areas. Wildlife movement could be restricted. Impacts on special status species could include permanent displacement, and restriction of movement. This might include loss of habitat and potential for establishment.

Loss of forage would displace wild horses to nearby suitable habitat.

Other land uses in disturbed areas would be precluded for the mine life and restricted during final reclamation. Grazing, oil and gas production, and transportation facilities would be prohibited and restricted from active mine areas. Hunting and other recreational activity access would be restricted for the mine life.

Alterations to line, form, character, and texture would affect visual resources. Revegetation of land surfaces would buffer visual impacts. However, until vegetation has matured, the lack of sagebrush would differentiate disturbed areas apart from undisturbed areas.

Loss of information about cultural heritage within the analysis area could occur if these sites are not identified and inventoried prior to disturbance. Any loss or damage to unidentified cultural or historical sites or resources associated with the assessment area could be substantial.

The tax base to the county, state, and federal governments would increase. Employment opportunities and the population of Sweetwater County would increase. Property values, the need for more schools, medical facilities, and other community services would also increase.

This Draft EIS presents the BLM's analysis of environmental impacts under the authority of NEPA and associated rules and guidelines. The BLM will use this analysis to make a leasing sale decision. The decision to lease these lands is a necessary requisite for mining, but is not in and of itself the enabling action that will allow mining. Additional analysis prior to mine development would occur after the lease is issued, when the lessee files an application for a surface mining permit and mining plan approval, supported by extensive proposed mining and reclamation plans, to the WDEQ/LQD.

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APPENDICES

Appendix A Coal LBA Flow Chart

Appendix B Permitting Requirements

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Appendix E Assessment Area Emissions Inventory

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Appendix G Soil Survey Report

Appendix H Correspondence with the Wyoming Natural Diversity Database

Appendix I Cumulative Personal Earnings by Industry for 2000

Appendix J Federal and State Mitigation and Monitoring Requirements Inherent to the Proposed Action

Appendix K Near-Field Monitoring Protocol and Results

ACRONYMS

AAM	Annual Arithmetic Mean
ANC	Acid Neutralizing Capacity
AP	Airport
APDs	Application for Permit to Drill
AQD	Air Quality Division
ASCM	Alternative Sediment Control Measures
AUMs	Animal Unit Months
b.p.	Years Before Present
BACT	Best Available Control Technology
BBCC	Black Butte Coal Company
BBL	Barrels of Oil
bgs	Below Ground Surface
BLM	Bureau of Land Management
btu	British Thermal Unit
CAA	Clean Air Act
CAAA	Clean Air Act Amendment of 1990
CASTNet	Clean Air Status and Trends Network
CBNG	Coal Bed Natural Gas
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CIAA	Cumulative Impact Assessment Area
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DAT	Deposition Analysis Thresholds
DEIS	Draft Environmental Impact Statement
dv	Deciview
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy Management Act
GIS	Geographic Information System
H_2SO_4	Sulphuric Acid
HAP	Hazardous Air Pollutant
HMA	Herd Management Area
HNO_3	Nitric Acid
IAA	Impact Assessment Area
IAQT	Interagency Air Quality Team
IDT	Interdisciplinary Team
IMPROVE	Inter-Agency Monitoring of Protected Visual Environments
ISCLT3	Industrial Source Complex Model-Long-Term version three
kg/ha-year	Kilograms Per Hectare – Year
kV	Kilovolt
LAC	Levels of Acceptable Change
lb	Pounds

LBA	Lease-by-Application
LQD	Land Quality Division
MCF	Thousand Cubic Feet
MFI	Median Family Income
mg/l	Milligrams per Liter
MLA	Mineral Leasing Act
N	North
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NH_4	Ammonium
NO_2	Nitrogen Dioxide
NO_3	Nitrate
NOI	Notice of Intent
NO_x	Nitrogen Oxides
NRHP	National Register of Historic Places
NSPS	National Source Performance Standards
NSR	New Source Review
O3	Ozone
OHV	Off-Highway Vehicle
OSM	Office of Surface Mining Reclamation and Enforcement
PM_{10}	Fine Particulates with an Aerodynamic Diameter of 10 Micrometers or Less
$PM_{2.5}$	Fine Particulates with an Aerodynamic Diameter of 2.5 Micrometers or Less
ppb	Parts per Billion
ppm	Parts per Million
PSD	Prevention of Significant Deterioration
R	Range
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Rights-of-Way
RSFO	Rock Springs Field Office
SAR	Sodium Adsorption Ratio
SCEMA	Sweetwater County Emergency Management Agency
SEO	State Engineer's Office
SLAMS	State and Local Air Monitoring System
SMCRA	Surface Mining Control and Reclamation Act
SO_2	Sulfur Dioxide
SO_4	Sulfate
SO_x	Sulfur Compounds
SPMs	Special Purpose Monitors
SWEDA	Sweetwater Economic Development Association
T	Township
TDS	Total Dissolved Solids
TEOM	Tapered Element Oscillating Microbalance
TPY	Tons Per Year
TSS	Total Suspended Solids
UGMA	Upland Gamebird Management Areas

USDI	United States Department of the Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VRM	Visual Resource Management
W	West
WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WARMS	Wyoming Air Resources Monitoring System
WAS	Western Archaeological Services
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WNDD	Wyoming Natural Diversity Database
WQD	Water Quality Division
µeq/L	Micro-equivalents per Liter
$\mu g/m^3$	Micrograms per Cubic Meter

CHAPTER 1.0 - PURPOSE AND NEED

1.1 INTRODUCTION

On March 24, 2004, Black Butte Coal Company (BBCC), a joint venture between Kiewit Coal Properties, Inc., a wholly-owned subsidiary of Level 3 Communications of Louisville, Colorado, and Bitter Creek Coal Company, a wholly-owned subsidiary of Anadarko Petroleum Corp. of Houston, Texas, filed a Lease-by-Application (LBA) with the Bureau of Land Management (BLM), which would allow them to access federal coal reserves located adjacent to the existing Black Butte Mine in Sweetwater County, Wyoming. The existing mine and LBA tract are located approximately 28 miles southeast of Rock Springs (**Figure 1.1** and **Figure 1.2**). The application was made pursuant to provisions of the Leasing on Application Regulations found in 43 Code of Federal Regulations (CFR) 3425. The tract applied for, known as the Pit 14 amendment area under BLM case number WYW-160394, is hereafter referred to as the LBA tract. The Proposed Action is to lease and extract the coal reserves within the LBA tract.

The Rock Springs Field Office (RSFO) of the Wyoming BLM analyzed the environmental impacts of issuing a lease in accordance with the National Environmental Policy Act (NEPA). Based on the potential amount of in-place coal associated with the lease tract and adjacent mine operations, the BLM has determined that and Environmental Impact Statement (EIS) would be prepared. The issuance of a lease for the BLM-administered lands in this application (the LBA tract) is a prerequisite for mining, but is not the enabling action that would allow mining to commence. After a lease has been issued by the BLM, but prior to mine development, the lessee must file a permit application package with the Land Quality Division (LQD) of the Wyoming Department of Environmental Quality (WDEQ) and Office of Surface Mining Reclamation and Enforcement (OSM) for a surface mining permit and approval of a mining plan. Analyses of the site-specific permit application and mining plan occurs at that time. Authorities and responsibilities of the BLM and other concerned regulatory agencies are described in Section 1.2 and Section 1.3. **Appendix A** presents a flow chart of the coal LBA process.

The project includes the leasing of federal coal reserves in the LBA tract and reasonably foreseeable mining related actions in a larger project area (**Figure 1.2**). The project area is located adjacent to Black Butte Mine's existing surface coal mine permit area. The project area contains private mineral estates proposed for mining and previously leased federal mineral estate (WYW-6266). The LBA tract is the currently unleased federal mineral estate lands within the project area. According to the application, extraction of coal from the LBA tract by BBCC is required to meet production commitments. Existing mine operations would support the mining of coal in the project area through the use of processing, maintenance, and other ancillary facilities located in the Black Butte Mine permit area.

The proposed project includes mixed surface ownership or "checkerboard", with every other section in private ownership and the others federally-owned (**Figure 1.2**). As proposed by BBCC, the proposed project area includes the 1,399-acre LBA tract (federal surface and minerals), 640 acres of previously leased federally owned surface and minerals, 160 acres of split estate (federal surface, State of Wyoming-owned minerals), and 2,159 acres of privately owned land (Anadarko-owned surface and mineral estate). The project area is 4,359 acres.

The BLM administers the federal coal leasing program under the Mineral Leasing Act (MLA). A federal coal lease grants the lessee the exclusive right to obtain a permit to mine coal on the leased tract subject to:

- Terms of the lease,
- The WDEQ Permit to Mine Coal,
- The federal MLA mining plan approval, and
- Applicable state and federal laws.

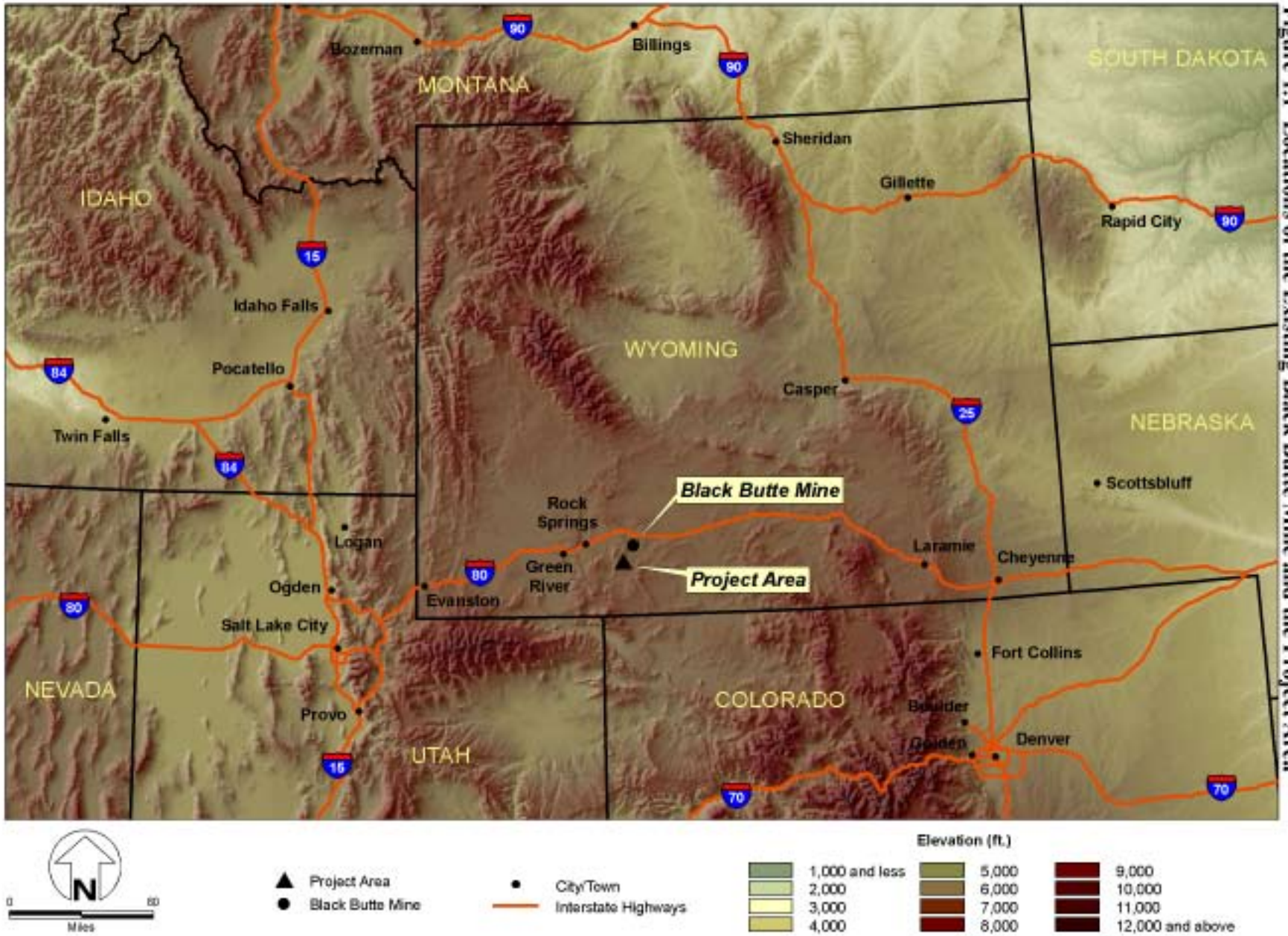
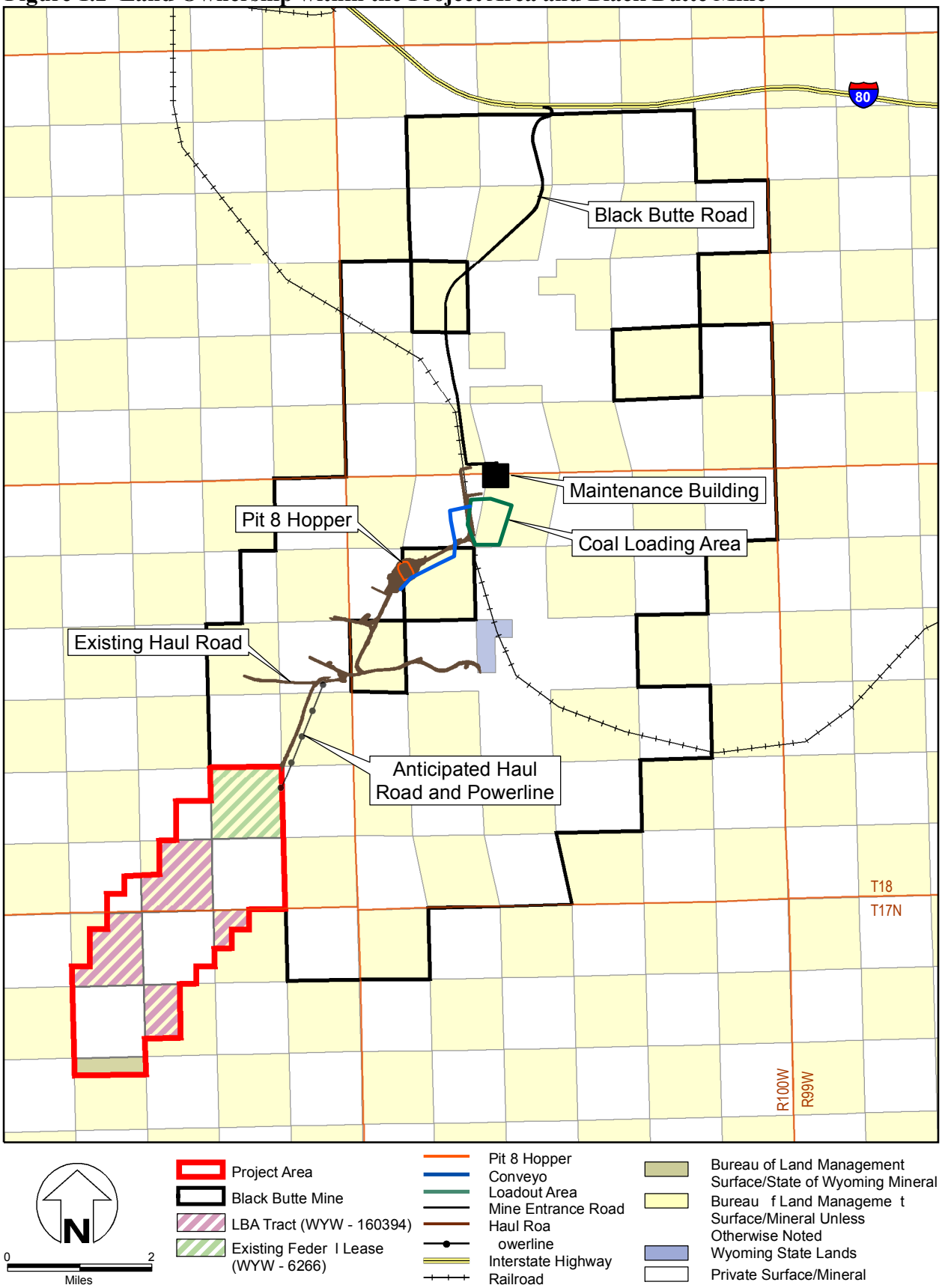


Figure 1.1 Locations of the Existing Black Butte Mine and the Project Area

Figure 1.2 Land Ownership within the Project Area and Black Butte Mine



The BLM's mineral leasing program encourages the development of domestic oil, gas, and coal reserves, and reduction of the U.S. dependence upon foreign energy sources. As a result of leasing and the subsequent mining and sale of federal coal resources, the public receives lease bonus payments, lease royalty payments, rental payments, and a supply of low cost coal for power generation.

If BBCC acquires a federal coal lease, the coal resources within the project area would be accessed as a maintenance tract to extend mine life at the existing Black Butte Mine by an estimated 20 years. The proposed mining method for Pit 14 operations would be dragline with trackhoe and dozer assisted strip mining. Extracted coal would be used for electric power generation. After mining, disturbed land would be reclaimed for livestock grazing, recreation, and wildlife habitat pursuant to WDEQ regulations.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The existing Black Butte Mine started operations in the late 1970s. Overburden removal operations began in early 1979 in preparation for shipments to Black Butte Mine customers (BBCC 2004a). Coal shipments have continued from Black Butte Mine at various levels, and the mine continues to operate today. In 1988, Black Butte Mine acquired an interest in the Leucite Hills Mine, located approximately four miles to the north of the existing Black Butte Mine. Coal production at these existing BBCC facilities has been slowing because existing privately and federally leased coal reserves are too deep to be economically recovered by conventional surface mining methods (e.g., draglines). As a result, additional minable coal reserves are needed to meet production requirements of the company's customers (including the Jim Bridger Power Plant) to meet the growing regional demand for electricity.

BBCC plans to supplement the decreasing supply of surface-mined coal with the addition of adjacent mining operations. The development of surface mining operations next to the existing surface mine would allow BBCC to use many of the existing support systems at the Black Butte Mine (e.g., roads, overland conveyor, administrative and maintenance facilities), thereby minimizing costs and disturbances to the environment. The purpose of BBCC's proposal would be to extract federally and privately owned coal reserves to meet current production requirements of the existing Black Butte Mine.

The primary purpose of the Energy Policy Act of 1992, as amended, is to add energy supplies from diverse sources, including domestic oil, gas, coal, hydropower, and nuclear power. BLM recognizes that the continued extraction of coal is essential to meet the nation's current and future energy needs. As a result, private development of federal coal reserves is integral to the BLM coal leasing program. This Proposed Action meets aspects of the energy Policy Act of 2005 that encourage and facilitate meeting national demands for electricity from a domestic source of energy.

1.3 REGULATORY AUTHORITY AND RESPONSIBILITY

The BBCC lease application was submitted and will be processed and evaluated under the federal authorities including:

- Federal Coal Leasing Amendments Act
- Federal Land Policy and Management Act (FLPMA)
- Mineral Leasing Act, as amended (MLA)
- Multiple-Use Sustained Yield Act of 1960
- National Environmental Policy Act (NEPA)
- Surface Mining Control and Reclamation Act (SMCRA)

The BLM is the lead agency responsible for leasing federal coal lands under the MLA, as amended by Federal Coal Leasing Amendments Act, and is responsible for preparation of this EIS under NEPA. The OSM is a cooperating agency. Following issuance of a coal lease by the BLM, BBCC would be

responsible for revising their existing permit through the development of a permit application and mining plan for the entire project area including the LBA tract. SMCRA gives OSM the responsibility of administering programs that regulate surface coal mining operations. In November of 1980, a program was approved (Section 503 of SMCRA) in which WDEQ was given permanent authority to regulate surface coal mining operations on non-federal lands within the state. In January 1987, WDEQ entered into a cooperative agreement with the U.S. Secretary of the Interior (Section 523(c) of SMCRA) that authorizes WDEQ to regulate surface coal mining operations on federal lands within the state.

Pursuant to the cooperative agreement, a federal coal leaseholder in Wyoming must submit a permit application package to OSM and WDEQ/LQD for any proposed coal mining and reclamation operations in the state. WDEQ/LQD reviews the permit application package to ensure it complies with permitting requirements, and that the coal mining operation would meet the performance standards of the approved Wyoming program. If the permit application package does comply, WDEQ/LQD issues the applicant a permit to conduct coal mining operations. OSM, BLM, and other federal and state agencies review the permit application package to ensure it complies with the terms of the coal lease, the MLA, and other federal and state laws and regulations. OSM recommends approval, approval with conditions, or disapproval of the MLA mining plan to the Assistant Secretary of the Interior for Land and Minerals Management. Before the MLA mining plan can be approved, OSM obtains input from BLM and the surface managing agency, if other than BLM.

If a proposed LBA tract is leased to an existing mine, the lessee is required to revise its coal mining permit prior to mining the coal, following the processes outlined above. As a part of that process, a new mining and reclamation plan would be developed showing how the lands in the new LBA tract would be mined and reclaimed. The revised permit area may be larger than the revised lease area to allow for disturbances outside the actual coal removal areas for such purposes as mining private or state mineral holdings, overstripping, matching to undisturbed topography, and constructing flood control, sediment control, and related facilities.

Specific impacts that would occur during the mining and reclamation of the LBA tract would be addressed in the mining and reclamation plans, as would the specific mitigation measures for anticipated impacts. WDEQ enforces the performance standards and permit requirements for reclamation during a mine's operation and has primary authority in environmental emergencies. The OSM retains oversight responsibility for this enforcement. BLM has authority in emergency situations where WDEQ or OSM cannot act before environmental harm and damage occurs. The BLM has the responsibility to consult with other state or federal agencies that have jurisdiction by law or special expertise with respect to potential environmental impacts.

The proposed leasing of the LBA tract and the reasonably foreseeable mining scenario has been analyzed in accordance with the requirements of NEPA, and the President's Council on Environmental Quality (CEQ) implementing regulations. This EIS serves the following purposes:

- It provides the public and government agencies with information about the potential environmental consequences of the project and its alternatives.
- It identifies practicable means to avoid or minimize environmental harm from the project and its alternatives.
- It provides the responsible official with information upon which to make an informed decision regarding the project.

NEPA requires federal agencies to use a systematic, interdisciplinary approach to ensure the integrated use of natural and social sciences in planning and decision making. Factors considered during the analysis process regarding the LBA tract include whether the proposal and alternatives are in conformance with the policies, regulations, and management plans of the BLM and other agencies likely associated with the project.

This EIS is not a decision document. The EIS documents the process used to analyze potential impacts of the project (i.e., LBA tract, leasing, and reasonably foreseeable mining) as proposed by the BBCC (hereafter referred to as the Proposed Action) and alternatives; and, it discloses the environmental effects of the Proposed Action and alternatives. A Record of Decision (ROD), signed by the responsible official (i.e., BLM State Director, Wyoming State Office), will document the final decision.

BLM decision options include:

- Approving the Proposed Action as submitted;
- Approving an alternative to the Proposed Action to account for environmental or recoverable coal concerns;
- Approving the Proposed Action or an alternative with mitigation measures to reduce environmental impacts; and
- Rejecting the Proposed Action (e.g., choosing the No Action Alternative or another alternative).

If BLM approves the Proposed Action, only those activities on public land detailed in the lease application would be authorized to occur. If BLM denies the Proposed Action, the applicant can modify and resubmit the lease application to address concerns on the original project. **Appendix B** presents other federal and state permitting requirements that must be satisfied to mine the LBA tract.

Sweetwater County administers land use within the county in accordance with its approved land use plan (Sweetwater County 2002), and also issues road encroachment authorizations, special use permits for roads, and permits for septic systems. BBCC would apply for all necessary permits, land use changes, and/or authorizations from the appropriate Sweetwater County agency or department for the specific program to be undertaken.

1.4 RELATIONSHIP TO EXISTING PLANS, POLICIES, AND PROGRAMS

In addition to the previously listed federal acts, guidance and regulations for managing and administering public lands, including the federal coal lands in the BBCC application, are set forth in 40 CFR 1500-1508 (Protection of Environment), 43 CFR 1600 (Planning, Programming, Budgeting), 43 CFR 3400 (Coal Management), and the Green River Resource Management Plan (RMP) and ROD (BLM 1997). Specific guidance for processing lease applications is provided by BLM Manual 3420 (Competitive Coal Leasing) (BLM 1989). Development of this EIS follows the BLM's National Environmental Policy Act Handbook (H-1790-1) (BLM 1988).

As required by the Federal Coal Leasing Amendments Act of 1976, this EIS and the alternatives discussed herein have been developed in conformance with the Green River RMP, ROD, and RMP decisions and guidance including standards, guidelines and land use objectives and actions for short- and long-term development of federal leasable minerals. The overall management objective for leasable solid minerals (coal) in the Green River RMP is:

> *To provide for both short- and long-range development of federal coal, in an orderly and timely manner, consistent with the policies of the federal coal management program, environmental integrity, national energy needs, and related demands (BLM 1997).*

Coal land use planning utilizes four screens established by the Federal Coal Management Program. These screens are used to identify whether a coal tract is acceptable for lease consideration. They include:

- Identification of Coal Development Potential;
- Application of Coal Unsuitability Criteria;
- Evaluation of Multiple Use Conflicts; and
- Surface Owner Consultation.

A coal tract acceptable for further leasing consideration must be located within areas determined to have coal development potential. The LBA tract lies within the Green River-Hams Fork Coal Region of northwest Colorado and south-central/southwestern Wyoming; Maps 19 and 31 of the Green River RMP and ROD (BLM 1997).

Coal unsuitability criteria listed in the federal coal management regulations (43 CFR 3461) and described in the Green River RMP, have been applied to the LBA tract as part of the Green River RMP planning process. **Appendix C** of this EIS summarizes the unsuitability criteria, describes the general recommendations of the Green River RMP, and presents the findings for this coal tract. As indicated in **Appendix C,** no lands within the LBA tract have been found unsuitable for coal mining and the use of these lands for mining complies with the intent of the land use policies of the Green River RMP.

The lands identified in this project are acceptable for consideration of coal leasing and subsequent coal mining. The LBA tract lands are within crucial winter range for mule deer. During development of the Green River RMP, the greater Cooper Ridge area (which includes the current Proposed Action) was "determined acceptable for further consideration for federal coal leasing and development, pending further analysis". Further analysis revealed that the area was determined acceptable with the following mitigation measures:

- No concurrent coal mine development, and
- The area would be reclaimed appropriately.

No other coal mines exist in the Cooper Ridge area. As a result, wintering habitat and a migration corridor will be maintained to meet the needs of the South Rock Springs Mule Deer Herd. Surface coal mining falls under stringent regulations for reclamation, which is overseen by the WDEQ. Not only must the area be replanted with appropriate grasses, forbs and shrubs, it must also be re-graded to approximate pre-mining topography. Thus, the South Rock Springs Mule Deer Herd would have appropriate forage to meet their dietary needs as well as terrain to conform to their surrounding environment following reclamation of the mine. The proposal to mine the LBA Tract is therefore in conformance with the Green River RMP.

In accordance with 43 CFR 3420.1-4e(3), multiple land use conflict analysis was completed after the coal unsuitability review, as part of the Green River RMP planning process, to identify and eliminate additional coal deposits from further consideration for leasing. This step in the coal screening process is applied to protect resource values of a locally important or unique nature that were not identified in the unsuitability criteria. The multiple use conflicts analysis in the Green River RMP identified no lands within the project area that would be unacceptable for coal leasing. The screening process identified mitigation measures needed to protect both cultural and wildlife resource values that would be applied should the coal be leased.

However, this step in the screening process did identify the application of mitigation measures to protect both cultural and wildlife resource values.

The determination of the Green River RMP for cultural resource values during processing of individual coal lease applications states that surveys would be done and tribes known to have inhabited the area would be solicited for comments. Both of these steps have been taken and have revealed no known conflicts. Surveys for cultural and historic sites would continue during mine plan approval processing and the term of the lease and mine-life. Thus cultural resource values would be protected.

The determination of the Green River RMP for wildlife resource values, specifically the crucial winter range for the South Rock Springs Mule Deer Herd, states that activities that simultaneously and continuously occur within their crucial winter range must be balanced. This balance would be maintained through appropriate sequencing and timing of development and coal leasing. Neither concurrent coal development nor other coal leases exist within the South Rock Springs Mule Deer Herd crucial winter

range at this time. Thus the intent of the Green River RMP to protect mule deer habitat on Cooper Ridge would be met. Furthermore, as part of the Green River RMP planning process:

> *Only the areas that were determined to be acceptable for coal development (including specified mining methods and mitigation requirements) became a part of the coal development scenario for the Proposed Plan. As a result, there were no unacceptable adverse affects that would be caused by coal development identified in the analysis of the Proposed Plan (BLM 1997).*

Due to the multiple land use conflict analysis, the project area was found to be suitable and acceptable for further coal leasing consideration with appropriate mitigation as stated above. Therefore, lands contained within the LBA tract are in conformance with the Green River RMP.

Surface owner consultation was completed during the preparation of the Green River RMP. It states:

> *There were no surface owners of split-estate lands (i.e., privately-owned surface over federally owned coal) who expressed a preference against surface mining the federal coal on their lands. Therefore, there were no federal coal lands in the Planning Area determined to be unavailable for further consideration for leasing and development due to surface owner consultation. It should be understood that surface owner of split estate lands still have the opportunity to consent or refuse to consent to the leasing of federal coal under their lands before such federal coal leases would be issue (BLM 1997).*

The lands and minerals within the project area are administered by the BLM, or are owned by State of Wyoming or private interests. One partial section (section 16) is federal surface and State of Wyoming owned coal. All private lands within the project area, both surface and coal, are owned by Anadarko. The remaining lands within the LBA tract are all federally owned surface and coal. There are no split estate coal lands where the surface is privately owned and the mineral estate is federally owned, nor where the mineral is privately owned and the surface is federally owned.

The Coal Occurrence and Development Potential area is subject to continued field investigations, studies, and evaluations to determine if certain methods of coal mining may occur without having long-term impacts on wildlife, cultural, and watershed resources in general and on threatened and endangered plant and animal species in particular. The Endangered Species Act (ESA) was amended in 1982 to allow the 'taking' of listed species (incidentally) during an otherwise lawful activity by non-federal entities (Federal Register Vol. 64, No. 45, 1999). Take is defined in the ESA as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered species. Harm may include significant habitat modification where it actually kills or injures a listed species through impairment of essential behavior (e.g., nesting or reproduction). Non-federal property owners, such as private landowners, corporations, or state or local governments, wishing to conduct activities on their land that could result in the incidental take of a listed species, must first obtain an incidental take statement from the U.S. Fish and Wildlife Service (USFWS) [Section 10(a)(1)(B)]. To obtain a statement, the applicant must develop a Habitat Conservation Plan designed to offset any harmful effects that the proposed activity could have on the species.

The following list includes existing NEPA documents relevant to the proposed project:

- BLM Green River RMP, EIS and ROD (BLM 1996, 1997);
- Cumulative air quality analyses for the Jonah Infill Drilling Project (BLM 2006, TRC Environmental Corporation 2006);
- BLM coal exploration drilling project EA of the Ten Mile Rim (BLM 2001);
- BLM Bridger Power Plant flue gas de-sulfurization pond expansion project EA (BLM 2002); and
- Air Quality Analysis for the Jonah Infill Drilling Project (BLM 2005a).

1.5 PUBLIC INVOLVEMENT

To allow for an early and open process for determining the scope and significance of issues related to the proposed project (40 CFR 1510.7), a public scoping period was provided by BLM. A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on January 4, 2005 (Federal Register 70 v5:1464-1465; WY-920-1320-EL; WYW160394). Publication of this notice in the Federal Register initiated a 30-day scoping period that provided for acceptance of comments through February 4, 2005, and announced that the BLM would hold a public meeting on January 26, 2005. BLM issued a news release regarding proposed project scoping to local media organizations. Scoping comments were received from 11 individuals and organizations during the scoping period.

1.6 ISSUES IDENTIFIED AND FORMULATION OF ALTERNATIVES

Scoping identified (1) physical, biological, and social resources that could be affected by the proposed project, and (2) issues related to each resource that would be analyzed in detail in the EIS (**Table 1.1**). Identification of the specific resources and related issues was then used to identify possible alternatives and to determine whether any new alternatives would be carried forward for detailed analysis.

Certain issues were determined to not be "significant issues related to the Proposed Action" (40 CFR 1501.7(3)) because they would not potentially be affected or impacted by the proposal. Other issues brought forth during public scoping and reasons for eliminating the issues from consideration in the analysis are provided below:

- Deny Pit 14 Coal LBA and Use Land for Wild Horses: This issue was eliminated from consideration because it does not meet the Purpose and Need of the action. Nor would this follow the management goals, objectives, and management actions defined in the Green River RMP

1.7 DEPARTMENT OF JUSTICE CONSULTATION

In the event of a competitive coal lease sale, but prior to issuance of a lease, the BLM will solicit the opinion of the Department of Justice on whether the planned lease issuance creates a situation inconsistent with federal antitrust laws. The Department of Justice is allowed 30 days to make this determination. If the Department of Justice has not responded in writing within 30 days, the BLM can proceed with issuance of the lease.

Table 1.1 Resource Issues Identified for Detailed Analysis

Resource	Issue
Physical Resources	
Air Quality	Impact of pollutant emissions. Impacts on visibility resulting from pollutant emissions and possible impairment in Bridger Wilderness from cumulative sources. Impacts of atmospheric deposition of pollutants.
Fluid Minerals	Long- and short-term impact on lease development. Impacts on lease status.
Leasable Minerals - Coal	Impact on mineral management associated with resource depletion. Impact on loss of coal resource due to mining.
Soils	Impacts on soils resulting from excavation and storage during the operational life of the project. Impact of erosion resulting from soil loss during the operational and reclamation phase of the project. Impacts on soil during the reclamation phase of the project.
Water Resources (including surface and groundwater)	Effects on the watershed, including changes in flow and headward erosion. Impact on and change in groundwater quality and quantity and associated effects on area seeps and springs.
Biological Resources	
Vegetation	Short-term and long-term impact on the capacity for vegetative production. Potential for increased noxious weed infestations. Impacts on habitats providing vegetation cover for special status species and wildlife (e.g., greater sage-grouse and big game).
Special Status Species (includes federally listed and BLM-sensitive plants and animals)	Direct or indirect modification or destruction of federally listed or BLM sensitive species habitat. Direct or indirect modification of potential greater sage-grouse habitat.
Wildlife and Fisheries	Direct or indirect modification or destruction of suitable or potentially suitable wildlife (big game, raptors, migratory birds, amphibians and reptiles) and fisheries habitat.
Livestock Grazing – Included for discussion in Social Resources	Impacts on livestock grazing and allotment use. Impact on or loss of range improvements. Impact on important water sources.
Wild Horses	Impacts on wild horse Herd Management Area (HMA). Impact on or loss of range improvements. Impact on important water sources. Impact on reduced carrying capacity.
Social Resources	
Land Tenure and Rights-of-Way (ROW) (includes transportation corridors)	Impact on any land management considerations (leasing, realty actions, ROWs). Impact on public lands access.
Recreation	Impact on dispersed big game hunting. Impact on off-highway vehicle (OHV) use.
Visual Resources	Impact on Visual Resource Management.
Cultural (including Historic Trails and Native American Religious Concerns)	Impact on known cultural sites and National Register of Historic Places (NRHP) status. Impact on historic trail and management of historic trail sections.
Social and Economic	Impact on economic opportunities in Sweetwater County.

CHAPTER 2.0 - PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

NEPA requires consideration and evaluation of reasonable alternatives that meet the project's purpose and need while minimizing or avoiding environmental impacts. NEPA also requires the evaluation of a No Action Alternative and a practical range of other "reasonable" action alternatives. "Reasonable" alternatives as defined by the CEQ are those that are technically or economically feasible using common sense. Reasonable alternatives are formulated to address issues and concerns raised by the public and agencies during scoping. Alternatives were determined not to be technically and/or economically, or environmentally practical or feasible, are identified in the EIS but have been eliminated from detailed study.

In this EIS, two alternatives, the Proposed Action and the No Action Alternative, are given detailed consideration. Three other alternatives were identified and found to be not reasonable. They are described and discussed in Section 2.4.

To determine if the maximum quantity of recoverable coal in the federal mineral estate was identified for mining, the BLM evaluated the original coal LBA submitted on March 24, 2004. Based on BLM's evaluation, additional coal was identified as being recoverable outside of the coal LBA tract on a federal surface and mineral estate lease already held by BBCC. The project area boundary was expanded to include this coal and was presented to BBCC as BLM's Preferred Alternative. The BBCC agreed to modify their proposal as suggested by the BLM to include the additional mineral estate and associated surface lands. The coal LBA tract acreage remained the same as originally applied for in the March 24, 2004, coal LBA tract submittal.

Under the Proposed Action, the LBA tract as applied for would be offered for lease at a competitive sale and would be subject to standard and special lease stipulations developed for the LBA tract. The Proposed Action assumes that BBCC would be the successful bidder on the LBA tract if it were offered for sale.

2.2 PROPOSED ACTION

This section describes BBCC's Proposed Action to lease and extract currently unleased federal coal reserves from the LBA tract. Implementation of the Proposed Action would likely result in the extraction of previously leased federal coal reserves, and private coal reserves within the project area in Sweetwater County, Wyoming, as identified in **Figure 2.1** and described in **Table 2.1**.

2.2.1 Location and Overview

The project area is located approximately 28 miles southeast of Rock Springs, Wyoming, and 14 miles south of Interstate 80. **Figure 1.2** presents a map of the project area in relation to surrounding facilities and highways. Access to the project area is via Interstate 80 and the Black Butte Mine access road. The project area encompasses 4,359 acres, of which 1,399 acres are federal surface and mineral estate (the LBA tract, WYW-160394), 640 acres are previously leased federal surface and mineral estate (WYW-6266), 160 acres are state mineral and federal surface estate, and 2,159 acres are private surface and mineral estate. **Figure 2.1** is a map of the LBA tract and additional lands comprising the project area and provides detail on potential mine project features. **Table 2.1** presents a description of the project area lands and a surface and mineral ownership summary.

Figure 2.1 The LBA Tract and Additional Lands Comprising the Project Area

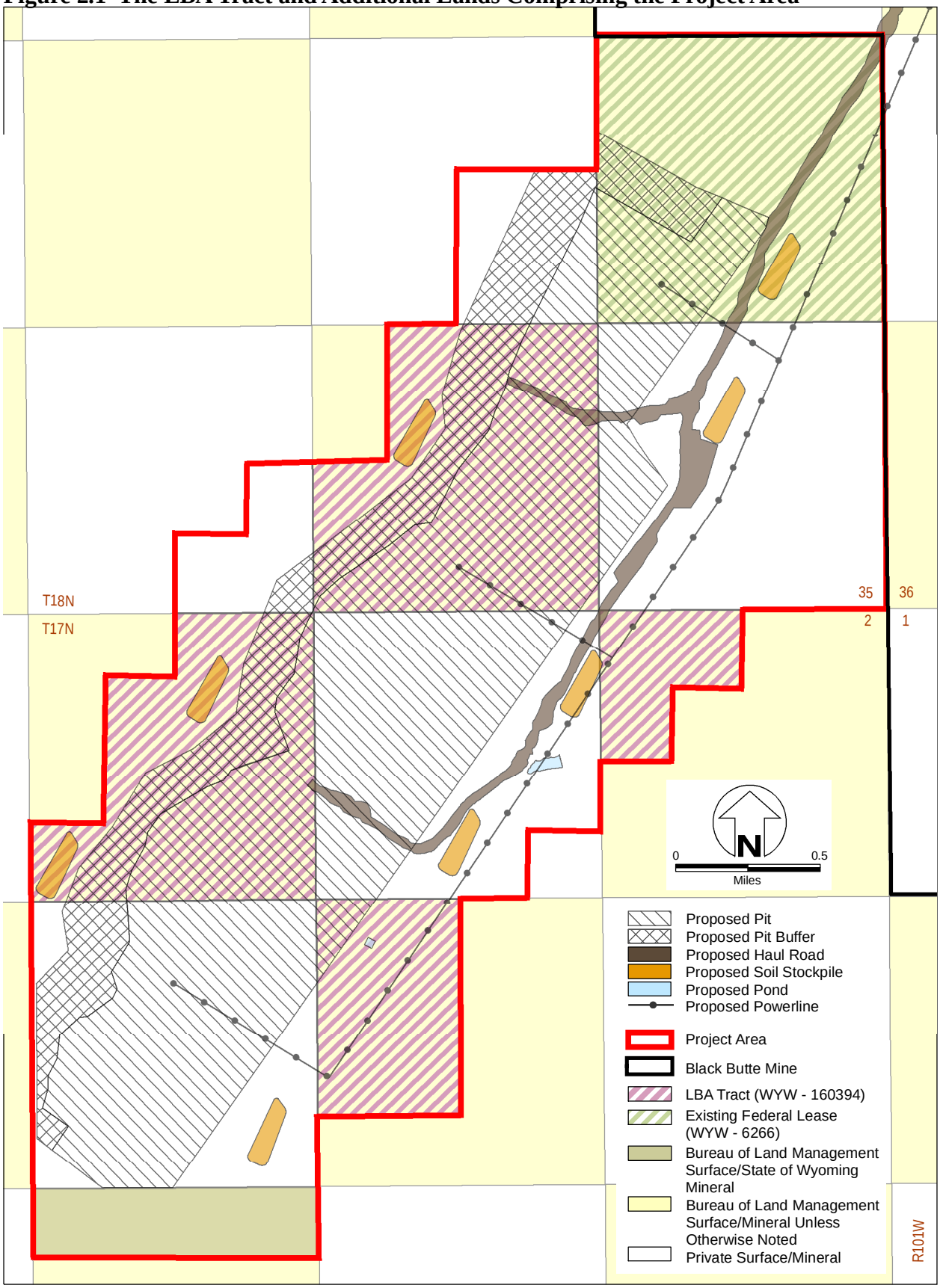


Table 2.1 Project Area Description and Ownership Summary

Tracts in the Project Area
LBA Tract Portion of Project Area (BLM surface and mineral estate)
T. 17 N., R. 101 W. 6th P.M., Wyoming Section 2: Lots 3, 4, SW1/4 NW1/4 Section 4: Lots 1, 2, S1/2 NE1/4, SE1/4 NW1/4, NE1/4 SW1/4, S1/2 SW1/4, SE1/4 Section 10: NW1/4, N1/2 SW1/4
T. 18 N., R. 101 W., 6th P.M., Wyoming Section 34: E1/2, E1/2 NW1/4, SW1/4
Additional Lands In the Project Area
T. 17 N., R. 101 W. 6th P.M., Wyoming Section 3: Lots 1-4, S1/2N1/2, SW1/4, N1/2SE1/4, SW1/4SE1/4 (private surface and mineral) Section 9: All (private surface and mineral) Section 16: N1/2 NW1/4, N1/2 NE1/4 (federal surface and state mineral)
T. 18 N., R. 101 W., 6th P.M., Wyoming Section 26: All (previously leased federal surface and mineral) Section 27: SE1/4 (private surface and mineral) Section 33: S1/2 SE1/4, NE1/4 SE1/4 (private surface and mineral) Section 35: All (private surface and mineral)

BBCC estimates that approximately 34.6 million tons of in-place coal reserves are present in the Upper Cretaceous Almond Formation within the project area (see the Geology Section in Chapter 3 for a discussion of this formation) (Clawson 2005a). As part of the fair market value determination process, BLM would independently evaluate the volume and average quality of the portion of the federal coal included in the LBA tract. BLM's estimate of the in-place reserves and average quality of the coal included in the LBA tract will be published in the Final EIS and sale notice, if the LBA tract is offered for sale. Some preliminary information on the quality of coal from the Almond Formation is presented in the Geology Section of Chapter 3.

Recoverable portions of the in-place coal reserves would be mined over an approximate 20-year period using the same surface mining methods currently utilized at the Black Butte Mine. Approximately 1.5 to three million tons of coal per year would be mined once topsoil stockpiling and initial overburden removal has occurred in 2008. If BBCC were awarded the lease and granted an associated mine permit, pit construction could begin in 2008. The estimated 20-year mine life would be followed by a potential 20-year reclamation and revegetation monitoring period.

The Proposed Action would be considered a maintenance tract for the existing Black Butte Mine. BBCC plans to shift production from its active pits to the project area and continue at a similar production rate. Because the project area would be an extension of the existing Black Butte Mine, the majority of facilities and infrastructure would be the same as those identified in the WDEQ Mine Permit No. 467-T5 and the BBCC's Resource Recovery and Protection Plan for the Black Butte Mine. A detailed mine and reclamation plan revision for the project area would be performed in coordination with the WDEQ/LQD using the existing WDEQ Mine Permit No. 467-T5 as the basis for the revision. In addition to resource protection measures contained in the mine permit, BLM special lease stipulations would apply to the LBA tract. The special lease stipulations are presented in **Appendix D**.

2.2.2 Mine Permit and Other Required Permits and Approvals

2.2.2.1 Mine Permit and License

BBCC would revise its existing mine and reclamation plan and seek to receive a revised permit and license based on the revised plan through the WDEQ/LQD for the proposed mining of the project area. The mine and reclamation plan would provide a comprehensive and detailed description of proposed mining activities including resource protection and mitigation measures developed in coordination with the WDEQ/LQD and other state and federal agencies. The mine and reclamation plan serves as a platform for the development of air quality, water quality and appropriation, and wetland and stream alteration permits potentially required from state and federal agencies.

In June 1976, BBCC submitted its application for permit and license to mine to the U.S. Geological Survey, BLM, and the WDEQ/LQD. The application contained a detailed mine and reclamation plan for the first five years of mining with a more general plan for the remaining years of operation. Following publication of the application and a period for public comment, BBCC received approval of its permit and license to mine from WDEQ/LQD on December 27, 1977. Approval of the Mine and Reclamation Plan was granted by the Department of the Interior on December 7, 1978, under SMCRA. Several amendments to the mine plan and permit have occurred since the first permit approval. BBCC's current mine permit version was approved by the WDEQ/LQD in November of 2003. Annual reports, pursuant to Black Butte's federal coal lease and WDEQ/LQD mining permits have been submitted to pertinent state and federal agencies from 1977 to 2004.

2.2.2.2 Coal Leases

A federal coal lease acquisition would be required of the lessee to access and remove coal from the LBA tract portion of the project area. The surface ownership of section 16 is administered by the BLM and BBCC would be required to obtain a ROW to the land surface as a part of the Proposed Action. The mineral rights in section 16 are held by the State of Wyoming. State-owned coal in this area is not currently proposed for mining. BBCC will also need to secure a lease from the owners of private coal reserves in the project area.

2.2.2.3 Air Quality

Air quality permits including a Permit to Construct and an Operating Permit would be required from the WDEQ/Air Quality Division (AQD). The permits would address allowable particulate and other emission levels and would stipulate mechanisms to be used to control emissions. BBCC is currently working with the WDEQ/AQD to identify effective control measures at the Black Butte Mine that would minimize particulate emissions.

2.2.2.4 Water Quality and Appropriation

The WDEQ/Water Quality Division (WQD) would review the proposed mine and reclamation plan and if the plans conform and comply with applicable rules and regulations, specific environmental permits would be issued. The Wyoming State Engineer's Office (SEO) would review specific applications to install monitoring and production wells, and would issue permits and appropriations in accordance with the applicant's needs and available water resources.

2.2.2.5 Wetland and Stream Channel Alteration

A wetlands delineation conducted by a U.S. Army Corps of Engineers-certified wetlands delineator was performed in the project area. No wetlands were determined to be present. Modifications to ephemeral

stream channels in the project area would require a stream alteration permit from the Wyoming SEO. The permit application would be reviewed by the U.S. Army Corps of Engineers for compliance with applicable rules and regulations. A permit would be issued by the state if the application meets the criteria.

2.2.2.6 Sweetwater County Zoning Change

The project area zoning status would be reviewed. If required, modifications to county zoning would be sought with Sweetwater County.

2.2.2.7 Resource Recovery and Protection Plan

The MLA requires that before conducting any federal coal development or mining operations on a federal coal lease, the operator must submit to and have approved by the BLM, a Resource Recovery and Protection Plan. As part of the Proposed Action, a detailed Resource Recovery and Protection Plan for the BLM would be prepared. The plan would describe how the proposed operation would meet the MLA requirements for due diligent development, production, resource recovery and protection (i.e., efficient recovery of the federal coal reserves), continued operation, maximum economic recovery, and the rules detailed in Title 43 C.F.R. Part 3480 for the life-of-mine. BBCC would mine the lease according to the approved plan, respective lease terms, and appropriate rules and regulations.

2.2.3 Mine Plan

The mine plan would include information about the proposed mine facilities (including the facilities necessary to mine the coal), mine equipment, coal reserves, mining methods, and associated activities such as treatment of mine water, water requirements, control of hazardous material, solid wastes, reclamation, employment, and general environmental protections. The content of the mine plan would be the basis for the WDEQ/LQD permit approval.

The approved Black Butte Mine permit (BBCC 2003, as revised) includes monitoring and mitigation measures required by SMCRA and Wyoming state law. If BBCC acquires the lease, these monitoring and mitigation measures would be extended and modified as necessary to cover proposed operations in the project area. The permit would have to be approved before coal removal could take place. Permit-specified monitoring and mitigation measures are considered to be part of the Proposed Action. The mine plan would be finalized and formally submitted to the WDEQ/LQD following the successful leasing of the LBA tract. The following is a summary of the preliminary proposed mine plan in the Proposed Action.

2.2.3.1 Project Area Mine Facilities

Proposed mine facilities include a haul road to the Pit 8 hopper, a 34.5 kilovolt (kV) distribution power line, a mobile equipment substation, topsoil stockpiles, a pit buffer, and various ponds/water control structures as required by WDEQ. The approximate haul road and powerline locations in relationship to the project area boundary, topsoil stockpile areas, pit buffer, and the proposed pit outline are presented in **Figure 2.1**. Proposed surface disturbances are presented below in **Table 2.2**.

It is anticipated that approximately 2,250 acres of surface disturbance would occur in the project area. Of this total anticipated disturbance, approximately 840 acres would be disturbed in the LBA tract.

Table 2.2 Approximate Surface Disturbances in the Project Area

Component of Proposed Action	Total Disturbed Acres
Haul Road	101
Light Use Roads	Included in other disturbances
Power Distribution Line	41
Top Soil Stockpiles	75
Ponds/Water Control Structures	3
Mine Pit	1,570
Mine Pit Buffer	460
Total Anticipated Surface Disturbance	2,250

2.2.3.2 Haul Road and Light-Use Roads

Haul trucks would be used to transport the coal from the project area to the existing Pit 8 hopper at the Black Butte Mine. Coal from the Pit 8 hopper would be transported by conveyor to the coal processing and loadout facility. The Pit 8 hopper, coal processing, and loadout facilities are located outside the project area. The proposed haul road would be approximately 28,021 feet long (5.31 miles) with an operational road width varying between 80 to 100 feet and overlaid by two feet of scoria. The operational haul road would fall within a ROW width of 200 feet. The scoria, which is found on the mine site, serves as a wearing surface which is easily maintained and sufficiently durable to withstand anticipated vehicle use. Placement of the haul roads would be on stable material to prevent erosion. Cut slopes would be minimized and, where practicable, revegetation practices would be conducted. The grade of the haul road would not exceed 10 percent and the road surface would be sloped toward the road ditch to provide drainage. (See **Figure 2.2** for typical haul road design.)

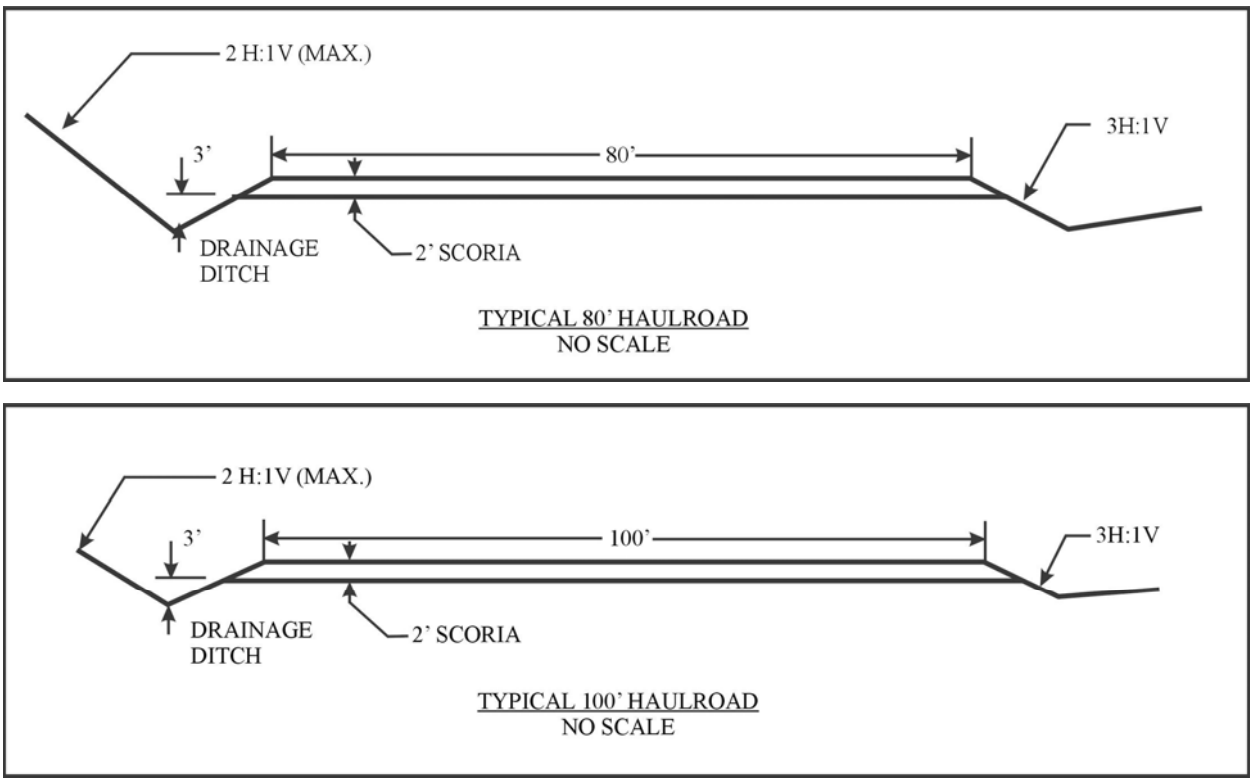
Ditches and culverts would be designed to pass the runoff from a peak flow from the design storm (based on the WDEQ/LQD Environmental Quality Act, 1980) as specified in WDEQ/LQD Guideline 8. Culverts would be covered with a minimum of one foot of compacted fill, or in accordance with design calculations based on loading weights, and would be placed on minimal slopes to reduce erosion. All roads, culverts, and ditches would be designed and constructed using standard engineering practices.

Maintenance on all haul roads would involve dust suppression, grading, and preventive measures due to wet and/or slippery conditions. Dust suppression would be accomplished by at least an annual application of magnesium chloride. Additional dust suppression would be performed as necessary. Periodic grading is required to maintain road surfaces and drainage. Caterpillar 16 motor graders would perform the required maintenance, which blade the haul road surface to fill in potholes and remove “high areas.”

Access around the project area would be primarily on haul roads, on mine pit surfaces, or on light-use roads built to service project area facilities. The surface disturbances associated with light-use roads are included in the surface disturbance estimates for the facilities. In the case where access is required to other portions of the project area, the roads would be designed to meet all appropriate road design standards. Light-use roads would be constructed for topsoil pile and powerline access, and field maintenance. Field design procedures would be used to minimize erosion and land disturbance. The approximate average road width would be 40 feet.

The culverts required for haul roads and light-use roads would be sized to convey the peak flow from the design storm, and would be capable of withstanding anticipated structural loads. Culvert inlets and outlets would be riprapped or provisions made for energy dissipation to control scour and erosion. Determination of the design storm would be based on the WDEQ/LQD Environmental Quality Act, 1980. A WDEQ/approved hydrology program would determine the peak flow rates and hydraulic analysis for culverts.

Figure 2.2 Typical Haul Road Designs



2.2.3.3 Power Distribution Line

Approximately 30,149 feet (5.71 miles) of new 34.5-kilovolt (kV) distribution powerline would be constructed in the project area. The approximate location of the 34.5-kV powerline is illustrated on **Figure 2.1**.

The proposed electrical service equipment would be similar in design to the existing 34.5-kV distribution system located at the Black Butte Mine. The proposed distribution powerline and hardware would be designed, constructed, operated, and maintained in conformance with the National Electrical Safety Code and other applicable codes and standards, Mitigating Bird Collisions with Power Lines: The State of the Art in 1994 (APLIC 1994), Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996 (APLIC 1996), and Avian Protection Plan Guidelines (APLIC and USFWS 2005).

Construction of the proposed powerline would be conducted using standard electrical construction techniques and equipment, would only involve use of wheeled vehicles driving along the ROW, and would not involve any topsoil salvaging operations. The only area to be physically disturbed by the proposed powerline would be where individual power pole structures and anchors would be installed.

2.2.3.4 Top Soil Stockpiling

Prior to surface disturbance, suitable surface soil materials or topsoil that is salvageable by conventional methods (i.e., truck/loader and dozers) would be stripped from all operational terrain, including roadways, sediment ponds, spoil areas, and pit areas. Topsoil removal depth would be determined before stripping activities occur. An intensive soil survey has been completed in the project area; including an Order I soil survey, soil chemical/physical analyses, and a soil type suitability determination. Chemical and physical analyses included texture, pH, electric conductivity, sodium adsorption ratio, saturation percentage, coarse fragments, boron, and bedrock. Lab analytical procedures for these parameters were based on the

most recent revision of WDEQ/LQD Guideline Number 1. Additional analyses may be required during WDEQ/LQD permitting.

Before the equipment moves into an area to strip topsoil, the outer limits of the area would be defined and staked. BBCC would salvage all available topsoil until the limiting depth is reached. In areas where there is a chemical limitation to topsoil stripping (e.g., sodium adsorption ratio, electric conductivity), the areas would be adequately staked for depth. Each area would be visually inspected by BBCC personnel for verification that the salvage work was completed.

A majority of all soil stripped from the mine area would be stockpiled outside the disturbed area. However, as mining activity progresses, concurrent regrading and reclamation would occur. This would allow for immediate topsoil replacement. This may be delayed where special handling of overburden is a problem, as waste rock (spoils) of unsuitable quality must be covered by a minimum of four-feet of suitable material before retopsoiling may occur. Spoil material directly underlying topsoil must meet specific chemical and physical criteria to be considered suitable. Only the topsoil that cannot be directly applied would be stockpiled.

Topsoil stockpiles would be designed, constructed, and maintained to minimize erosion. Generally the stockpiles would be oblong with an approximate 5:1 slope from end-to-end with an approximate 3:1 slope on either side. Topsoil piles would be constructed by trucks depositing the soil in dumps. Upon completion of the stockpile, it would be seeded with a temporary seed mixture, developed in coordination with the WDEQ/LQD for the reclamation plan, to further minimize the effects of erosion. Toe ditches would be constructed around soil stockpiles to contain runoff.

2.2.3.5 Ponds/Water Control Structures

Water quantity and quality would be controlled and managed throughout the life-of-mine by the construction of reservoirs, diversion channels, and interceptor channels. Prior to mining, the drainage control area for the project area would be determined. Using currently accepted engineering methods, the total runoff quantity and volume for the various ponds, diversion channels, and interceptor channels would be calculated. Applications and formal designs for all pond structures would be filed with the Wyoming SEO and the WDEQ/WQD.

Ponds would serve primarily one of three purposes:

- Control of runoff and sediment from disturbed lands.
- Containment of pit inflow waters and waste process water.
- Retention of runoff from undisturbed areas above pits.

All ponds would be monitored for water quality of stored runoff. The stored water may be kept in ponds indefinitely as long as there is enough room to store the design event, or the pond may be dewatered using a portable pump when the stored water quality meets effluent standards. The inlet of the pump would be located above the maximum elevation of the designed sedimentation storage volume. If the stored water meets the effluent standards, the water would be discharged to a natural drainage way, or used for mine-related actions (e.g., dust control, reclamation needs). If the stored water does not reach effluent standards within a reasonable time period, the water would be pumped to water trucks or designated holding ponds for use in haul road dust abatement. Water discharge activities would be conducted in accordance with BBCC's existing National Pollutant Discharge Elimination System discharge permit issued by WDEQ/WQD.

Diversion channels would be designed to convey the peak flow rates from the required design storm from existing, undisturbed natural drainages. Determination of the design storm would be based on Guideline No. 8, "Hydrology" (WDEQ/LQD). The design storm is based on the life of the diversion. Diversion

channels are required to prevent runoff inflow and sediment deposition in the mining pit, which could seriously hamper operations and contaminate the exposed coal.

Most diversion channels would be trapezoidal in section with 2:1 side slopes. Some diversion channels require only a V-shaped ditch. Diversion channels would be topsoiled and seeded with grasses to minimize erosion.

Interceptor channels would be designed to capture runoff from disturbed areas, spoil areas or newly backfilled areas prior to reclamation and conveyance of the intercepted runoff to a pond for sediment control and discharge or evaporation. After completion of mining and as part of reclamation, all interceptor channels would be graded out to blend into surrounding topography, topsoiled, and seeded. Scour and erosion would be controlled with riprap or energy dissipators at appropriate locations.

Alternative sediment control measures (ASCMs) would be used in addition to, or in lieu of, sedimentation ponds when it can be demonstrated that ASCMs use would not degrade receiving waters. Generally, ASCMs would be used to provide short-term sediment control for areas not exceeding 30 acres of total drainage. Due to the variety of methods available for ASCMs and to ensure the most appropriate method for a given location and design period, the types of ASCMs to be utilized would be determined on a site-specific basis.

The types of ASCMs that may be utilized include:

- Sediment fences
- Straw bale check dams
- Loose rock check dams
- Single-fence rock check dams
- Wire-bound rock check dams
- Detention basins
- Ring ditches
- Erosion control practices
- Vegetative cover

2.2.3.6 Mining Methods

Similar to the Black Butte Mine to the north, mining within the project area would be a surface coal mine operation with draglines, dozers, and trackhoes as the principal equipment for overburden excavation.

Front-end loaders would also be used to remove overburden or interburden as required. Ripping or blasting would be necessary for overburden and interburden removal. The typical dragline operation would be preceded by the leveling of blasted overburden to facilitate movement. The first cut to be made (box cut) would consist of the excavation of the overburden down to the surface of coal and spoiling to the side along the low wall. During excavation of the box cut, the dragline may also cut ramps for haul roads. These ramps would enter the pit roughly perpendicular to the strike. Upon completion of the box cut, the dragline would move to a "turnover cut". This cut would proceed parallel to the box cut, and the spoil excavated would be placed in the portion of the box cut from which the coal has been removed. Each cut would be approximately parallel to the strike and, as completed, the dragline would move down-dip to begin the next parallel cut.

Because of its relatively inexpensive cost per yard moved, the dragline would be the primary dirt mover. Overburden would be generally removed in 150-foot- to 200-foot-wide cuts as the dragline moves along the strike. The spoil removed would be placed out-of-pit while in the box cut, and then placed into the previous cut as operations progress. A truck and trackhoe assisted operation may be utilized. Advantages of this method of overburden removal include reduction of dragline spoil rehandle, preparation of a level surface for the dragline, allowing the drill to reach coal, and availability of suitable overburden for special handling. Coal would be removed primarily by a Caterpillar 992 front-end loader and Caterpillar 777 haul trucks.

Figures 2.3 through **Figure 2.6** illustrate the typical topsoil salvage and dragline techniques that may be utilized in the project area. The spoiling figures show a typical mining progression of overburden and interburden being removed to expose coal seams and how the resultant spoils are placed in the mined portion of the pit prior to the establishment of the final surface topography. During proposed operations, the depth of the working pit would range from 25 to 200 feet below surface due to the down-dip orientation of the target coal seam.

BBCC would determine if excess spoil exists for the pit. Those pits which are mined by dragline assisted with shovel would have an overburden swell factor somewhere between 17 and 28 percent. The volume of permanent out-of-pit spoil would be strictly dictated by BBCC's ability to achieve approximate original contours. A determination would be made of the total overburden to be mined and the associated percentage that would be placed permanently out-of-pit, thereby limiting the extent of disturbance to the area and obtaining a natural regraded surface. A geotechnical analysis of the stability of the permanent out-of-pit spoils would be made to ensure failure of those materials would not occur. These determinations would be evaluated for approval by the WDEQ/LQD.

Figure 2.3 Typical Topsoil Stockpiling Procedure

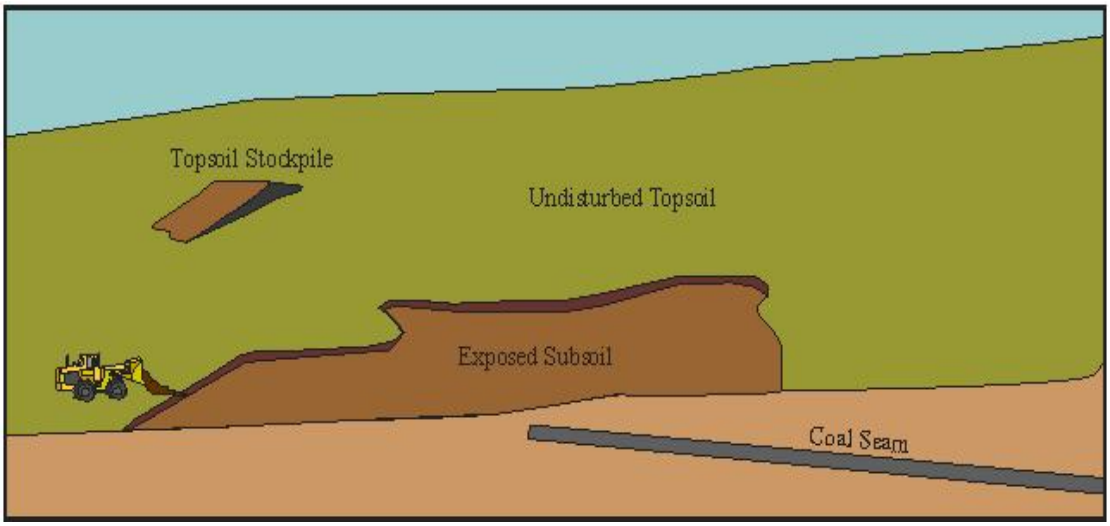


Figure 2.4 Typical Dragline Multiple Seam Spoiling Procedure

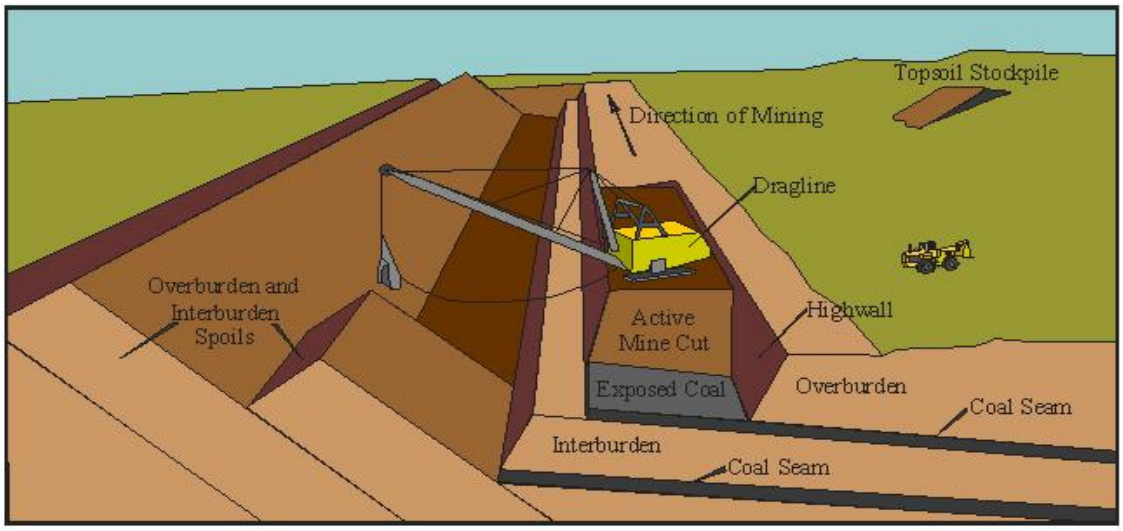


Figure 2.5 Typical Dragline Multiple Seam Spoiling Procedure

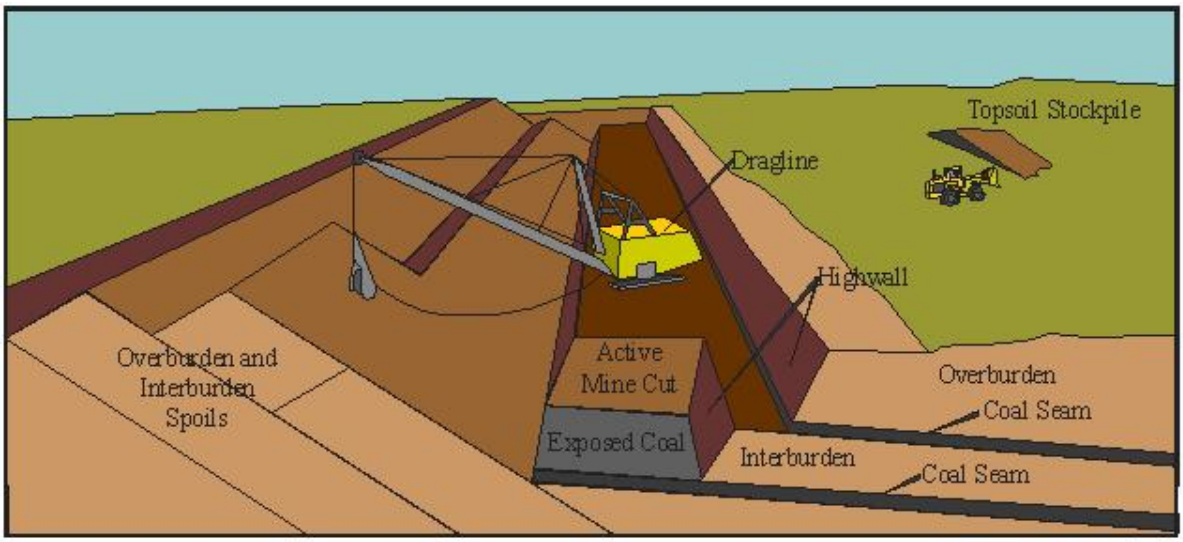
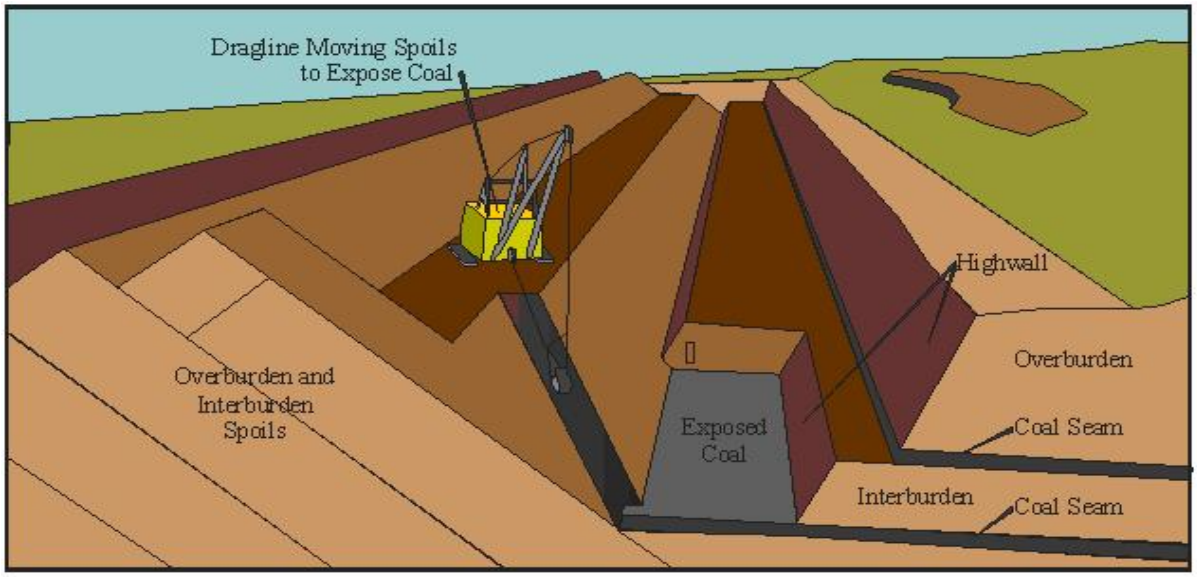


Figure 2.6 Typical Dragline Multiple Seam Spoiling Procedure



2.2.3.7 Mine Equipment

Table 2.3 lists the typical types of equipment that would be used under the Proposed Action during construction, mine operations, and reclamation. The specific number and equipment manufacturers and models would be determined as the project schedule is developed.

Table 2.3 Typical Major Equipment

Equipment Description	Number of Units
Bucyrus-Erie 1570W dragline w/78 cubic yard bucket	2
Caterpillar 992G front-end loader	2
Caterpillar 777 water truck (18,000 gallon)	2
Caterpillar 16H motor grader	2
Caterpillar D10N crawler tractor w/dozer	1
Caterpillar D10R crawler tractor w/dozer	3
Caterpillar D11R crawler tractor w/dozer	2
Caterpillar D11R CD crawler tractor w/dozer	2
Caterpillar 834 rubber tired dozer	1
Ingersoll-Rand Drill-DMM-3	2
Ingersoll-Rand Drill-DM45E	1
IT 28B, Dragline Support	1
IT 28G, Dragline Support	1
Caterpillar 950, Front End Loader	1
Caterpillar 5130 Excavator w/14 yard bucket	1
Caterpillar 777D, 100 Ton End Dump Trucks	12
Cable Reeler	1
Caterpillar 777A Lowboy Tractor	1
Smith Sanders Lowboy Trailer	1

2.2.3.8 Off Project Area Surface Support Facilities

Surface support facilities for the project would include those currently in use by BBCC and located within the Black Butte Mine permit area (outside of the Pit 14 Coal LBA EIS project area). There would be no need for additional disturbances in the project area to construct and house these facilities. These facilities include the following:

- Office/Shop/Warehouse building
- Water treatment facility
- Coal processing and loadout facility
- Water and sewer facilities
- Explosive storage facility
- Parking areas
- Conveyor truss over the Union Pacific main rail line
- Bulk storage area
- Truck wash facility
- Bulk item storage facility
- Fuel storage and dispensing facilities
- Mine Power Electrical Substation

These existing facilities have been designed and constructed in accordance with standard engineering practices, and all applicable federal, state, and county regulations. Consideration of these facilities would be addressed in a mine permit revision.

2.2.3.9 Water Requirements

Depending on coal production, approximately seven million gallons of water per year would be utilized for dust suppression. This is an expected continuation of existing use at the Black Butte Mine. Water would be provided from retention ponds or from existing water wells located at the Black Butte Mine. All water sources would be permitted by the Wyoming SEO.

2.2.3.10 Blasting Plan

BBCC would conduct all blasting operations in compliance with WDEQ/LQD Rules and Regulations, Chapter VI, Section 4(a)(i-v) and 4(b)(i-iii). To make the general public aware of blasting operations, BBCC would publish its blasting schedule once a year. The public notice of the blasting schedule would be published in the regional newspaper. This same notice would also be mailed to any local governments or residences if their facilities or homes are within one-half mile of the permit area.

There would be three basic types of blasts: overburden blasts for dragline, overburden blasts for shovel, and coal blasts. As a safety measure, BBCC personnel would design blasts to minimize flyrock and airblast. Due to the mine's remoteness, preblasting surveys and seismographic recordings of blasting operations by BBCC would not be required.

2.2.3.11 Control of Hazardous Materials and Solid and Hazardous Waste

All solid waste, including normal trash and non-saleable scrap iron would be transported to the surface support facility and disposed of at a licensed waste facility. Trash receptacles would be located at the surface support facility (outside of the project area) and at appropriate locations throughout the project area. All receptacles would be collected regularly and transported from the permit area to selected and approved disposal sites.

Solid waste that would be produced at the surface support facilities and project area may include floor sweepings, shop rags, lubricant containers, welding rod ends, metal shavings, worn tires, packing material, used filters, and office and food wastes. Sewage is handled by WDEQ/permitted sewage systems at the existing surface support facilities. Portable toilets would be provided for workers at the project area. Waste from these would be transported to the sewage system at the surface support facility.

Maintenance and major oil changes for most moveable equipment would take place inside the service building at the existing Black Butte Mine. Used oil would be contained and disposed of in accordance with WDEQ Solid and Hazardous Waste Division guidelines. Mobile fuel trucks would be used to service and fuel mine equipment in the project area as appropriate. All fuel storage facilities and equipment would be constructed and operated in accordance with all applicable state and federal regulations.

BBCC has reviewed the EPA's Consolidated List of Chemicals Subject to Reporting Under the Superfund Amendments and Re-authorization Act of 1986, as amended, and EPA's List of Extremely Hazardous Substances as defined in 40 CFR 355, as amended, for hazardous substances used at the Black Butte Mine. BBCC maintains files containing materials safety data sheets for all chemicals, compounds, and substances, which would be used during the course of mining.

BBCC would be responsible for ensuring that all production, use, storage, transport, and disposal of hazardous or extremely hazardous materials as a result of mining are in accordance with all applicable federal, state, and local government rules, regulations, and guidelines. All mining activities involving the production, use, or disposal of hazardous or extremely hazardous materials would be conducted to minimize potential environmental impacts.

BBCC would prepare and implement several plans or policies to ensure environmental protection from hazardous or extremely hazardous materials. These include:

- Spill prevention, control, and countermeasure plans
- Spill response plans
- Inventories of hazardous chemical categories pursuant to section 312 of the EPA's Superfund Amendments and Re-authorization Act, as amended
- Emergency response plans

All mining operations would comply with regulations promulgated under the Resource Conservation and Recovery Act, Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act, Toxic Substances Control Act, Mine Safety and Health Act, and the Clean Air Act. In addition, mining operations would comply with all attendant state rules and regulations relating to hazardous materials reporting, transportation, management, and disposal. Acquisition of the LBA tract and other lands within the project area by BBCC would not change the current practices being implemented for Black Butte Mine nor the type and quantities of wastes generated or disposed of at the mine. Hazardous materials anticipated to be used or produced during the implementation of the Proposed Action fall into the following categories:

- Fuels - gasoline (potentially containing benzene, toluene, xylene, methyl tert-butyl, ether, and tetraethyl lead), and diesel fuel;
- Coolants/antifreezes;
- Lubricants - grease (potentially containing complex hydrocarbons and lithium compounds) and motor oil;
- Paints; and
- Solvents.

2.2.3.12 Post Mine Reclamation

BBCC would develop a site-specific, detailed reclamation plan in consultation with the WDEQ/LQD. The plan would include specifications for grading the surface to an acceptable contour, how salvaged topsoil is reapplied to an acceptable depth over suitable overburden, and how vegetation is re-established for the determined post mining land use. A detailed channel restoration plan would be developed for major drainages.

BBCC would be required to post a reclamation performance bond for all areas physically disturbed by mining operations with the State of Wyoming to ensure that it complies with all the reclamation requirements of the WDEQ/LQD permit and that reclamation requirements are met. Once mining and reclamation operations have been completed, BBCC would follow reclamation bond release procedures specified by WDEQ/LQD.

Reclamation bond release would occur after a 10-year bond release period (post-completion of permanent reclamation operations) on stable reclaimed land where revegetation standards have been met. WDEQ/LQD would release the full reclamation performance bond after strict reclamation standards have been met and the public has been provided an opportunity to comment.

Prior to reseeding, all compacted areas would be scarified by ripping or chiseling to loosen compacted soils. Scarification promotes water infiltration, soil aeration, and root penetration. Scarification would be done when soils are dry to promote shattering of compacted soils. Seedbed preparation would be conducted immediately prior to seeding to prepare a firm seedbed conducive to proper seed placement and moisture retention, break up surface crusts, and eliminate weeds. It is anticipated that chiseling would be sufficient because it leaves a surface smooth enough to accommodate a tractor-drawn drill seeder but rough enough to catch broadcast seed and trap moisture and runoff.

The seed mix used for revegetation would include a diverse mix of native perennial grasses, forbs, and shrubs. Reclamation would attempt to re-establish native plant communities with an emphasis on sagebrush steppe habitats. Establishment of native species would support post-mining land use by stabilizing the soil, providing livestock and wildlife forage, and providing thermal, nesting, and parturition cover for wildlife. Native species likely to be considered include bluebunch wheatgrass, bottlebrush squirreltail, needle-and-thread grass, and Wyoming big sagebrush. In general, reclamation operations would use weed-free seed, equipment, and methods that are appropriate for arid plains

conditions and those that have been successfully used for re-vegetation at other mines in the area. Special consideration of post mining habitat establishment for mule deer crucial winter range and sagebrush obligate species would be performed in coordination with the WDEQ/LQD, the Wyoming Game and Fish Department (WGFD), and BLM.

Fall and spring seeding would occur to take advantage of available moisture. During final reclamation and abandonment, as specified in the mine permit, BBCC would obtain necessary authorizations from the appropriate regulatory agencies to abandon facilities.

2.2.3.13 Avoidance of Public Nuisance and Endangerment

As specified under Wyoming Statute 35-11-406 (m)(viii), the director of the WDEQ can deny a permit to mine if the affected lands lie within 300 feet of any existing occupied dwelling, home, public building, school, church, community or institutional building, park or cemetery, unless the landowner's consent is obtained. None of these features occurs within 300 feet of the project area. The nearest occupied dwellings, homes, public buildings, schools, churches, or institutional buildings, parks, cemeteries, or community centers are located over 13 miles northwest of the project area in the community of Point of Rocks.

2.2.3.14 Normal Operating Hours

Proposed mine operations would be identical to those at the existing Black Butte Mine. Mining operations would be proposed to occur 24 hours per day, seven days per week, and 52 weeks per year.

2.2.3.15 Signage

To facilitate health and safety requirements to the general public, all public access would be restricted/precluded within the project area for the life of the operation. An entrance identification sign would be posted and maintained at all major entrances into the project area. The signs would contain the name, address, and telephone number of the operator, the name of the local authorized agent, the WDEQ/LQD permit number of the operation, and notification of restricted access.

2.2.3.16 Fire Control

BBCC maintains a trailer-mounted fire extinguisher, water trucks, and dozers that may be utilized in the event of an equipment fire or wildland fire. BBCC also has established procedures to respond to and combat fires. All employees are trained in the use of hand-held fire extinguishers, and appropriate personnel are trained in the specific use of other firefighting equipment.

2.2.3.17 Weed Control

Designated or prohibited noxious weeds on lands within the project area would be controlled. In general, the following procedures would be instituted:

- Land disturbance would be kept to a minimum during the mining process.
- BBCC would utilize only certified weed-free mulch and seed during reclamation operations.
- Chemical herbicides may be used to control designated or prohibited noxious weeds. The local weed and pest agency would be contacted, and the situation would be addressed in compliance with appropriate regulations.

2.2.3.18 Estimated Employment Requirements

The existing Black Butte Mine employs a staff of 171 full-time personnel (Annual Report of the Wyoming State Inspector of Mines 2004). This staffing level is expected to remain stable through 2025 if the lease is awarded to BBCC, and mining operation is implemented.

2.2.3.19 Traffic Estimates

There would be an estimated traffic load of six unit trains per week to and from the existing Black Butte Mine facilities. Haul trucks would carry approximately 100 tons of coal per load from the project area to the Pit 8 hopper at the Black Butte Mine. The number of haul trucks required would be dictated by the distance between the coal loading area and the Pit 8 hopper on the existing permit area and the coal production quantity.

2.2.4 Resource Protection Measures

Beyond the standard and BLM special lease stipulations (**Appendix D**) including those contained in the Green River RMP and ROD (BLM 1997), BBCC would implement the following resource protection measures, WDEQ/LQD permit mitigation measures, and environmental performance standards measures. These stipulations, rules, and regulations would be adhered to on all project area lands.

2.2.4.1 Soil Protection Measures

BBCC proposes to minimize soil erosion by using the following measures:

- Topsoil stockpiles would be planted with an appropriate seed mixture.
- Seeding of reclaimed areas would occur after topsoil has been applied.
- Approved sediment control measures would be used when applicable.
- Surface disturbance would be limited to only those areas required by the operation.
- Extra caution would be used during wet weather to prevent excessive rutting.
- Any erosion occurring within the active mine area would be mitigated as necessary.

2.2.4.2 Surface and Groundwater Protection Measures

BBCC has installed 10 groundwater monitoring wells within the project area. Additional wells may be needed to meet permit requirements. Baseline data is currently being gathered to establish groundwater quality and quantity, with additional baseline monitoring to continue through 2006. A plan for monitoring during and after mining would be developed in consultation with WDEQ/LQD and WDEQ/WQD. Impacts on surface water would be minimized by timely reclamation of disturbed areas and by construction of ditches and berms to manage and control water within the disturbed areas of the Proposed Action. Additional sediment control measures or sediment ponds would be developed in consultation with the WDEQ (Section 2.2.3.5).

2.2.4.3 Big Game Protection Measures

The Proposed Action would limit impacts on big game (antelope, mule deer, and elk) by reclaiming lands for a post-mining use of range land for livestock and wildlife. The seed mix selected for reclamation would consist of native perennial grasses, forbs, and shrubs indicative of a sagebrush steppe habitat suitable to support post-mine land use by big game. Special attention would be given to habitat restoration of mule deer crucial winter range. Reclamation and habitat restoration would be coordinated with the WDEQ/LQD through the permit revision process.

2.2.4.4 Sagebrush Obligate Sensitive Species Protection Measures

Reclamation and habitat restoration measures would be developed by BBCC in coordination with the BLM and the WDEQ/LQD. These measures could include any or all of the following techniques: re-establishment of shrubs, forbs, and grasses indicative of sagebrush steppe communities in the region; grading of reclaimed lands to include swales and depressions; monitoring of greater sage-grouse leks on and adjacent to the project area before, during, and after mining. Though a 2005 field survey designed to identify greater sage grouse use and habitat within the project area did not identify any previously unknown lek locations, appropriate mitigation steps would be taken should any new leks become established during the life of the operation.

2.2.4.5 Raptor Protection Measures

The mine plan would include the continuation of the existing raptor monitoring and mitigation plan approved by the USFWS, BLM, WGFD, and WDEQ/LQD (BBCC 2005a). Monitoring in the project area has been on-going for several years and includes nest monitoring, territory assessment, and prey-base analysis.

State and federal regulations limit surface activities near active raptor nests. The size of the restrictive radius and the timing restrictions as identified in a No Surface Occupancy (Dunder 2005a) are as follows:

- During the nest building and incubation period, the distance for bald eagles and ferruginous hawks is one mile and for all other raptors, it is a half mile.
- Outside of the nest building and incubation period, the distances are 1,968 feet for all eagles, 1,313 feet for ferruginous hawks, and 815 feet for all other raptor species.

The distances may be modified depending on species of raptor and whether or not the nest is within the line of sight to construction and mining activities.

2.2.4.6 Air Quality Protection Measures

Under the Proposed Action, road watering, road maintenance, and the application of a chemical dust suppressant on haul roads and access roads would limit air quality impacts from fugitive dust emissions. A permit would be secured from the WDEQ/AQD prior to disturbance. In addition, contemporaneous interim reclamation would also reduce impacts on air quality by removing sources of fugitive dust. The following emission control measures would be used where applicable:

- Primary treatment strategy would include periodic water application (approximately 0.25-0.5 gallons per square yard) to the ground surface inside pit limits and temporary dirt roads as necessary to control fugitive dust using two Caterpillar 777 water trucks equipped with 18,000-gallon tanks.
- Secondary treatment strategy would include periodic calcium and magnesium chloride and water application (30 percent magnesium chloride solution at 0.3 to 0.5 gallons per square yard) to ground surface of major haul roads outside pit areas and scoria-treated roads. Re-treatment would generally be completed on a semiannual basis with water (primary) treatment applied as needed between chemical treatments.
- Special winter dust control strategies would include application of coal waste or scoria to snow covered or icy roads (with removal of the coal waste or scoria when road conditions improve).
- Pre-stripping areas of topsoil on the highwall side of the pit would be minimized.
- Any pre-stripped surface would be armored with temporary spoils (coarser materials).
- Where temporary spoils are not stacked, the pre-stripped surface would be ripped and/or seeded with the quick growing temporary seed mix (spring or fall seeding).

- Traffic over the pre-stripped area would be limited to a few designated routes and routes would be managed for dust suppression.
- Periodic WDEQ and BBCC evaluations of dust suppression activities and adjustment of plans as necessary would occur.

Additional emission control measures may be incorporated into the mine plan during the WDEQ permitting process or through other regulatory agency initiated actions to account for high wind or persistent drought conditions.

2.2.4.7 Public Health and Safety Protection Measures

BBCC would conduct all mining operations in accordance with Mine Safety and Health Administration regulations and procedures. Mining activity would not be in close proximity to any public highway or civil structure. Active mining areas would be bermed or signed to prevent accidental entrance. Blasting area locations and blasting schedules would be posted in area newspapers. All applicable laws concerning the handling and disposal of hazardous wastes would be followed. Spill Prevention Control and Countermeasure Plans would be updated periodically and kept on file at the mine for use in case of spills.

BBCC employees would be required to wear hearing protection in areas where noise levels may cause hearing damage. Due to the remoteness of the project area, no produced noise abatement measures are proposed.

2.2.4.8 Cultural Resource Protection

Based on the results of a Class III cultural resource survey conducted within the project area, all historic and prehistoric resources that are potentially eligible for the NRHP that could be adversely affected by the Proposed Action would be protected from disturbance or would be appropriately mitigated if the site could not be avoided. Where necessary and appropriate, site-specific mitigation measures would be developed and implemented in accordance with the current cultural resource protection plan contained in BBCC's approved WDEQ/LQD permit. The site-specific mitigation measures would also be developed and implemented with the concurrence of the BLM, OSM, WDEQ/LQD, and the Wyoming State Historic Preservation Office.

If any cultural resources are discovered during construction or reclamation operations, work in the area of the discovery would be halted, the appropriate regulatory agency would be notified, and appropriate treatment plans would be implemented. BBCC employees would be instructed not to search for, scavenge, or remove any cultural resources found while working on the project.

2.2.4.9 Fluid Leasable Mineral Protection

At the request of oil and gas operators with valid federal fluid mineral leases in the project area, the leases would be suspended until that time when oil and gas activities could be resumed without conflict with coal mining operations. BBCC would support this action if allowed by the BLM. Directional drilling is an option for oil and gas operators to access potential oil and gas resources. Based on increased costs and risks, and apparent unsuitability, this would likely not be a viable oil and gas recovery opportunity in the project area (BLM 2005b).

2.2.4.10 Adaptive Management Strategy

Should identified measures not perform to standards; the regulatory agencies (BLM, OSM, WDEQ/LQD, and AQD, etc.) and industry require the flexibility to mitigate impacts when more site and project specific information becomes available. This transition from prescriptive-based stipulations to adaptive management concepts of performance-based standards, would allow the agencies to move toward the

implementation of adaptive management principles recognizing that knowledge about natural resource systems is sometimes uncertain and changing. These principles will help the regulatory agencies make decisions effectively by utilizing a rigorous combination of management, research, and monitoring so that credible information is gained and management activities can be modified, over time, based on a continuous understanding gained from new information.

2.2.4.11 Public Land Survey

A licensed surveyor for BBCC would re-establish any Public Land Survey monuments removed as part of the normal mining operations. This action would likely occur after final reclamation has been completed and accepted by the WDEQ/LQD, but could be accomplished earlier in certain cases where the land surface is no longer being utilized in support of mining operations.

2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be approved and the LBA tract would not be leased or developed for extraction of federal coal reserves by BBCC. Though current mining operations would continue for an additional four years, BBCC may need to re-evaluate future mining operations based upon known reserves within the leases currently held.

The No Action Alternative allows a comparison of the economic and environmental consequences of leasing and mining LBA tract lands under BBCC's Proposed Action versus not leasing and mining them. Not leasing this land in a configuration associated with the existing Black Butte Mine at this time may result in a bypass of federal coal, which may not be in the public's best financial interest. However, selection of the No Action Alternative would not preclude the possibility of subsequent leasing and mining of these lands as a stand-alone mine as described in Section 2.4.2.

BBCC's ability to sustain historic coal production levels would be limited to the remaining economically recoverable coal reserves located within their existing Black Butte Mine permit area. Current projections based on existing contracts indicate production would continue through 2008 at 2.2 million tons per year (BBCC 2003). In 2009, production would decline and eventually cease (BBCC 2005a). Employment levels at the mine would be substantially reduced from the current 171 employees and the remaining employees would be used to service the Black Butte Mine's reclamation commitments.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The BLM reviewed three potential alternatives during the course of alternative development. Based on technical, economic, and/or environmental factors, none of these alternatives was considered to be a reasonable alternative to the Proposed Action nor would they effectively address the purpose and need for the proposal as described. None of these alternatives were carried forward for detailed analysis in this EIS. The rationale for eliminating each alternative from further analysis is discussed below.

2.4.1 Accessing Federal Coal Reserves by Underground Mining Methods

An alternative suggested during public scoping identified mining of coal reserves in the project area by use of underground recovery methods. BLM reviewed the technical feasibility aspects and determined that regional geology and anticipated surface cover within the project area would not facilitate this mining method. The coal seams of the Almond Formation underlying the project area are very different from those of the Fort Union Formation currently being mined via underground techniques by the Bridger Coal Company north of the project area. The Almond Formation has a steeper grade (10 percent) and thinner coal seams. The main Fort Union coal seam is up to 25 feet thick, whereas the Almond Formation seams range from 5.5 feet to eight feet thick, with some as thin as two feet, or less.

Although some of these seams may be minable using underground methods, there are three primary considerations that preclude underground mining for the proposed lease:

- The main coal seams are highly variable in thickness and tend to split into a number of thin, discontinuous seams along strike towards the north and the south ends of the project area, and to a lesser extent down-dip to the east. The parting thickness between these coal splits also increases dramatically towards the north and the south.
- In typical underground mining operations with splitting seams, operators must wash the coal if it is diluted with parting or interburden. BBCC does not currently have a coal washing operation and has not proposed one for development of the project area.
- The grade of the seams progresses downward to the east from a western outcrop/subcrop at about a 10 percent slope. Most longwall mining systems used in underground mining require a slope no greater than five or six percent, and a slope of less than three percent is preferred.

If the local geology was consistent and coal seams were not split, BBCC (or any coal mining company), would need to invest in high capital equipment and methodologies to safely and economically develop the project area. Assuming an objective of maximum recovery, a mining company would have to invest in a longwall mining package and refit any existing or proposed operations to facilitate this methodology. Because underground mining requires an entry portal, the process would require opening a significant box cut, or face at depth. A mine operator would not be able to recover the majority of the coal reserves identified in the project area due to the nature of underground mining, where pillars would need to be left in place permanently. Furthermore, longwall mining is risky in shallow overburden situations due to the tendency to cave to the surface in those conditions. This has the effect of crushing-out the support pillars surrounding the longwall panel and causing heavy damage, or even loss of the equipment, and also creating a very hazardous working situation for underground miners. Given the geological constraints of this case, the cost of developing an underground mining operation would be greater than the cost for surface mining. For these reasons, this alternative was found to be technically impractical and uneconomical and was therefore eliminated from further consideration.

2.4.2 Non-BBCC Coal Lease

This alternative assumes that the BLM would award the lease to a bidder other than the current applicant. Because there are no adjacent mines that could incorporate the coal reserves into an existing operation, a successful bidder other than BBCC would have to establish a new stand-alone mine and associated facilities and infrastructure.

A new stand-alone mine would require considerable initial capital expenses, including the construction of new external transportation facilities (e.g., rail loop or paved access road), surface facilities (e.g., coal-processing facilities, coal load-out facilities), internal transportation facilities (e.g., conveyors or haul roads), utilities and communication facilities (e.g., powerline, transformers, water wells, telephone lines), and support buildings (e.g., offices, shop, change house, and warehouse).

The new coal mine would compete for customers with established mining operations in the immediate area (i.e., Bridger Mine, Leucite Hills Mine, and Black Butte Mine) and in the region (e.g., P&M Kemmerer Mine). No other companies have expressed an interest to the BLM in coal exploration or development activity in the LBA tract. Further, the size of the LBA tract and the small amount of estimated federal coal reserves within would not be sufficient to make a new, stand-alone mine economically practical. For these reasons, it is unlikely that the LBA tract would attract additional bidders interested in starting a new mine. Therefore, this alternative was eliminated from consideration and is not analyzed in detail in this EIS.

In the event that the successful bidder for the federal coal reserves within the LBA tract is not the BBCC, that bidder would be required to submit detailed mine development information, including mine and

reclamation plans and mine and support facility requirements. Because any new mine facilities not associated with the Proposed Action have not been addressed in an analysis to date, this NEPA analysis would be reviewed and supplemented as necessary.

2.4.3 Postpone Competitive Lease Sale

Under this alternative, the sale of the federal coal reserves within the LBA tract would be postponed more than five years. Postponement would be based on the assumption that coal prices would rise in the future, thus increasing the fair market value of the area resulting in a higher bonus bid when the coal is sold.

The leasing and mining of federal coal generates three sources of revenue to federal and state governments: (1) a bonus bid is paid at the time the coal is leased, (2) a fee of $3.00 per acre is paid annually, and (3) a royalty payment (based on 12.5 percent of the gross value of the coal for surface mining methods and eight percent of the gross value of the coal for underground mining methods) is collected when the coal is sold. The royalty payment is normally larger than the bonus bid, and because it is collected when the coal is sold, it includes a mechanism for government revenues to increase if prices rise. Although postponing the lease sale until prices rise could conceivably result in a higher bonus bid paid for the LBA tract, it would not necessarily result in higher royalty payments. The process for leasing and permitting a coal tract typically takes several years; if a sale is postponed until the prices increase, coal prices would not necessarily remain high until the coal is actually mined.

The economic concept of “net present value of money” suggests that future economic values must be financially discounted due to (1) the effect of inflation and (2) the analysis that money earned today is more valuable than undetermined revenues earned in the future because it can be invested at a known rate. Therefore, unless coal prices are both increased and sustained, it is in the government's best financial interest to lease the coal tract today rather than waiting an unspecified period of time in hope that the price of coal would increase in the future. Therefore, this alternative was eliminated from consideration and not analyzed in detail because the potential economic benefits of postponement are not predictable and because the effects of mining at a later time would be similar to those discussed herein

2.5 COMPARISON OF ALTERNATIVES

The following tables compare the impacts from the Proposed Action and No Action Alternative, including a summary comparison of projected coal reserves, surface disturbance, mine life, and projected federal, state and local revenues (**Table 2.4**), the magnitude of direct and indirect impacts (**Table 2.5**), and a comparative summary of cumulative impacts (**Table 2.6**). The tables are presented to give a concise summary of the alternatives in a comparative form. The environmental consequences are fully analyzed in Chapter 4.

These summary impact tables are derived from the following explanation of impacts and magnitude. Under NEPA, all agencies of the federal government are required to provide a detailed statement on:

- The environmental impact of the Proposed Action;
- Any adverse environmental effects that cannot be avoided;
- Alternatives to the Proposed Action;
- The relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and
- Any irreversible and irretrievable commitments of resources (42 USC 4332[2]).

Impacts can be beneficial or adverse, and they can be a primary result of an action (direct) or a secondary result (indirect). They can be permanent (persisting beyond the time the reclamation bond is released), long term (ending after mining ceases and before the reclamation bond is released), or short term (persisting only during mining). The level of impacts also may vary. The basis for the conclusions

regarding significance are the criteria set forth by the CEQ (40 CFR 1508.27) and the professional judgment of the specialists doing the analyses. Impacts may range from negligible to substantial. Impacts can be significant during mining but be reduced to less than significant levels following completion of reclamation. Definition of the magnitude of impacts associated with the Proposed Action and No Action Alternatives is presented in Chapter 4.

Table 2.4 Comparison of Coal Production, Surface Disturbance, and Mine Life

Item	No Action Alternative (existing Black Butte Mine)	Added by the Proposed Action
Coal Reserves[1] (as of 1/1/06)	8.9 million tons	34.6 million tons
Federal Lease Acres[2]	14, 902 acres	1,399 acres
Total area to be disturbed[3]	14,920 acres	2,250 acres
Permit Area[4]	38,053 acres	4,359 acres
Average annual post 2005 coal production	2.2 million tons	0[5]
Remaining life of mine (as of 1/1/06)	4 years	20 years
Average number of employees	171	0[6]
Total projected federal, state, and local revenues from existing coal reserves (as of 1/1/05)	$30 million to $76 million	$160 million to $300-million

[1] No Action Alternative coal quantities shown are the estimated remaining production quantity. Proposed Action coal quantity represents in-place minable coal.
[2] Under the Proposed Action, acreage includes the LBA tract only. Under the No Action Alternative acreage does not include state and private coal within the permit area.
[3] Includes areas reclaimed at the existing Black Butte Mine and anticipated disturbance over life of mine
[4] The permit area encompasses all federal, state, and private lands to be mined or otherwise containing ancillary facilities used to support mining activities.
[5] The amount of production would remain unchanged from current mining.
[6] No additional employment is expected by Proposed Action.

Table 2.5 Summary Comparison of Direct and Indirect Impacts

(Chapter 4 contains additional description of impacts.)

Resource	Magnitude, Type and Duration Of Impact	
	No Action	**Proposed Action**
AIR QUALITY		
Coal mining operations would increase emissions of air pollutants which may increase concentrations of particulate matter, as well as CO, NO_2, and SO_2.	Direct short-term concentrations of particulate matter may increase and may exceed the 24-hour PM_{10} NAAQS.	Same as the No Action Alternative but expanded in duration and area from coal removal in the project area.
Indirect impacts include emissions from coal combustion (electrical power production).	Indirect impacts are long term and may range in magnitude but would occur regardless of alternative.	Indirect impacts are long term and may range in magnitude but would occur regardless of alternative.
GEOLOGY AND MINERALS		
The topography following reclamation would be gentler and more uniform.	Impacts would be moderate and permanent on the existing Black Butte Mine.	Same as the No Action Alternative but expanded in area due to mining in project area.
Coal, overburden, and interburden would be removed. Overburden and interburden would be replaced. Replaced interburden and overburden would contain similar lithologies, but dissimilar physical characteristics from pre-mining material. Unsuitable overburden and interburden material would be placed in areas where it would not affect groundwater quality or revegetation success.	Impacts would be moderate and permanent on the existing Black Butte Mine.	Same as the No Action Alternative but expanded in area due to mining in project area.
No loss of the coal bed natural gas is anticipated. Conventional oil, gas, and coal bed natural gas (CBNG) resources could not be developed in active mining areas.	Impacts would be negligible and short term on the existing Black Butte Mine.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.5 (cont.) Summary Comparison of Direct and Indirect Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
SOILS		
Changes to physical properties would include increased near-surface bulk density and more uniformity in soil type, thickness, and texture.	Impacts would be moderate and long term to permanent on Black Butte Mine. Some changes to physical properties would be beneficial.	Same as the No Action Alternative but expanded in area due to mining in project area.
Changes in chemical properties would include more uniform soil nutrient distribution.	Impacts would be moderate and long term to permanent on the Black Butte Mine. Some changes to the physical properties would be beneficial.	Same as the No Action Alternative but expanded in area due to mining in project area.
Changes in biological properties would include a reduction in organic matter and microorganism populations. The existing plant habitat in stockpiled soils would be reduced.	Impacts would be moderate and long term to permanent on the Black Butte Mine. Some changes to the physical properties would be beneficial.	Same as the No Action Alternative but expanded in area due to mining in project area.
The WDEQ permit requirements would reduce the potential for increased erosion and sedimentation.	Impacts would be moderate and long term to permanent on the Black Butte Mine. Some changes to the physical properties would be beneficial.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.5 (cont.) Summary Comparison of Direct and Indirect Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
WATER RESOURCES		
Runoff events would carry additional sediment loads from disturbed sites. Potential increases in runoff, wind and water erosion, and sedimentation within the project area due to disturbances to vegetation and soil resources. In some cases where pre-mining stream channel function is poor, reclamation may improve the erosion and sedimentation characteristics.	Impacts would be minor and short term to long term on Black Butte Mine area due to on-going mining. Impacts would be addressed under the present mine sediment control and reclamation plan.	Same as the No Action Alternative but expanded in area due to mining in project area.
Surface water depletion from the Colorado River system would occur due to evaporative losses from retention ponds.	Impacts would be moderate and short term on the existing Black Butte Mine and downstream due to on-going mining.	Impacts would be addressed through sediment control and reclamation activities.
Groundwater potentiometric surface drawdown would propagate from the area of coal removal.	Impacts would be minor and long term on the Black Butte Mine area due to on-going mining.	Same as the No Action Alternative but expanded in area due to mining in project area.
Groundwater in the backfilled aquifer, following mining activities, is predicted to exhibit an increase in total dissolved solids concentrations as backfilled materials are saturated. Over time the groundwater quality of the water in the backfill aquifer will return to near pre-mine conditions. It is expected that the water quality of the backfill aquifer will have the same use classification (Class III, livestock) and the groundwater in the area prior to mining.	Impacts would be minor and long term on the Black Butte Mine area due to on-going mining.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.5 (cont.) Summary Comparison of Direct and Indirect Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
VEGETATION (including invasive species)		
During mining, progressive removal of native vegetation would result in increased erosion, loss of wildlife and livestock habitat, and loss of wildlife habitat carrying capacity.	Impacts would be moderate and short term to long term on Black Butte Mine. Steps to control invasion by nonnative plant species would be continued.	Same as the No Action Alternative, but expanded in area due to mining in project area.
After reclamation, vegetation patterns would be changed, vegetation diversity would be decreased, shrub density could be reduced and wildlife carrying capacity would potentially be reduced.	Impacts would be moderate, trending toward minor and long term.	Same as the No Action Alternative, but expanded in area due to mining in project area.
WILDLIFE AND FISHERIES (including special status species)		
During mining, wildlife would be displaced from and habitat would be lost in active mining areas. Wildlife movement through the project area would be restricted and shifts in habitat utilization would occur during the life-of-operations. Nesting and foraging habitat for all species would be lost. Suitable habitat for sagebrush-obligate species would be disturbed. Mine related traffic would increase wildlife mortality.	Impacts would be minor to moderate and short term to long term on Black Butte Mine area.	Same as the No Action Alternative, but expanded in area due to mining in project area.
After reclamation, big game habitat carrying capacity on reclaimed lands would be restored, but habitat diversity may decrease. Wildlife use may diminish available forage on reclaimed area and hinder reclamation success.	Impacts would be minor to moderate and long term on Black Butte Mine area.	Same as the No Action Alternative, but expanded in area due to mining in project area.

Table 2.5 (cont.) Summary Comparison of Direct and Indirect Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
Direct impacts on breeding raptors could include temporary or permanent displacement, or nest abandonment from construction or operations noise and activity; loss of brood (i.e., egg or young); destruction or alteration of nesting or roosting habitat; and/or destruction or alteration of foraging habitat or resources. However, because raptor protection and mitigation measures are built into the Proposed Action, it is unlikely that breeding raptors would incur impacts from implementation of the Proposed Action.	Impacts would be minor to moderate and long term on Black Butte Mine area.	Same as the No Action Alternative, but expanded in area due to mining in project area.
Indirect impacts on raptors could include a decrease in available prey, such as small mammals that rely upon sagebrush habitats, and subsequent displacement, nest abandonment, or otherwise failed breeding attempts.	Impacts would be minor to moderate and long term on Black Butte Mine area.	Same as the No Action Alternative but expanded in area due to mining in project area.
Impacts on BLM-sensitive species could include direct loss of habitat, temporary or permanent displacement; and restriction of movement (caused by mine pit, haul roads, etc). However, to the extent that suitable, unoccupied habitat is available adjacent to the project area, populations would remain relatively unaffected. If suitable, occupied habitat is available nearby. Individuals would likely still be able to utilize the cover and forage resources therein, but could suffer from the effects of competition if the areas became congested by overuse from displaced species.	Impacts would be negligible to moderate and long term, depending on the species on existing Black Butte Mine area.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.5 (cont.) Summary Comparison of Direct and Indirect Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
WILDHORSES		
Loss of forage would displace individuals to nearby suitable habitat. Because necessary resources for wild horses exist throughout the entire HMA, the loss of these acres would not likely impact wild horse populations.	Impacts would be minor and short term on Black Butte Mine area.	Same as the No Action Alternative but expanded in area due to mining in project area.
LAND USE, GRAZING, RECREATION, AND TRANSPORTATION		
Public access would be eliminated during the life-of-operations (active mining) to ensure public safety, and restricted during post-mine reclamation to assist the establishment of suitable vegetation.	Impacts would be moderate to substantial and short term to long term on Black Butte Mine area.	Same as the No Action Alternative but expanded in area due to mining in project area.
Livestock grazing use in active mining areas would be restricted during the life of the mine and until adequate reclamation is achieved.	Impacts would be moderate to substantial and short term on Black Butte Mine area.	Same as the No Action Alternative but expanded in area due to mining in project area.
Oil and gas production and transportation facilities would be restricted from active mine areas during mining. Subcoal oil and gas reservoirs would not be accessible for development during mining and before reclamation.	Impacts would be minor to moderate and short term on Black Butte Mine.	Same as the No Action Alternative but expanded in area due to mining in project area.
Hunting and other recreational activity access would be restricted during mining.	Impacts would be moderate and short term on Black Butte Mine.	Same as the No Action Alternative but expanded in area due to mining in project area.
Loss of use of two-track routes in project area boundaries. Railroads would be used to ship coal; employees would travel to and from work on existing roads.	Impacts would be minor and short term for mining operations within the Black Butte Mine area.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.5 (cont.) Summary Comparison of Direct and Indirect Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
VISUAL RESOURCES		
Alterations to line, form, character, and texture would occur. Mining in the project area would not be visible from any major travel routes. Portions of the Black Butte Mine area and ancillary facilities proposed for use by this project would be highly visible from Interstate 80 and routes within the project area.	Impacts would be moderate and short term on the Black Butte Mine area during mining. Impacts would be minor and permanent following reclamation.	Same as the No Action Alternative but expanded in area due to mining in project area.
As the land is reclaimed, the surface disturbance from mining would be recontoured with re-creations of existing landforms occurring where practical. Revegetation of land surfaces would buffer visual impact; however, until vegetation has matured, the lack of sagebrush would set disturbed areas off of undisturbed areas. When revegetation maturation is complete it would be difficult to distinguish disturbed areas from undisturbed areas.	Impacts would be moderate and short term on the Black Butte Mine area during mining. Impacts would be minor and permanent following reclamation.	Same as the No Action Alternative but expanded in area due to mining in project area.
CULTURAL RESOURCES (including Native American Concerns)		
Historic and prehistoric sites and isolated artifacts would be disturbed. All sites that meet the eligibility requirements for the NRHP would be avoided or mitigated through data recovery. Potential for vandalism and unauthorized collection would increase.	Impacts would be moderate and long term to permanent.	Same as the No Action Alternative but expanded in area due to mining in project area. No Native American Concerns identified in the project area.
SOCIOECONOMICS		
Federal, state and local governments would receive revenues from royalties and taxes. Sweetwater County would benefit from economic development, stable employment, and taxes.	Impacts would be moderate and short term for mining operations on existing mine area while mining continued. Following cessation of mining and reclamation activities, impacts would be moderate and permanent.	Impacts would be moderate, beneficial, and short to long term for mining operations on expanded area of coal removal.

Table 2.6 Summary Comparison of Cumulative Impacts

(Chapter 4 contains additional description of impacts.)

RESOURCE	Magnitude Type and Duration of Impact	
	No Action	**Proposed Action**
AIR QUALITY		
Far field visibility and atmospheric deposition would cause impacts on Bridger Wilderness Area and terrestrial ecosystems.	Impacts would be moderate and long term within the cumulative impact assessment area (IAA).	Same as the No Action Alternative but expanded in area due to mining in project area.
GEOLOGY AND MINERALS		
Coal would be removed from the area and would not be available for use in the future.	Impacts would be moderate but permanent in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
Conventional oil and gas development and CBNG would be postponed.	Impacts would be minor and short term in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
SOILS		
Changes to physical, chemical and biological properties of soils in the disturbed areas of the IAA.	Impacts would be moderate and long term to permanent in the IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
Potential for increased erosion and sedimentation in the IAA prior to reclamation.	Impacts would be moderate and long term in the IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.6 (cont.) Summary Comparison of Cumulative Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
WATER RESOURCES		
Storm water and snowmelt events that occur within the project area and in combination with other disturbances in the assessment area with surface water retention systems would result in decreased contributions to stream flow.	Impacts would be minor and short term to long term in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
Drawdown of the potentiometric water surface in water bearing units would occur.	A localized and minor impact would occur in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
VEGETATION (including invasive species)		
Progressive removal of native vegetation would result in increased erosion, loss of wildlife and livestock habitat, and loss of wildlife habitat carrying capacity.	Impacts would be negligible in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
After reclamation, vegetation patterns would be changed, vegetation diversity would be decreased, shrub density could be reduced and wildlife carrying capacity would potentially be reduced.	Impacts would be negligible in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.6 (cont.) Summary Comparison of Cumulative Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
WILDLIFE (including special status species)		
Wildlife would be displaced from and habitat would be lost in surface disturbed areas. Wildlife movement could be restricted.	Impacts would be minor to moderate and long term in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area. Impacts would be minor to moderate and long term in the cumulative IAA.
Impacts on special status species could include permanent displacement and restriction of movement. This might include loss of habitat and potential for establishment.	Impacts would be likely impact but are minor for Colorado River endemics in the cumulative IAA. The USFWS has determined that any water withdrawal from the Colorado River system may constitute a may affect status and may jeopardize Colorado River threatened and endangered fish species. Impacts to migratory birds, raptors, sage grouse, mountain plover, pygmy rabbit, white-tailed prairie dog, and swift fox would be negligible to minor in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area. Impacts would likely impact but be minor for Colorado River endemics in the cumulative IAA. Impacts to migratory birds, raptors, sage grouse, mountain plover, pygmy rabbit, white-tailed prairie dog, and swift fox would be minor to moderate in the cumulative IAA.
WILD HORSES		
Loss of forage would displace individuals to nearby suitable habitat.	Impacts would minor and long term in the cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
LAND USE, GRAZING, RECREATION, AND TRANSPORTATION		
Other land uses in disturbed areas would be precluded for the mine life and restricted during final reclamation. Grazing, Oil and gas production and transportation facilities would be prohibited and restricted from active mine areas. Hunting and other recreational activity access would be restricted for the mine life.	Impacts would be minor to moderate for livestock grazing, recreation, and transportation in the cumulative IAA. Impacts would be minor in the cumulative IAA for oil and gas production.	Same as the No Action Alternative but expanded in area due to mining in project area.

Table 2.6 (cont.) Summary Comparison of Cumulative Impacts

Resource	Magnitude, Type and Duration Of Impact	
	No Action	Proposed Action
VISUAL RESOURCES Alterations to line, form, character, and texture would occur. Revegetation of land surfaces would buffer visual impacts; however, until vegetation has matured, the lack of sagebrush would set disturbed areas off of undisturbed areas.	Impacts following reclamation would be moderate and permanent in cumulative IAA.	Same as the No Action Alternative but expanded in area due to mining in project area.
CULTURAL RESOURCES (including Native American Concerns) Loss of information about heritage in the analysis area and in the region if these sites are not identified and inventoried prior to disturbance. Any loss or damage to unidentified cultural or historical sites or resources associated with the assessment area could be substantial.	Impacts would be moderate and permanent in the cumulative IAA for known sites. Impacts may be greater on private lands where cultural inventories are not required.	Same as the No Action Alternative but expanded in area due to mining in project area.
SOCIOECONOMICS The tax base to the county, state, and federal governments would increase. Employment opportunities and the population of Sweetwater County would increase. Property values, the need for more schools, medical facilities, and other community services would also increase.	Impacts would be substantial and long term in the cumulative IAA. The cessation of mining at the end of the Black Butte Mine's permitted reserves would create a negative and moderate impact that would slow growth impacts associated with known and reasonably foreseeable actions.	Impacts would be substantial and long term in the cumulative IAA with the additive impact of the mine contributing a stable base for reasonably foreseeable future actions to build tax base on. However, the need for additional community services would be realized sooner than in the No Action Alternative.

CHAPTER 3.0 - AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The Affected Environment chapter of this EIS for the proposed Pit 14 Coal LBA project discusses physical, natural, and social resources as they currently exist within the project area. Management issues identified by the BLM-RSFO, public scoping, and interdisciplinary analysis of the area have guided the material presented herein.

The proposed project could potentially affect critical elements of the human environment as listed in the BLM's NEPA Handbook H-1790-1 (USDI-BLM 1988) and subsequent Executive Orders. These critical elements are listed in **Table 3.1**, along with whether or not they would be potentially affected by the project and if they are addressed in the EIS. The resource elements discussed in this EIS are summarized in **Table 3.2**.

Table 3.1 Critical Elements of the Human Environment for the Pit 14 Coal LBA Project

Element	Status In The Project Area	Addressed In Text Of EIS
Air Quality Issues	Potentially affected	Yes
Areas of Critical Environmental Concern	None present	No
Cultural Resources	Potentially affected	Yes
Environmental Justice	Potentially affected	Yes
Farm Lands (prime or unique)	None present	No
Floodplains	None present	No
Invasive/Non-Native Species	Potentially affected	Yes
Native American Religious Concerns	Potentially affected	Yes
Threatened or Endangered Species	Potentially affected	Yes
Wastes, Hazardous or Solid	None present	No
Water Quality Drinking/Ground	Potentially affected	Yes
Wetlands/Riparian Zones	None present	Yes
Wild and Scenic Rivers	None Present	No
Wilderness (study area)	None present	Yes
Source: As listed in BLM National Environmental Policy Act Handbook H-1790-1 (BLM 1988b) and subsequent Executive Orders.		

For each resource element, an assessment area (also referred to as the impact assessment area (IAA) on figures in Chapter 3 and in Chapter 4), has been identified in order to analyze potential, project-related impacts on the resource. The assessment area, or IAA, is defined as the outermost boundary of an area that encompasses potential direct, indirect, and cumulative impacts that may affect the resources identified for analysis.

Existing disturbances within the assessment areas for each resource elements listed in **Table 3.2** is summarized in **Table 3.3**.

Table 3.2 Other Resource Elements Discussed in the Pit 14 Coal LBA Project

Element	Status In The Project Area	Addressed In Text Of EIS
Geology and Minerals	Potentially affected	Yes
Soils	Potentially affected	Yes
Surface Water Resources	Potentially affected	Yes
Vegetation	Potentially affected	Yes
Wildlife and Fisheries	Potentially affected	Yes
Wild Horses	Potentially affected	Yes
Land Use	Potentially affected	Yes
Visual Resources	Potentially affected	Yes
Social and Economic Values	Potentially affected	Yes

Table 3.3 Known Disturbance (in Acres) by Resource

Resource	Assessment Area Acres	Total Acres of Known Disturbance on BLM-Administered Land	Assumed Acres of Disturbance on Other Land[1]	Total Disturbed[2]
Solid Leasable Minerals	277,120	12,939	8,992	21,931 (7.91%)
Fluid Leasable Minerals	903,223	11,495	7,988	19,483 (2.16%)
Soils	4,359	2	1	3 (0.07%)
Groundwater	4,359	2	1	3 (0.07%)
Surface Water	271,169	8,620	5,991	14,611 (5.39%)
Vegetation (Including Special Status Plant Species and Invasive Species)	4,359	2	1	3 (0.07%)
Pronghorn	1,603,167	20,699	14,384	35,083 (2.19%)
Mule Deer	1,134,282	8,324	5,784	14,108 (1.24%)
Elk	1,453,728	10,959	7,615	18,574 (1.28%)
Raptor	107,860	5,769	4,023	9,812 (9.10%)
Special Status Animal Species	4,359	2	1	3 (0.07%)
Greater Sage-Grouse	711,526	8,160	5,670	13,830 (1.94%)
Fisheries	271,169	8,620	5,991	14,611 (5.39%)
Wild Horses	1,170,717	12,398	8,616	21,014 (1.79%)
Land Status & Prior Rights	4,359	2	1	3 (0.07%)
Livestock and Grazing Management	1,011,718	10,599	7,365	17,964 (1.78%)
Recreation	1,572,997	10,814	7,515	18,329 (1.17%)
Transportation and ROWs	4,359	2	1	3 (0.07%)
Visual Resources	697,910	10,366	7,204	17,570 (2.52%)
Cultural Resources	277,120	12,939	8,992	21,931 (7.91%)

[1] Assumed disturbance is equal to 40 percent of known disturbance acreage on BLM-administered lands
[2] Includes percentage of assessment area disturbed.

3.2 AIR QUALITY

The assessment area for air quality includes Sweetwater County, Wyoming and regional sensitive areas, including the Bridger Wilderness Area. **Figure 3.1** presents the general air quality assessment area.

Regional air quality is influenced by the interaction of several factors including meteorology, climate, the magnitude and spatial distribution of local and regional air pollutant sources, and the chemical properties of emitted air pollutants. The following sections summarize existing air quality monitoring activities as well as reported pollutant concentrations in the project area and region. All federal actions within the RSFO must comply with the Clean Air Act and be in conformance with the air quality management objectives specified in the Green River RMP and ROD (BLM 1997).

3.2.1 Air Quality Monitoring

3.2.1.1 Climate

The project area is located in a semi-arid cold, mid-latitude steppe climate regime typified by dry windy conditions, limited rainfall, and long cold winters (Christopherson 1992). **Table 3.4** summarizes components of climate in the project area between 2000 and 2004 and in the region between 1948 and 2005 (IML 2000-2004, Western Regional Climate Center 2005). A representative wind rose for Rock Springs Airport (AP) near the project area in southwest Wyoming is provided as **Figure 3.2**.

Table 3.4 Summary of Climate

Climate Component	Description
Temperature	Maximum temperature (Rock Springs AP, WY): 98°F (37°C) Minimum temperature (Rock Springs AP, WY): -37°F (-38°C) Mean annual temperature (Rock Springs AP, WY): 43°F (6°C) Maximum temperature (Black Butte Mine): 96°F (36°C) Minimum temperature (Black Butte Mine): -30°F (-35°C) Mean annual temperature (Black Butte Mine): 42°F (6°C)
Wind Speed	Predominant Wind Direction (Black Butte Mine): 18.5 percent from West Average Wind Speed (Black Butte Mine): 8.9 mph Maximum Wind Speed (Black Butte Mine): 39.5 mph Minimum Wind Speed (Black Butte Mine): 0 mph
Precipitation	Mean annual precipitation (Rock Springs AP, WY): 8.8 inches Mean annual snow depth (Rock Springs AP, WY): 1 inch Mean annual snowfall (Rock Springs AP, WY): 43.6 inches

Indicators of air quality addressed in this section include concentrations of air pollutants, visibility, and atmospheric deposition. Air pollutant concentration is an indicator of breathable, healthful air; visibility is an indicator of our ability to see the landscape around us; and atmospheric deposition is an indicator of the health of terrestrial and aquatic ecosystems.

3.2.1.2 Air Pollutant Concentrations

Pollutant concentration refers to the amount of a pollutant present in a given amount of air, and can be reported in units of micrograms per cubic meter ($\mu g/m^3$), parts per million (ppm) or parts per billion

(ppb). In addition to meteorological monitoring conducted by numerous agencies and entities throughout the area, the State of Wyoming utilizes monitoring to determine whether the region is in compliance ("attainment") with Wyoming and federal concentration standards (**Figure 3.1**).

The WDEQ/AQD performs regulatory criteria pollutant monitoring throughout the State of Wyoming for nitrogen dioxide (NO_2), ozone (O_3), and two categories of particulate matter: fine particulates with an aerodynamic diameter of 10 micrometers or less (PM_{10}), and fine particulates with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$).

Monitoring system and network locations for various components of air quality presented in **Figure 3.1** include:

- State and Local Air Monitoring System (SLAMS) network measures concentrations of PM_{10} and $PM_{2.5}$ throughout Wyoming. There are 14 SLAMS locations in Wyoming. Data collected in 2003 from the Rock Springs SLAMS site are the most representative of the area potentially affected by the Proposed Action (WDEQ 2004a). Where fine particulate matter ($PM_{2.5}$) data are not collected, ambient $PM_{2.5}$ concentrations may be estimated as up to one half of the reported PM_{10} concentrations (Pace 2005). The $PM_{2.5}/PM_{10}$ ratio in an area varies depending upon the sources contributing to the concentrations, and may require additional data collection for accurate estimation.
- Clean Air Status and Trends Network (CASTNet) system has measured concentrations of sulfur dioxide (SO_2), sulfate (SO_4), O_3, nitrate (NO_3), nitric acid (HNO_3) and ammonium (NH_4) in the United States since the late 1980s. There are three CASTNet stations in Wyoming. Data from the Pinedale CASTNet site (PND165) are the most representative of the assessment area (EPA 2005).
- Wyoming Air Resources Monitoring System (WARMS) has also measured concentrations of SO_2, SO_4, HNO_3, particulate NO_3, total NO_3, and particulate NH_4 in Wyoming since 1999. WARMS data from the network start-up period from 1999 and 2000 may be unreliable. There are four WARMS stations in Wyoming. Data collected from the Pinedale WARMS site are the most representative of the assessment area (Sutton 2005).
- National Atmospheric Deposition Program (NADP) assesses wet deposition by measuring the chemical composition of precipitation (rain and snow). There are eight NADP stations in Wyoming. Data collected from the Pinedale NADP site (WY06) are the most representative of the assessment area (NADP 2005).
- Inter-Agency Monitoring of Protected Visual Environments (IMPROVE) has measured visibility in national parks and wilderness areas in the United States since the 1980s. There are six IMPROVE stations in Wyoming. Data collected from the Bridger Wilderness (BRID1) IMPROVE site are the most representative of the assessment area (Visibility Information Exchange Web System 2005).
- Special Purpose Monitors (SPMs). SPMs have recently been established in the Upper Green River Basin to monitor NO_2, O_3, PM_{10}, and visibility.

Specific monitoring protocols, known as reference (or equivalent) methods, must be followed to determine compliance with Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS). Other conditions must also be met in order for data to be used for regulatory purposes. These include (1) that the air monitoring station meet probe siting criteria, (2) that the station be in the ambient air, and (3) that the data be collected according to a quality assurance project plan approved by the responsible regulatory agency (such as the WDEQ/AQD).

Criteria pollutants identified as potential concerns for the Proposed Action are PM_{10}, NO_2, and SO_2. The major types of emissions that come from surface coal mining activities are in the form of fugitive dust and tailpipe emissions from large mining equipment. Activities such as blasting, loading and hauling overburden and coal, and the large areas of disturbed land all produce fugitive dust. Stationary and point

Figure 3.1 Monitoring System and Network Locations

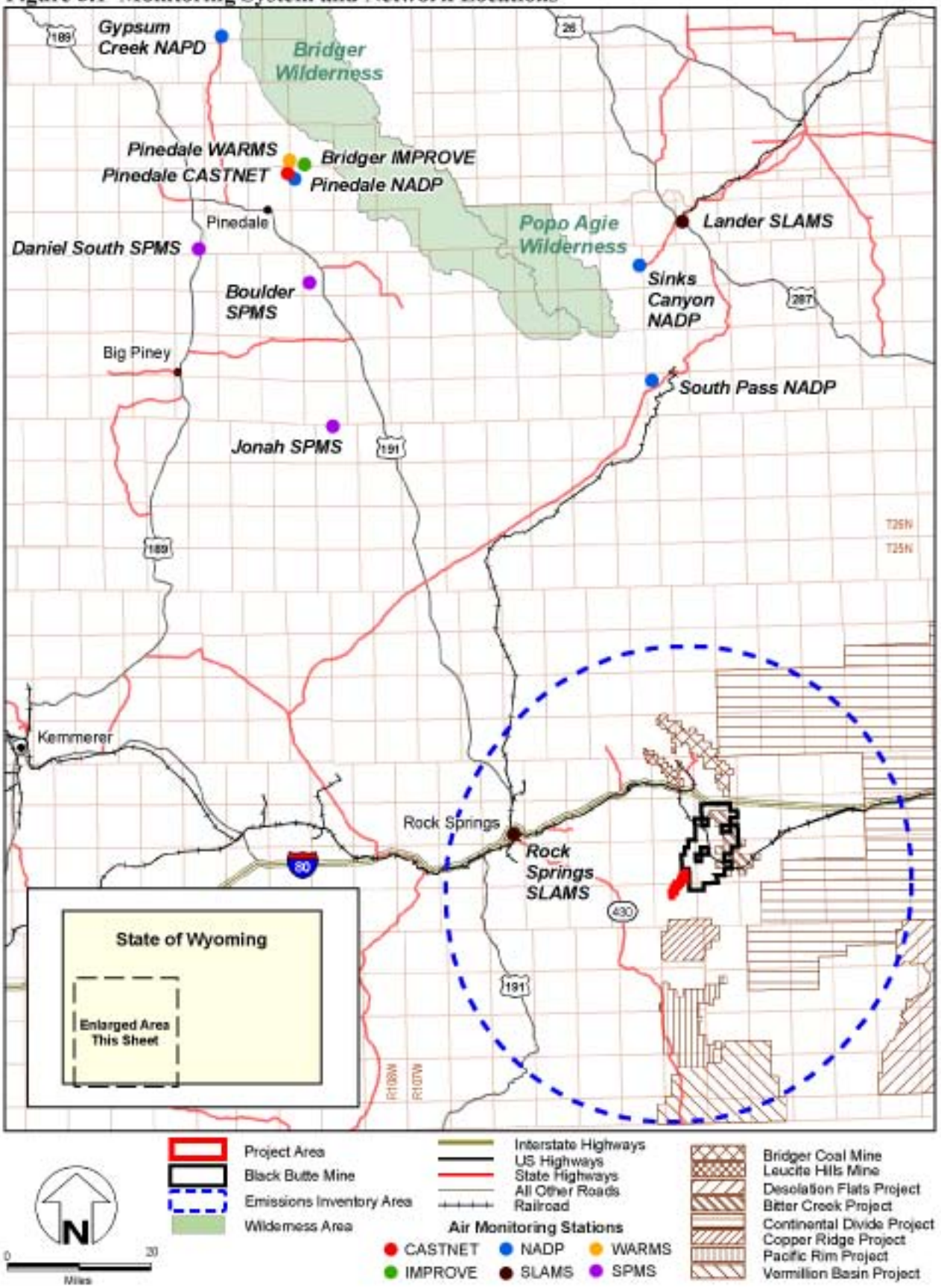
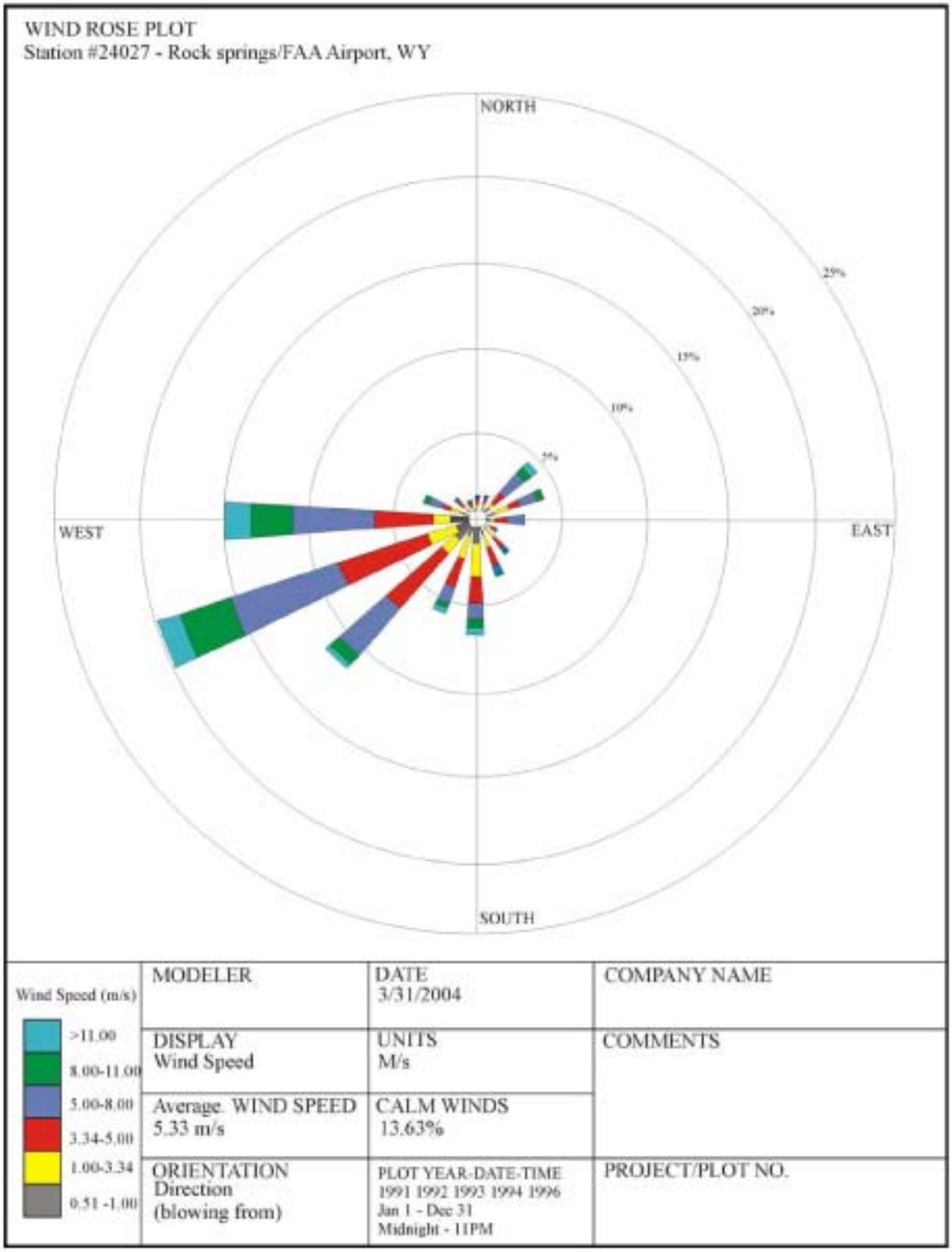


Figure 3.2 Representative Wind Rose for Rock Springs, Wyoming



sources are associated with coal crushing, storage, and handling facilities. In general, particulate matter (PM_{10}) is the major pollutant from coal mine point sources. Overburden blasting is also sometimes responsible for producing NO_2 from the incomplete combustion of explosives used in the blasting process.

As part of the ongoing operations, PM_{10} and meteorological data are collected at several locations at the existing Black Butte Mine (**Figure 3.3**) and reported on a quarterly basis as required by BBCC's Quality Assurance Project Plan submitted to WDEQ in March 1996.

Ambient particulate data are collected in the vicinity of the project area by a PM_{10} high volume air sampler (PM_{10}859) and a PM_{10} low volume Rupprecht & Patashnick tapered element oscillating microbalance (TEOM) continuous monitor (PM_{10}868). Meteorological data, including temperature, wind speed and direction, are also collected on site (METEO station in **Figure 3.3**).

Criteria Air Pollutants

Criteria air pollutants are those for which national concentration standards have been established. Pollutant concentrations greater than these standards represent a risk to human health or welfare. Criteria air pollutants include CO, NO_2, SO_2, O_3, PM_{10}, $PM_{2.5}$, and lead. Criteria air pollutant concentrations are compared to NAAQS and WAAQS to determine compliance.

Table 3.5 presents background concentrations of criteria air pollutants in southwest Wyoming identified as a potential concern for the Proposed Action. Background concentrations are in compliance with applicable WAAQS and NAAQS.

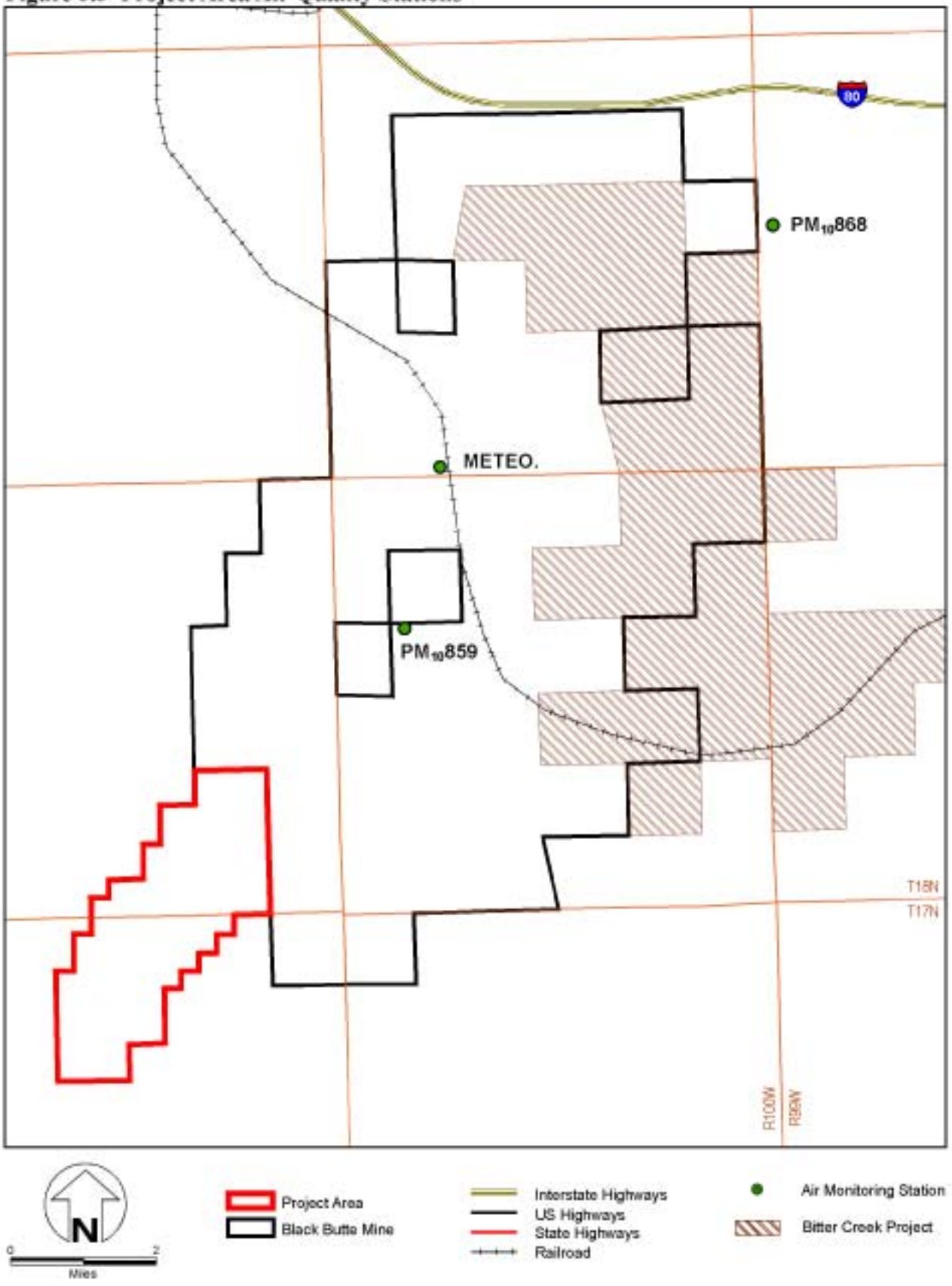
Table 3.5 Criteria Pollutant Standards and Background Concentrations

Pollutant	Averaging Period	Wyoming Standard ($\mu g/m^3$)	National Standard ($\mu g/m^3$)	PSD Increments ($\mu g/m^3$)		Regional Concentration ($\mu g/m^3$)
				Class I	Class II	
PM_{10}	24-hour	150	150	8	30	18-35
	Annual Arithmetic Mean (AAM)	50	50	4	17	8-10
NO_2	AAM	100	100	2.5	25	4
SO_2	3-hour	1,300	1,300	25	512	132
	24-hour	260	365	5	91	43
	AAM	60	80	2	20	9

Source: PM_{10} – data collected at Bridger Power Plant, Site 901 from Jan. 1999 to Dec. 2000; Black Butte Mine, Site 863, from Jan. 1999 to Dec. 2000; and Seedskadee National Wildlife Refuge, 1989-2001. NO_x – Green River Visibility Study, period of record 1996-1999. SO_2 –LaBarge Study Area, Northwest Pipeline Craven Creek Site. (BLM 2004b)

Some criteria air pollutant concentrations are compared to Prevention of Significant Deterioration (PSD) increments. The goal of the PSD program is to protect public health and welfare from air pollution effects, notwithstanding attainment and maintenance of the NAAQS, and "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores and other areas of special national or regional natural, recreation, scenic, or historic value." PSD increments have been established for NO_2, SO_2 and PM_{10}.

Figure 3.3 Project Area Air Quality Stations



Particulate Matter

Particulate matter (i.e., fugitive dust, soil particles, pollen, etc.) is essentially the small particles suspended in the air which settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of suspended particles:

- PM_{10}, are small enough to be inhaled and can cause adverse health effects.
- $PM_{2.5}$, are so small that they can be drawn deeply into the lungs and cause serious health problems. These particles are often a cause of visibility impairment.

PM_{10} data were collected at a SLAMS site in Rock Springs in 2003. Reported concentrations of PM_{10} at the Rock Springs SLAMS site ranged from 6 to 82 µg/m^3 and were 4 to 55 percent of the applicable 24-hour WAAQS (**Table 3.5**).

Between 2000 and 2004, annual mean PM_{10} concentrations were reported to be approximately 16.7 µg/m^3 at the Black Butte Mine monitoring station PM_{10}859 and 22.9 µg/m^3 at monitoring station PM_{10}868-TEOM (**Figure 3.3**), both levels being well below the annual WAAQS level of 50 µg/m^3 (IML 2000 - 2004). However, regulatory monitoring of 24-hour average particulate matter near Black Butte Mine indicated concentrations that are not in compliance with applicable WAAQS. On June 27, 2005, WDEQ issued BBCC a Notice of Violation for 13 exceedances of the 24-hour PM_{10} standard since 2000 (**Table 3.6**).

Between 2000 and 2004, the average annual precipitation reported at the Black Butte Mine was approximately 6.68 inches per year, which is well below the average annual precipitation of 8.84 inches per year recorded in the region (**Table 3.4**). This low precipitation in the area over the past several years, coupled with the high winds generally reported on days where PM_{10} exceedances were recorded, may have exacerbated the fugitive dust conditions observed at the Black Butte Mine. On July 9, 2005, BBCC responded to the Notice of Violation by submitting a Fugitive Dust Action Plan to WDEQ (BBCC 2005c). The Fugitive Dust Action Plan is anticipated to be finalized in early 2006 and proposes mitigation measures the mine would implement to reduce fugitive dust emissions. Resource protection measures summarized in Chapter 2 include the mitigation measures proposed in the Fugitive Dust Action Plan.

Table 3.6 Reported PM_{10} Exceedances with Daily Meteorological Data

Date	PM_{10} 24-Hour Average (µg/m^3)	Wind Speed Average (MPH)	Wind Speed Maximum (MPH)	Predominant Wind Direction (%)	Temperature Range (Celsius)
10/23/2001	214.9	23.7	31.9	54.2 from W	-2.7 – 10.9
1/20/2002	174.7	18.9	28.0	54.1 from WSW	-11.4 – -4.4
2/8/2002	415.0	21.9	35.1	66.7 from W	-7.9 – -1.1
2/28/2002	175.6	17.2	24.7	33.3 from W	-12.7 – 2.0
5/22/2002	182.1	24.5	36.6	50.0 from WSW	2.3 – 10.6
3/6/2003	196.5	25.6	38.5	75.0 from WSW	-1.8 – 4.7
11/28/2004	283.7	20.1	28.5	66.7 from NNE	-12.5 – -7.1
11/30/2004	516.2	7.6	12.9	33.3 from SSW	-13.6 – 4.7
12/1/2004	156.9	9.9	17.2	33.3 from W	-13.1 – -4.9
12/2/2004	306.3	9.8	15.8	45.8 from WSW	-18.3 – -4.2
12/20/2004	258.9	20.0	33.2	58.3 from W	-7.7 – 2.2
3/12/2005	229.7	20.0	33.1	50.0 from W	-4.8 – 12.9
3/17/2005	340.7	22.6	35.9	58.3 from W	-4.3 – 4.8

Nitrogen Dioxide

NO_2 is a red-brown gas formed during operation of internal combustion engines. Such engines emit a mixture of nitrogen gases, collectively called nitrogen oxides (NO_x). NO_2 can contribute to "brown cloud" conditions and ozone formation, and can convert to ammonium and nitrate particles and nitric acid which can cause visibility impairment and acid deposition ("acid rain"). Bacterial action in soil can be a natural source of nitrogen compounds.

NO_2 data are not currently collected at the Black Butte Mine or at the Rock Springs SLAMS station. Other nitrogen compound pollutants of interest include NO_3, HNO_3, and NH_4. Because the chemistry of nitrogen-containing pollutants is very complex and because monitoring of these air pollutants typically does not adhere to reference methods, it would be inappropriate to infer NO_2 concentrations from concentrations of HNO_3, NO_3, and NH_4, or to compare these concentrations to the NO_2 WAAQS, NAAQS or PSD increments. It would, however, be unlikely that high NO_2 concentrations would occur where low concentrations of other nitrogen-based pollutants are reported.

Nitrogen compound data have been collected at the Pinedale CASTNet site (PND165) since 1989 and at the WARMS Pinedale site since 2000. **Table 3.7** presents regional air quality monitoring data for nitrogen and sulfur compounds collected at the CASTNet PND165 site between January 1989 and December 2003. WARMS data collected for nitric acid between December 2002 and June 2005 and for nitrate and ammonium between January 2000 and June 2005 is also presented. Regional monitoring of nitrogen-containing pollutants shows concentrations typical for remote areas (Seinfeld 1986, Stern *et al.* 1973).

Table 3.7 Regional Nitrogen and Sulfur Compound Monitoring Data

Compound	CASTNet (PND165) Mean Annual Concentration ($\mu g/m^3$)	WARMS Pinedale Site Average Weekly Concentration ($\mu g/m^3$)	Typical Range For Remote Area[1,2] ($\mu g/m^3$)	Typical Range For Urban Areas[1,2] ($\mu g/m^3$)
HNO_3	0.35	0.55	0.05-0.8	8-129
NO_3	0.15	0.74	≤0.5	≥2.5
NH_4	0.2	0.26	≤0.2	≥1
SO_2	0.36	0.49	2.6-26	52-520
SO_4	0.53	0.72	≤2.5	≥10

[1] Ranges for HNO_3 and SO_2 from Seinfeld 1986
[2] Ranges for NO_3, NH_4 and SO_4 from Stern *et al.*1973

Sulfur Dioxide

SO_2 forms during combustion from trace levels of sulfur in coal or diesel fuel, and can convert to ammonium sulfate and sulfuric acid (H_2SO_4), which can cause visibility impairment and acid deposition. Volcanoes are natural sources of SO_2. Although generally not considered a significant direct result of surface coal mining, sulfur compound emissions from coal combustion have been identified as a potential concern from the Proposed Action.

Background concentrations of SO_2 (as measured at the CASTNet PND165 site between 1989 and 2003) ranged from 0.29 to 0.46 $\mu g/m^3$. Other monitoring of sulfur compounds shows concentrations of SO_2 and particulate SO_4 are typical for remote areas. Although monitoring for SO_2 and SO_4 typically does not adhere to reference methods, and resulting data cannot be used to determine WAAQS compliance, the collected concentration data contributes to our understanding of air quality.

Sulfur compound data have been collected at the Pinedale CASTNet site (PND165) since 1989 and at the WARMS Pinedale site since 2000. **Table 3.7** presents regional air quality monitoring data for sulfur (and nitrogen) compounds collected at the CASTNet PND165 site between January 1989 and December 2003. WARMS data collected for SO_2 and SO_4 between January 2000 and June 2005 is also presented. Regional monitoring of these sulfur-containing pollutants shows concentrations typical for remote areas (Seinfeld 1986, Stern *et al.* 1973).

Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are those pollutants that are known or suspected to cause cancer or other serious health problems, such as chronic respiratory disease, reproductive disorders, or birth defects. The EPA has classified 189 air pollutants as HAPs, including formaldehyde, benzene, toluene, ethylbenzene, xylenes, and n-hexane. Potential concentrations of HAPs are compared to inhalation reference concentrations to estimate the risk of health effects. An increase in HAPs concentrations resulting from the Proposed Action has not been identified as a concern for this project.

Other Concerns

Although generally not considered a significant direct result of surface coal mining, mercury, and carbon dioxide (CO_2) emissions from coal combustion at Pacificorp's Jim Bridger Power Plant have been identified as a potential concern for the Proposed Action. The Jim Bridger Power Plant receives a substantial portion of its coal supply from the Black Butte Mine. Mercury emissions may impact public health and aquatic ecosystems due to toxicity. CO_2 is considered a greenhouse gas potentially contributing to global warming.

Mercury emissions are a significant source of anthropogenic mercury. The public health impact of greatest concern is neuro-toxicity associated with ingestion of dietary methyl-mercury by pregnant women. Although consumption of fish is the primary cause for human and wildlife exposure to methyl-mercury, EPA does not advise the typical U.S. consumer of fish from restaurants and grocery stores to limit fish consumption.

Because mercury accumulates most efficiently in the aquatic food web, fish-eating birds and mammals are more highly exposed to mercury than any other known components of aquatic ecosystems. Adverse effects of mercury exposure to fish, birds and mammals include death, reduced reproduction, impaired growth and development, and behavioral abnormalities.

EPA has identified emissions from coal-fired power plants as a significant source of atmospheric mercury. Mercury emission volumes from power plants depend on coal chemistry and air pollution controls. Emissions from all reported sources in Sweetwater County, Wyoming were 640 pounds of mercury compounds in 1999, with approximately 65 percent (413 pounds) reported from the Jim Bridger Power Plant. Emissions from all reported sources throughout Wyoming were 2,013 pounds of mercury compounds in 1999.

3.2.1.3 Visibility

The IMPROVE network has measured visibility in national parks and wilderness areas in the United States since the 1980s. Visibility data are calculated for each day, ranked from cleanest to haziest, and reported into three categories:

- 20 percent cleanest: mean visibility for the 20 percent of days with the best visibility
- 50 percent average: the annual mean visibility
- 20 percent haziest: mean visibility for the 20 percent of days with the poorest visibility

Visibility data were collected at the Bridger Wilderness (BRID1) IMPROVE site from 1989 to 2003 (**Figure 3.1**). Mean annual visual range varies from 156 to 186 miles on clear days, 111 to 128 miles on average days and 71 to 91 miles on hazy days. These data are most representative of the assessment area.

Additional visibility data is collected in the region at the Brooklyn Lake (BRLA1), Mount Zirkel Wilderness (MOZI1), and Rocky Mountain National Park (RMHQ1) IMPROVE monitoring sites. Visibility at these sites, as well as the BRID1 site, is summarized in **Table 3.8**.

Table 3.8 Visual Range Recorded at Regional IMPROVE Visibility Monitoring Sites

IMPROVE Monitoring Site	Years	Miles From Project Area	Visual Range (Miles)		
			20 Percent Cleanest Days	Average Days	20 Percent Haziest Days
Bridger Wilderness	1989-2003	113	156-186	111-128	71-91
Mt. Zirkel[1]	1995-2003	124	145-179	101-123	72-87
Brooklyn Lake[1]	2001-2003	128	178-195	117-127	71-81
Rocky Mountain NP[1]	1989	186	162	97	56

Source: Visibility Information Exchange Web System 2005
[1] Outside of assessment area

3.2.1.4 Atmospheric Deposition

Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems, and is reported as the mass of material deposited on an area (kilograms per hectare – year [kg/ha-year]). Air pollutants are deposited by wet deposition (precipitation) and dry deposition (gravitational settling of particles and adherence of gaseous pollutants to soil, water, and vegetation). Substances deposited include:

- acids: such as H_2SO_4 and HNO_3; this acid deposition is sometimes referred to as "acid rain"
- air toxics: such as pesticides, herbicides, and volatile organic compounds
- nutrients: such as NO_3 and NH_4

The estimation of atmospheric deposition is complicated by the contribution to deposition by several components: rain, snow, cloud water, particle settling and gaseous pollutants. Deposition varies with precipitation which, in turn, varies with elevation and time. **Table 3.9** presents a summary of atmospheric deposition data collected in the region.

Wet Deposition

The NADP monitoring network assesses wet deposition by measuring the chemical composition of precipitation (rain and snow). The natural acidity of rainwater is considered to be represented by a range of pH values from 5.0 to 5.6 (Ahrens 1993). Precipitation pH values lower than 5.0 may be considered acidifying and may cause adverse effects to plants and animals. A voluntary level-of-concern for change in pH has been estimated to be 0.1 - 0.2 pH units (USFS 1989).

Wet deposition data have been collected in Pinedale, WY at the WY06 NADP site since 1982. Mean annual precipitation pH measurements collected between 2000 and 2004 ranged from 5.12 to 5.38 pH units. These data are the most representative of the project region.

Table 3.9 Summary of Current Atmospheric Deposition

Deposition Component	Description	Miles From Project Area	Levels of Concern
Precipitation pH	Precipitation pH (lab measurements) is within natural range Pinedale, WY NADP WY06 Site: 5.12 – 5.38 South Pass City, WY NADP WY97 Site: 5.08 – 5.25	 113 70	Increase or decrease of 0.1-0.2 pH units
Total Nitrogen Deposition	Total nitrogen deposition is less than levels of concern Pinedale : 1.3 - 2 kg/ha-year	 113	> 10 kg/ha-year
Total Sulfur Deposition	Total sulfur deposition is less than levels of concern Pinedale: 0.65 - 1 kg/ha-year	 113	> 20 kg/ha-year
Lake Chemistry[1, 2]	Acid neutralizing capacity (ANC) and sensitivity – Bridger Wilderness Black Joe: 69.0 µeq/L (sensitive) Deep: 61.0 µeq/L (sensitive) Hobbs: 68.0 µeq/L (sensitive) Upper Frozen: 5.8 µeq/L (extremely sensitive)	 76 86 85 114 206	Sensitive = 25<ANC<100 µeq/L Very Sensitive = 210<ANC<25 µeq/L Extremely Sensitive = ANC<10 µeq/L

[1] BLM 2004a
[2] USFS 2003

Dry Deposition

Dry deposition refers to the transfer of airborne gaseous and particulate material from the atmosphere to the Earth's surface. The previously discussed CASTNet system measures dry deposition of O_3, SO_2, SO_4, NO_3, HNO_3, and NH_4. Deposition data collected in Pinedale, WY (CASTNet site PND165) from 1990 through 2003 are the most representative of the project region.

There are no standards, thresholds, or levels of concern established for dry deposition. Dry deposition, measured by CASTNet, is added to wet deposition, measured by NADP, to estimate total deposition.

Total Deposition

Total deposition refers to the sum of airborne material transferred to the Earth's surface by both wet and dry deposition. Total nitrogen deposition is calculated by summing the nitrogen portion of wet and dry deposition of nitrogen compounds, and total sulfur deposition is calculated by summing the sulfur portion of wet and dry deposition of sulfur compounds.

Total deposition voluntary levels of concern have been estimated for several areas (USFS 1989). Estimated total deposition guidelines include the "red line" (defined as the total deposition that the area can tolerate) and the "green line" (defined as the acceptable level of total deposition). Total nitrogen deposition guidelines for Bridger Wilderness include the red line (set at 10 kg/ha-year) and the green line (set at 3 to 5 kg/ha-year).

Total sulfur depositions guidelines for Bridger Wilderness include the red line (set at 20 kg/ha-year) and the green line (set at 5 kg/ha-year). Total deposition voluntary guidelines are currently under review and may be re-set to lower values.

Total deposition data were calculated at Pinedale, WY from 1990 to 2003. Mean annual total nitrogen deposition ranges from 1.3 to 2 kg/ha-year. Mean annual total sulfur deposition ranges from 0.65 to 1 kg/ha-year.

Lake Chemistry

Atmospheric deposition can cause acidification of lakes and streams. One expression of lake acidification is change in ANC, the lake's capacity to resist acidification from atmospheric deposition. Atmospheric deposition of nitrogen and sulfur compounds can affect the ANC of sensitive lakes. Acid neutralizing capacity is expressed in units of micro-equivalents per liter (μeq/L). Lakes with ANC values from 25 to 100 μeq/L are considered to be sensitive to atmospheric deposition, lakes with ANC values from 10 to 25 μeq/L are considered to be very sensitive and lakes with ANC value of less than 10 are considered to be extremely sensitive. **Table 3.9** summarizes the current sensitivity of selected sensitive lakes in the Bridger Wilderness Area.

3.2.2 Emissions

An emissions inventory was compiled using the WDEQ/AQD New Source Review (NSR) database identifying major and minor emissions sources within 50 kilometers (31.1 miles) of the project area. The emissions inventory identified facilities, facility owners, facility classification, most recent NSR permit or waiver number and issue date since 1996, as well as permitted (not actual) pollutant emissions for each facility (**Appendix E**). **Table 3.10** summaries the facility types, number of facilities and relatively recent total permitted emissions levels for PM_{10}, NO_x and sulfur compounds (SO_x) from these permitted facilities.

Table 3.10 Emissions Inventory of Permitted Sources within 50 km of the Project Area

Facility Type	Number of Facilities	Permitted PM_{10} Emissions (tons/year)	Permitted NO_x Emissions (tons/year)	Permitted SO_x Emissions (tons/year)
Compressor Station	31	-	1,686.6	-
Crushing and Screening	3	7.8	4.8	0.1
Dehydration	122	-	18.7	74.4
Generation	6	0.2	14.5	0.4
Incineration	2	0.1	-	-
Miscellaneous	6	135.8	891.6	2,594.4
Pipeline Station	1	-	0.9	-
Power Plant	1	1.4	-	-
Production Site	319	-	350.7	1.9
Soil Remediation Unit	1	-	0.3	-
Sour Gas Plant	2	-	2,713.9	80.6
Storage Tank Battery	11	-	24.3	0.1
Surface Coal Mine	1	87.1	-	-
Sweet Gas Plant	2	-	223.8	-
Transloading Facility	1	0.1	-	-
Unknown	5	-	18.4	-
TOTAL	516	232.5	5,948.5	2,751.9

An additional review of the 1999 National Emissions Inventory (NEI) completed by the EPA was also conducted to assess estimated emissions and sources within Sweetwater County (EPA 2003) (**Appendix F**). The NEI is an estimate of actual emissions from each facility considered a major source and includes emissions sources not included in the NSR above. Approximately 30 major sources of PM_{10}, NO_x and/or SO_2 were identified in Sweetwater County. The estimated total emissions from all major sources of PM_{10}, NO_x and/or SO_2 were 10,508, 51,857, and 38,651 tons per year, respectively. The only coal mining

facility identified in the NEI was the Bridger Coal Company – Jim Bridger Mine. Reported emissions of PM_{10}, NO_x and/or SO_2 at the Jim Bridger Mine were 664, 208, and 12 tons per year, respectively. The Black Butte Mine facility was not identified in the NSR search (the last permit issued to Black Butte Mine was in 1995 and the database started tracking new permits and waivers issued in southwest Wyoming after January 1, 1996) or 1999 NEI search (Black Butte Mine is not considered a major source).

3.3 GEOLOGY AND MINERAL RESOURCES

Mineral resources present in the project area include solid leasable minerals (coal) and fluid leasable minerals (liquid and gas petroleum hydrocarbons and methane gas associated with coal occurrences). The description of mineral resources is based on the assessment areas being analyzed in this EIS.

The assessment area for solid leasable minerals is that portion of the east flank of the Rock Springs Anticline containing the existing Black Butte, Bridger Coal, and Leucite Hills Mines (**Figure 3.4**).

The assessment area is 277,120 acres, including 131,872.61 acres of BLM-administered land, 144,411.27 acres of private land, and 836.11 acres of State of Wyoming land. Total estimated existing disturbance is 21,931 acres or 7.91 percent of the assessment area.

The assessment area for fluid leasables includes lands south of Interstate 80, and east of Highway 430 within the BLM RSFO boundary area (Figure 3.5). The assessment area is 902,223 acres, and includes 530,383.52 acres of BLM-administered land, 357,534.10 acres of private land, and 14,305.37 acres of State of Wyoming land. Total estimated existing disturbance is 19,483 acres or 2.16 percent of the assessment area.

The project area is located on the eastern limb of the Rock Springs Anticline. The anticline structure has an axis that trends north-south. The anticline is asymmetrical with the eastern limb dipping less steeply than the western (Love and Christiansen 1985). The target coal-bearing geologic formation at the project area is the Cretaceous-aged Almond Formation. Relatively thin deposits of Quaternary alluvium, colluvium, and aeolian sediments overlie the Almond Formation where outcrops are not present. The Almond Formation is also overlain by the Cretaceous-aged Lewis Shale, Fox Hills Sandstone, and the Lance Formation to the east of the project area (Roehler 1979). Tertiary-aged formations overlie these formations further to the east. **Figure 3.4** presents a geologic map of the project area.

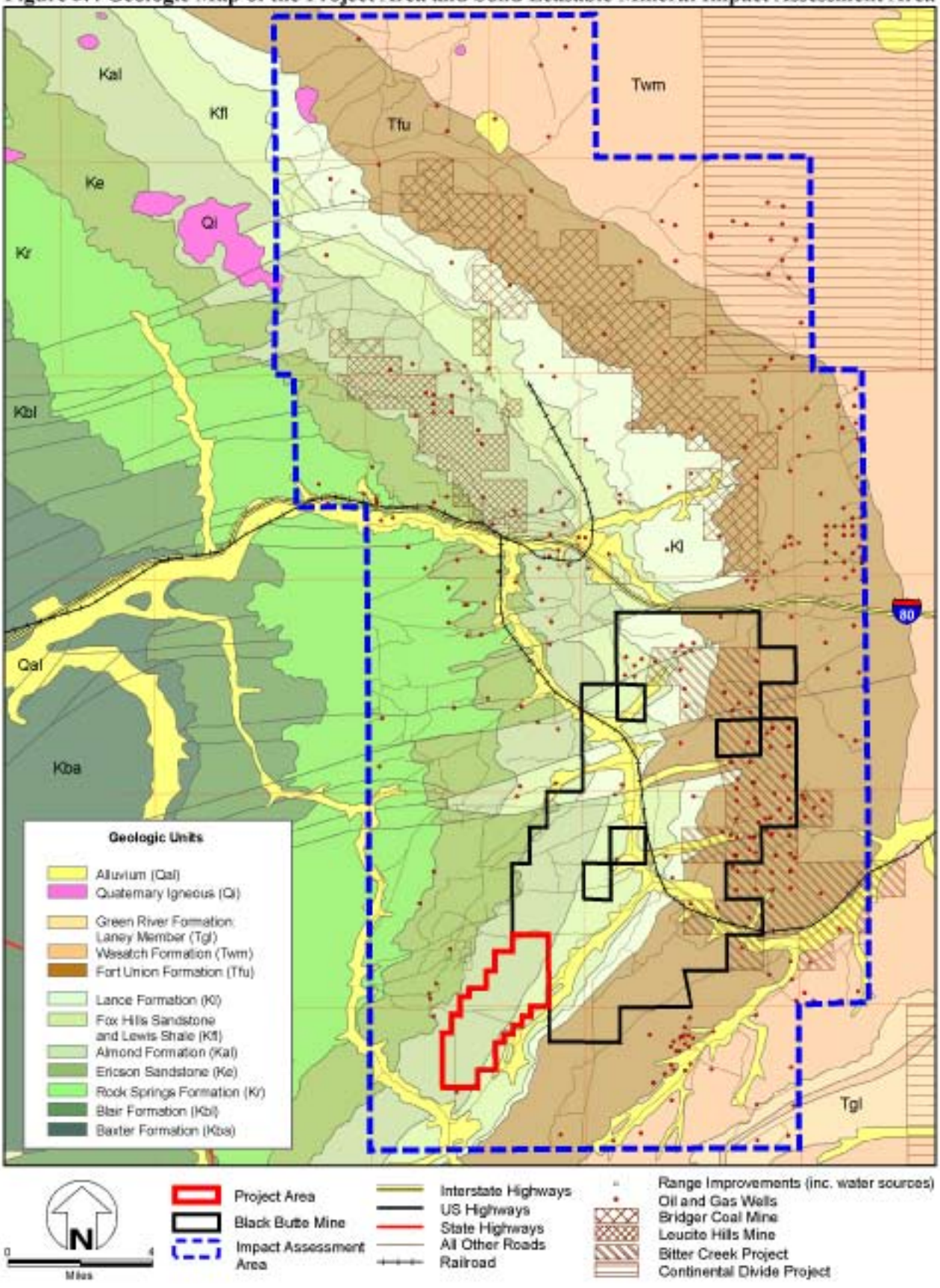
Outcrops of the Almond Formation have a bedding dip ranging between three and 10 degrees to the east-southeast in the project area (BBCC 2004a). The Almond Formation averages 325 feet in thickness. It consists of three distinct units, based on differing lithology. The lower unit is composed of a dark-gray shale interbedded with a similarly colored fine grained sandstone approximately 100 feet in thickness. The middle unit is made up of 75 feet of a dark gray shale and interbedded gray siltstone, gray fine-grained sandstone, gray and brown carbonaceous shale, and coal. The upper unit is 150 feet of dark-gray shale, light-gray sandstone, and siltstone (BBCC 2004a).

The topography of the project area reflects the interbedded lithologies and is composed of ridges of resistant sandstone separated by swales of less resistant shale and coal. A large high angle reverse fault, the Brady Fault, is present five miles east of the project area. No significant structural features, with the exception of the Rock Springs Anticline, are present in the project area.

3.3.1 Solid Leasable Minerals (Coal)

The project area contains about 34.6 million tons of in-place minable coal within the Almond Formation. The coal is in four seams that split and can be discontinuous. Interbeds of sandstone, siltstone, and shale separate the coal. The four coal seams (referred to as seams AG, AF, AFL, and AE) are on average, 3.0, 4.4, 5.0, and 5.7 feet thick, respectively. The average quality of the coal is 10,020 British Thermal Units per pound (btus/lb) with an ash content of 7.6 percent and a sulfur content of 0.53 percent (Wiig 2005).

Figure 3.4 Geologic Map of the Project Area and Solid Leasable Mineral Impact Assessment Area



Ownership of the coal mineral rights identified for mining is split between federal (BLM administered) and private owners. The mineral estate ownership of the entire project area, including property not proposed for mining is 2,039 acres of federal, 2,159 acres of private, and 160 acres of state minerals.

The Black Butte Mine permit area contains numerous coal seams that have been mined for decades. The coal occurs in the Fort Union, Lance, and Almond Formations in seams from two to 25 feet thick. Total coal produced at the Black Butte Mine through 2002 was approximately 84 million tons with an expected production of 97.2 million tons through the year 2008 (BBCC 2005a). The remaining in-place minable reserves in the existing permit area beginning in 2005 was estimated at 8.9 million tons of coal. The total current unreclaimed area of surface disturbance in the Black Butte Mine is 6,743 acres. The reclaimed surface disturbance area is 3,814 acres.

The Leucite Hills Mine, located north of Interstate 80 and adjacent to the Black Butte Mine, produces coal from the Almond Formation and has an estimated 3.8 million tons of in-place minable coal (McCarthy 2005). The anticipated mine life is three years. The total current unreclaimed area of surface disturbance in the Leucite Hills Mine is 1,772 acres. The reclaimed surface disturbance area is 512 acres.

The Bridger Coal Mine to the north of the project area and Interstate 80, is a surface coal mine that has been transitioning to underground operations. The surface mining of coal is expected to continue for the next few years. The mine is producing from the Fort Union Formation. The Bridger Coal Mine has an estimated 121 million tons of in-place minable coal (BLM 2004b). The anticipated mine life is 15 to 20 years. The total current unreclaimed area of surface disturbance in the Bridger Coal Mine is 6,532 acres. The reclaimed surface disturbance area is 2,980 acres.

3.3.2 Fluid Leasable Minerals

According to Wyoming Oil and Gas Conservation Commission records, approximately 1,197 wells have been drilled in the assessment area (**Figure 3.5**). There has been little conventional oil and gas exploration activity in the immediate vicinity of the project area. Available data suggest that productive conventional oil and gas reservoirs do not occur within the project assessment area (BLM 2005b).

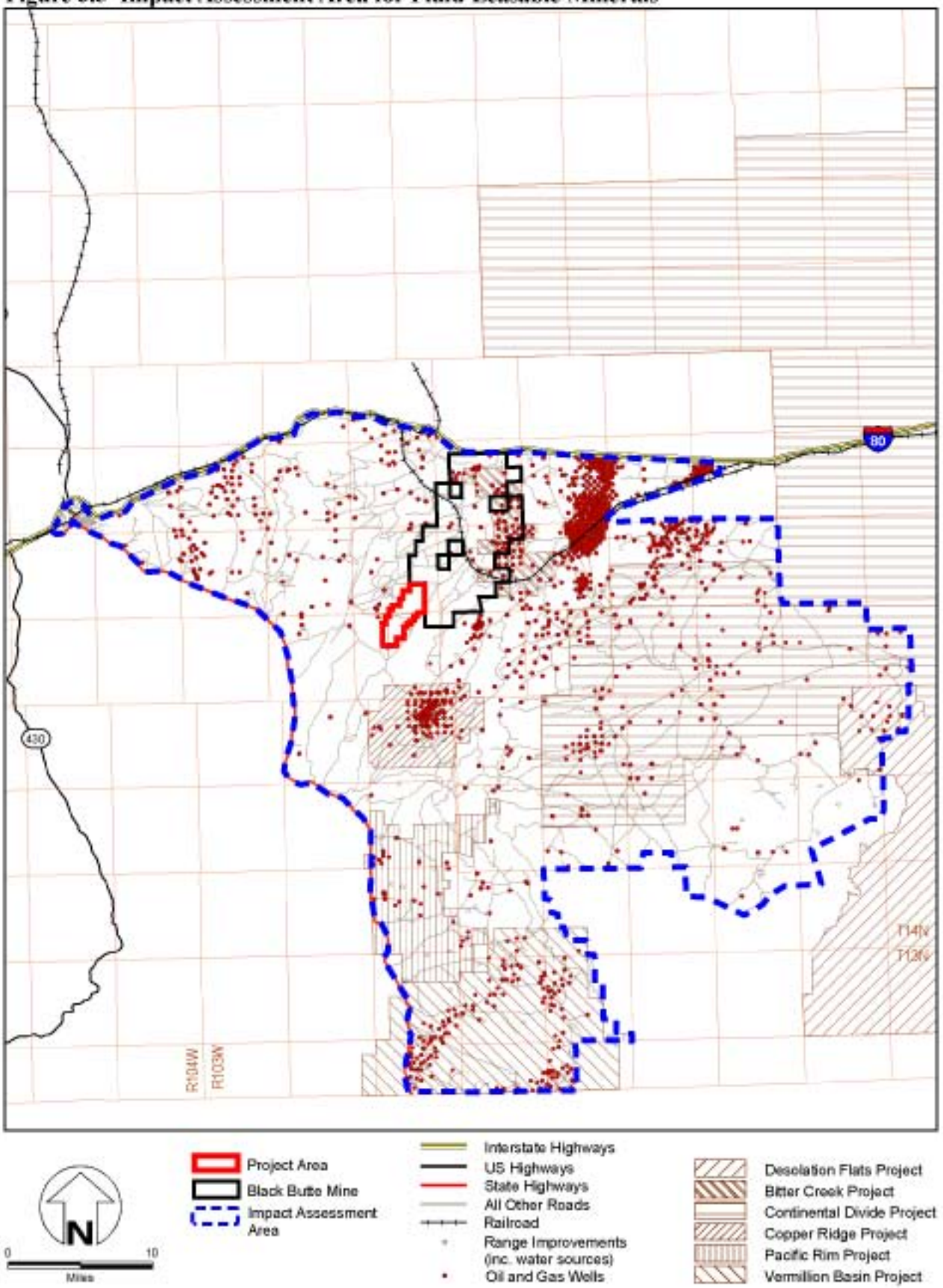
Parts of five oil and gas leases overlie the project area. If productive wells are not established on these leases they will expire at the end of their 10-year terms (the lease expiration dates range between 2006 and 2011). The leases can be developed for conventional oil and gas or for CBNG. The BLM Wyoming Reservoir Management Group, as of July 2005, had not been advised of any proposed CBNG unit development for the project area. The nearest producing CBNG wells are more than four miles away from the project area (BLM 2005b). The two townships that encompass the project area, T. 18 N., R. 101 W. and T. 17 N., R. 101 W., contain only one active CBNG well.

Conventional oil and gas exploration and production have occurred to the east and southeast of the project area in the Churchill and Brady Deep Units as well as outside of these units. Cretaceous, Jurassic, and Pennsylvanian age rocks of the Almond, Rock Springs, Blair, Dakota Sandstone, Nugget, Park City, and Weber Formations are the host formations of those discoveries and exploration efforts. Occurrences of oil and gas in these units are related to the Brady Fault and two small anticlinal structures that have formed structural traps. Additional production occurs in discontinuous stratigraphic traps. The depth of the producing zones range between 5,900 and 14,300 feet (Roehler 1979).

To estimate conventional oil and gas reserves from producing wells in reservoir formations located near the project area, BLM performed decline analyses on producing conventional oil and gas wells in the four townships closest to the project area (T. 17-18 N. R. 100 W. and T. 17-18 N. R. 101 W.). The results of the analyses for the formation reservoirs are presented in **Table 3.11**.

Despite the reserves estimated to be present outside of the project area (**Table 3.11**), there is no evidence that productive reservoirs containing conventional oil and gas are present in the project area. This is due

Figure 3.5 Impact Assessment Area for Fluid Leasable Minerals



to several factors. There are no small geologic/anticlinal structures similar to those in the Brady Unit, or productive sands similar to the Churchill Unit, known to occur in the project area. Other formations that produce in surrounding areas are less geologically favorable in the project area due to shallow depths, different geologic/depositional environments, surface erosion or other factors. Further, the failure of the nearest exploratory wells to achieve economic production suggests that economic conventional resources may not occur within the project area (BLM 2005b).

Oil and gas production does occur from the Almond Formation from both sandstone and coal interbeds to the east of the project area (BLM 2005b). The lack of distinction between producing zones in the formation makes the categorization of the oil and gas occurrence as conventional or CBNG difficult. In any case, the Almond Formation at the project area is relatively shallow, which decreases the likelihood that either conventional or CBNG oil and gas resources will occur.

Table 3.11 Oil and Gas Production and Reserves in the Vicinity of the Project Area

Reservoir	No. Wells	Av. Well Life (years)	Reservoir Average Cumulative Production Gas (MCF[1])	Reservoir Average Estimated Ultimate Recovery Gas (MCF)	Reservoir Average Cumulative Production Oil (BBL[2])	Reservoir Average Estimated Ultimate Recovery Oil (BBL)
Almond	12	29	1,434,743	1,323,324	296	3,276
Almond Coal	29	5	154,416	197,218	8,344	11,100
Amsden-Darwin	1	8	0	0	313	511
Blair	2	9	162,628	272,162	1,315	1,584
Dakota	5	20	284,848	400,060	364	617
Entrada	1	23	1,981,380	2,541,583	79,580	79,580
Lance	4	3	4,716	5,090	0	0
Mesa Verde	4	24	389,584	406,545	130	130
Nugget	7	48	830,869	1,715,209	150,456	1,844,903
Phosphoria	2	24	1,360,273	2,388,863	58,618	90,439
Weber	3	39	1,985,451	6,503,264	247,069	268,750

Production data from IHS Energy Records; decline analyses prepared using IHS Powertools software. (BLM 2005b)
[1] MCF= Thousand Cubic Feet
[2] BBL = Barrels of Oil

The Bitter Creek Project CBNG area overlaps the eastern portion of the existing Black Butte Mine (to the northeast of the project area). The Almond Formation is a target reservoir in the Bitter Creek Project CBNG area. Reservoir studies indicate the upper Almond Formation sandstones and thin coal seams produce gas (BLM 2003b). Shallow gas occurrences in the assessment area near the Black Butte Mine generally are at a depth of 2,000 to 3,000 feet in the Bitter Creek Project CBNG area (Clawson 2005b).

As mentioned previously, the nearest producing CBNG wells are located three to four miles southeast of the project area. The wells are located in the North Copper Ridge Unit and are completed in the Almond Formation. Although there is some ambiguity concerning the well completions, two of these wells can be identified as, or strongly inferred to be, true coalbed completions. These wells have minimal reserves (one to six MCF of gas) and economic lives of approximately one year. Although reported as CBNG wells, the remaining wells either have completed sandstones adjacent to the coals or lack sufficient data to resolve their completion intervals. Due to the shallower depths and resulting lower hydrostatic pressures in the minable coal seams in the project area, the methane storage capacity of the Almond coals would be expected to be even lower in the project area than in the North Copper Ridge Unit (BLM 2005b).

Except in federal units or areas where special spacing orders have been established, the typical oil and gas well spacing in a producing field would include 160 acres for natural gas and 40 acres for oil wells. The surface disturbance generally required for each well, inclusive of well pad, access roads, and gathering pipelines would be four and a half to five acres (BLM 2005b).

3.3.3 Geologic Hazards

No active faults are known to be present at the project area (BLM 1996). There are no other geologic hazards such as landslide areas, 100 year-floodplains, or hydrogen-sulfide producing wells on the project area. Subsidence due to underground mining is not a concern because none occur in the project area. Rock fall is possible on steeper slopes, but is not likely due to the less severe slopes in the project area relative to adjoining steep buttes and large hillsides.

3.4 SOILS

The soils resources assessment area is the project area (**Figure 3.6** and **Figure 3.7**). The assessment area is 4,359 acres in size, and includes 2,199.20 acres of BLM-administered land and 2,159.40 acres of private land. Total estimated existing disturbance is three acres or 0.07 percent of the assessment area.

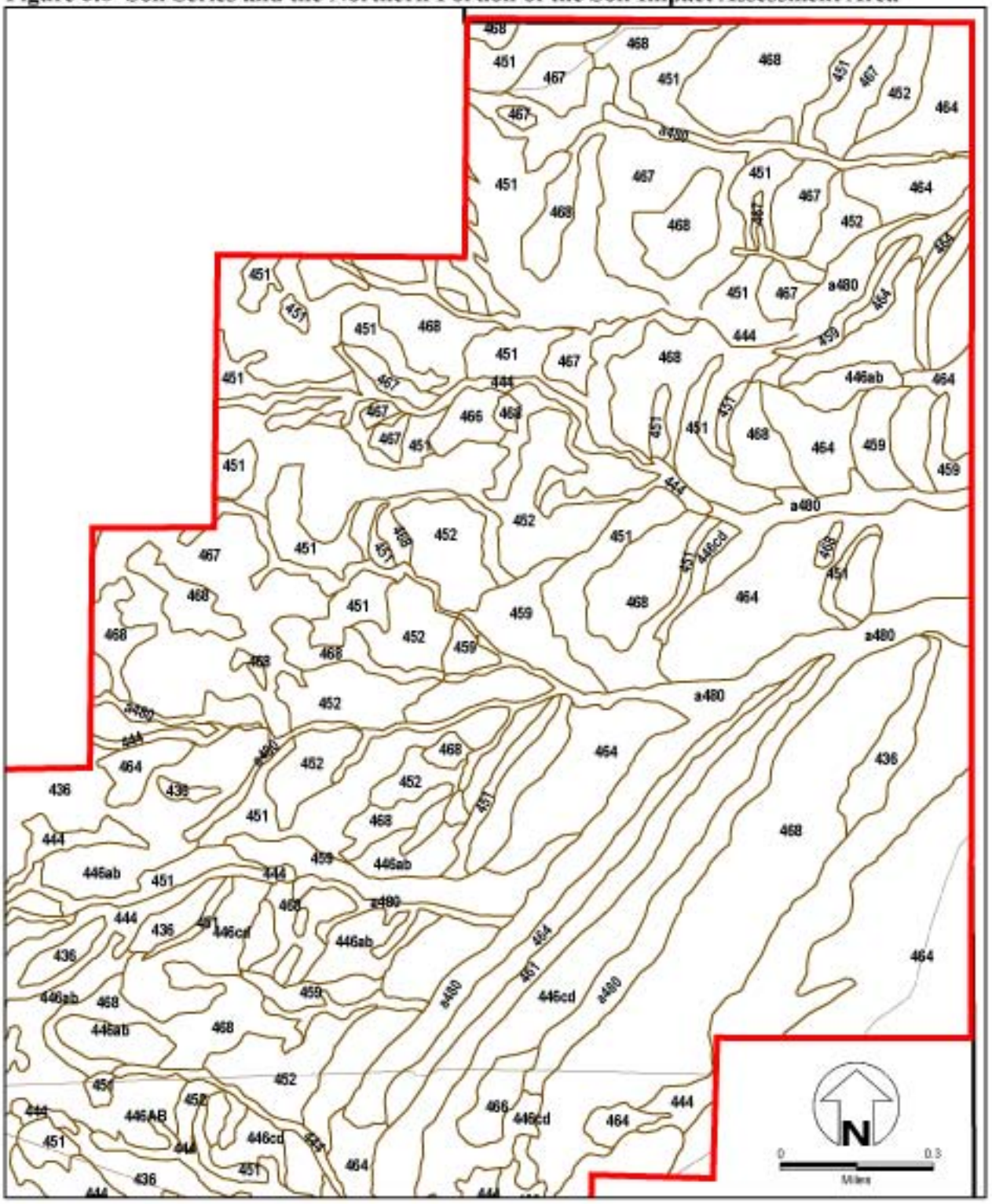
A detailed Order 1-2 soil survey of the project area was conducted in 2003 and is presented in **Appendix G** (Nyenhuis 2003). The soil series in the analysis area are presented on **Figure 3.6** and **Figure 3.7**. The Order 1-2 soil survey was completed in accordance with WDEQ-LQD Guideline No. 1, which outlines the soils information required for a coal mining permit. The survey included field inventories, sampling, and laboratory analysis of soil samples.

Table 3.12 presents the soil series that occur within the project area, their erosion potential and recommended salvage depths (Nyenhuis 2003).

Table 3.12 Soils Series that Occur within the Project Area

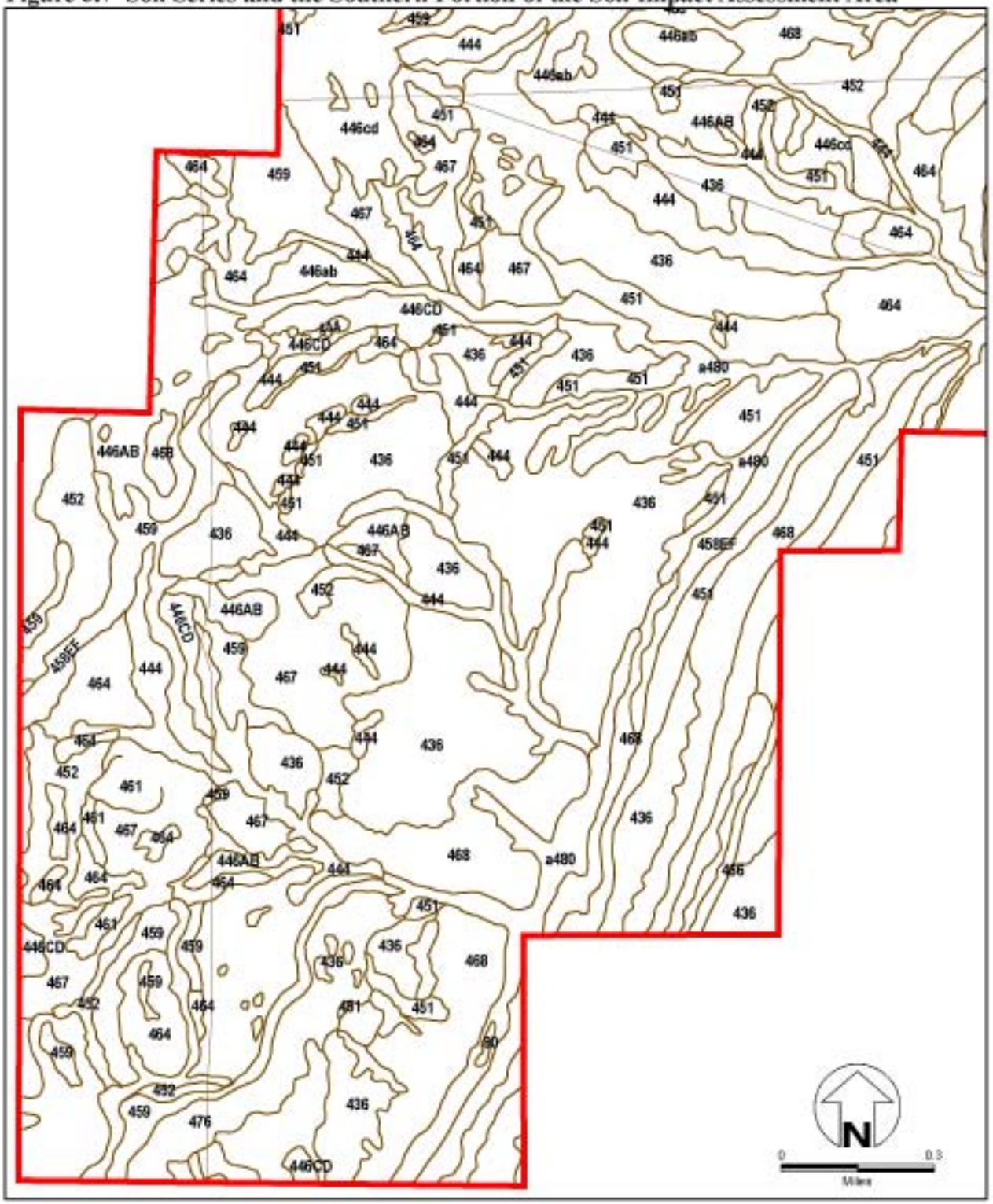
Map Unit No.	Map Unit Name	Erosion Potential	Recommended Salvage Depth (inches)
8	Winton very channery sandy loam, 0 to 45% slopes	None	6
10	Kandaly loamy sand, six to 15% slopes	None	32 or 50
436	Teagulf-Huguston-Terada complex, 0 to 6% slopes	None to Slight	25
444	Thayer fine sandy loam, 0 to 6% slopes	Slight	48
446AB	Horsley-Haterton complex, 0 to 6% slopes	Slight	10
446CD	Horsley-Haterton complex, six to 15% slopes	Slight	10
451	Tasselman-Winton complex, three to 30% slopes	None to Slight	9
452	Huguston-Teagulf complex, three to 10% slopes	None to Slight	20
458EF	Winton-Horsley-Rock Outcrop association, very steep	None to Slight	4 (Rock Outcrop = 0)
459	Rock Outcrop-Winton-Horsley association, steep	None to Slight	3 (Rock Outcrop = 0)
461	Rock Land, 0 to 75% slopes	-	0
464	Boltus-Horsley complex, 0 to 30% slopes	Moderate to Slight	6
466	Huguston-Rock Outcrop-Terada complex six to 30% slopes	None to Slight	15 (Rock Outcrop = 0)
467	Huguston-Horsley-Haterton complex, six to 30% slopes	None to Slight	12
468	Kandaly-Huguston-Teagulf complex, three to 30% slopes	None to Slight	25
a480	Monte loam, 0 to 6% slopes	Slight	53

Figure 3.6 Soil Series and the Northern Portion of the Soil Impact Assessment Area



Project Area and Impact Assessment Area
Roads
8 = Winton Channery Loam
10 = Kandaly Loamy Sand
80 = Not described in soils report
436 = Teagulf - Huguston - Terada Complex
444 = Thayer Fine Sandy Loam
446AB = Horsely - Haterton Complex
446CD = Horsley - Haterton Complex
451 = Tasselman - Winton Complex
452 = Quealman - Leckman
458EF = Winton - Horsley - Rock Outcrop
459 = Rock Outcrop
461 = Rock Land
464 = Boltus-Horsley Complex
466 = Huguston - Rock Outcrop
467 = Huguston - Horsely - Haterton Complex
468 = Kandaly - Huguston - Teagulf Complex
476 = Not described in soils report
A480 = Chrisman - Dines Complex

Figure 3.7 Soil Series and the Southern Portion of the Soil Impact Assessment Area



Project Area and Impact Assessment Area
Roads
8 = Winton Channery Loam
10 = Kandaly Loamy Sand
80 = Not described in soils report
436 = Teagulf - Huguston - Terada Complex
444 = Thayer Fine Sandy Loam
446AB = Horsely - Haterton Complex
446CD = Horsley - Haterton Complex
451 = Tasselman - Winton Complex
452 = Quealman - Leckman
458EF = Winton - Horsley - Rock Outcrop
459 = Rock Outcrop
461 = Rock Land
464 = Boltus-Horsley Complex
466 = Huguston - Rock Outcrop
467 = Huguston - Horsely - Haterton Complex
468 = Kandaly - Huguston - Teagulf Complex
476 = Not described in soils report
A480 = Chrisman - Dines Complex

The soil types and salvage depths in the project area are similar to soils currently being salvaged and used for reclamation at the existing BBM.

Several soil types in the project area are characterized in Appendix 5-5 of the Green River RMP and ROD (BLM 1997) as Sandy Soils (468 Kandaly-Huguston-Teagulf complex, four percent to 15 percent slopes) and Erosive Soils (464 Boltus-Horsley complex, eight percent to 30 percent slopes). These soil types were described in the soil survey as having none to slight erosion potential (468 Kandaly-Huguston-Teagulf complex, three to 30 percent slopes) and moderate erosion potential (464 Boltus-Horsley complex, 0 percent to 30 percent slopes).

3.5 WATER RESOURCES

3.5.1 Groundwater Quality and Quantity

The assessment area for groundwater is the project area (**Figure 3.8**). The assessment area is 4,359 acres in size, and includes 2,199.20 acres of BLM-administered land and 2,159.4 acres of private land. Total estimated existing disturbance is three acres or 0.07 percent of the assessment area.

Within the project area there are three potential water bearing geologic units that could be affected by coal mining activities. In descending order of age, the units are alluvial sediments (Quaternary and Recent), the Almond Formation (Cretaceous), and the Ericson Sandstone (Cretaceous) (**Figure 3.4**). The Ericson Sandstone underlies the coal-bearing Almond Formation and is considered since it is the water supply for the Black Butte Mine and is a regionally important aquifer.

WDEQ/WQD classifies groundwater suitability based various constituents and parameters for domestic use (Class I), agricultural use (Class II) and livestock use (Class III) (WDEQ/WQD 2005). The guidelines include standards for total dissolved solids (TDS) concentrations, sodium adsorption ratio (SAR) values, and other constituents. For Class I water, TDS concentrations must be below 500 milligrams per liter (mg/l) and SAR values are not specified. For Class II water, TDS concentrations must be below 2,000 mg/l and SAR values below eight. For Class III water, TDS concentrations must be below 5,000 mg/l and SAR values are not specified.

3.5.1.1 Alluvial Aquifers

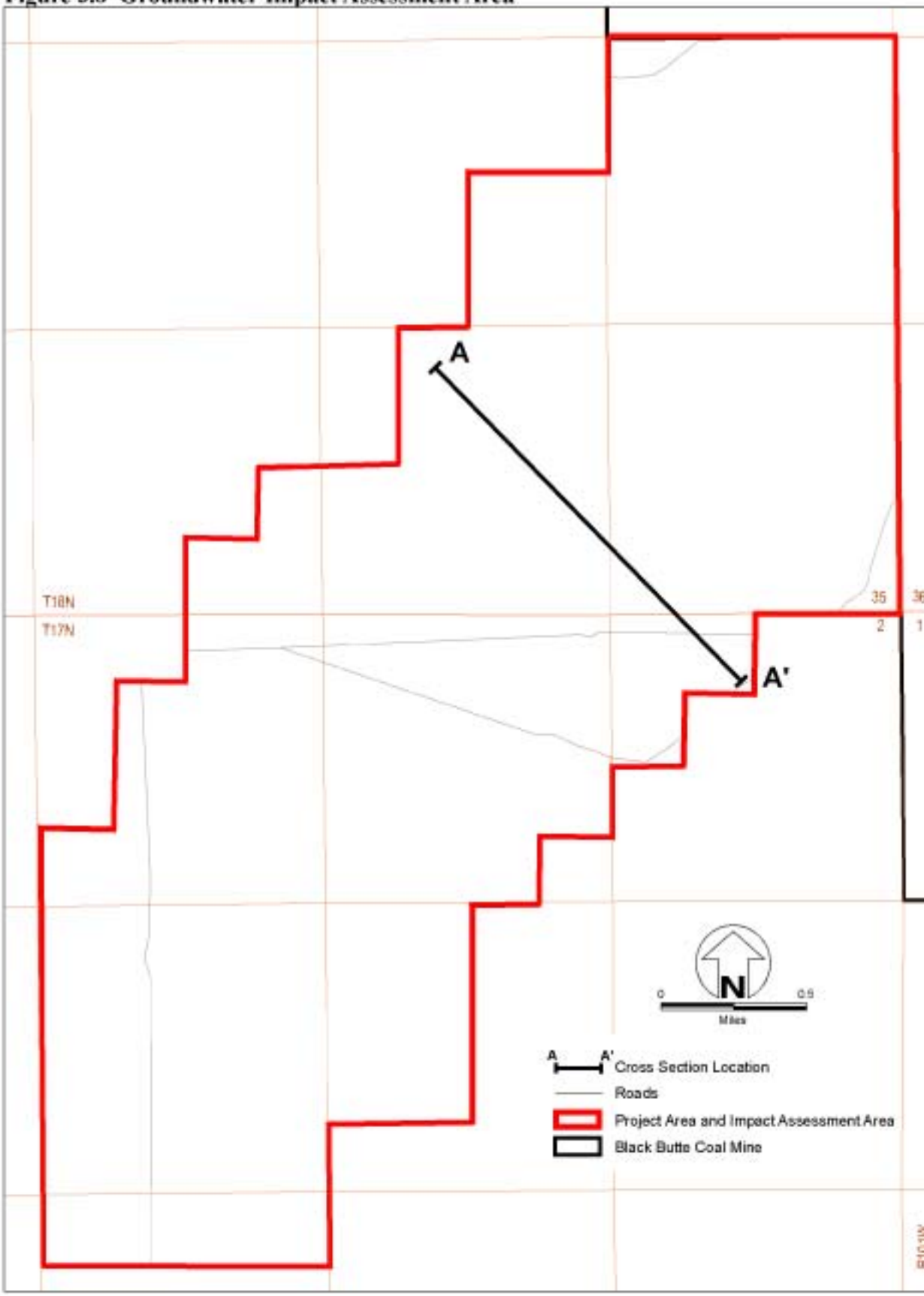
In the project area the surface drainages are generally dry washes with thin accumulations of alluvium, colluvium, or slope wash. The alluvial aquifers in the region are laterally discontinuous precluding significant storage and movement of groundwater (Ogle and Wood 2004).

3.5.1.2 Almond Aquifer

The Almond aquifer consists of interbedded sandstones, shales, and coal seams. The formation generally grades from alluvial deposits at the base upward to marines facies. The sandstones in the Almond Formation have limited areal extent and are therefore considered local aquifers. The coal units in the formation have a greater areal extent but have relatively low permeability.

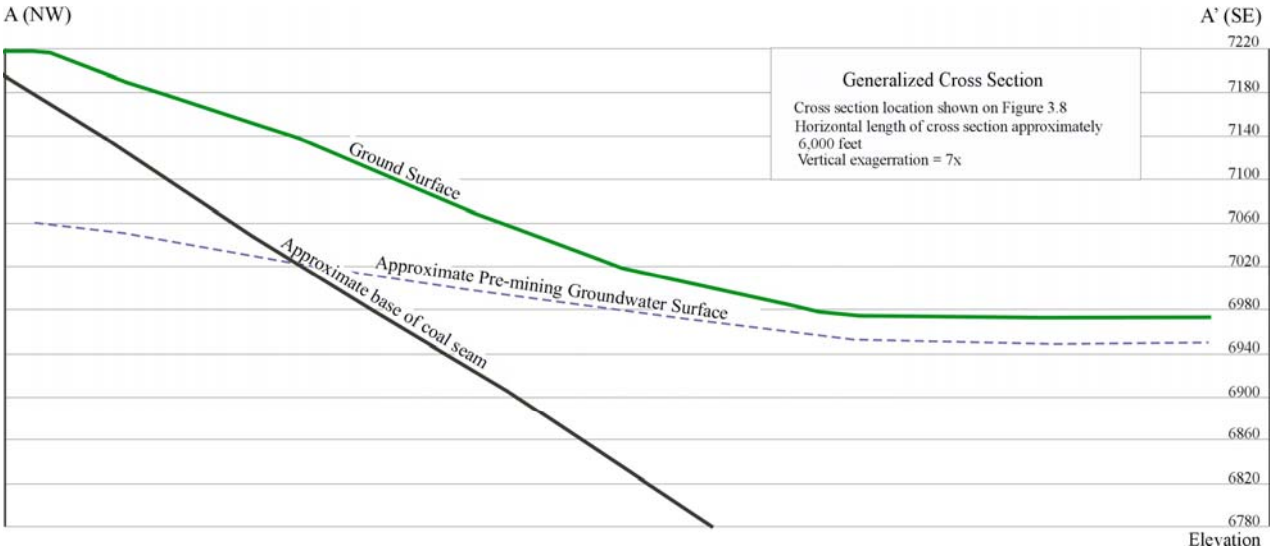
The hydrologic properties of the Almond aquifer are dependent on lithology. Sandstones in the formation have transmissivity ranging from 0.17 ft^2/day to 37.1 ft^2/day and average about 7.0 ft^2/day. Aquifer tests on two wells completed in the Upper Sand unit within the Almond Formation in the vicinity of the project area indicated hydraulic conductivity ranging from 7.7 to 15.7 ft^2/day. Aquifer tests on nine monitoring wells completed in the Coal Seam 2 indicated hydraulic conductivity in the coal units ranges from 0.1 to 2.9 ft^2/day (Ogle and Wood 2004).

Figure 3.8 Groundwater Impact Assessment Area



The groundwater produced from the Almond Formation is generally a sodium sulfate or sodium bicarbonate type. TDS measurements from groundwater samples from several monitoring wells completed in the Almond Formation at the Black Butte Mine range from 1,500 to 2,300 mg/l and 40 to 70 SAR (Ogle and Wood 2004). The water produced from the formation is generally unsuitable for domestic or irrigation use. The depth to groundwater in two monitoring wells installed in the project area is between 19.6 and 24.1 feet below ground surface (bgs) in well SW-1 and between 79.2 and 80.7 bgs in well SW-2. **Figure 3.9** presents a cross-section of the pre-mine estimated groundwater profile.

Figure 3.9 Cross Section Showing Approximate Pre-mining Groundwater Surface



3.5.1.3 Ericson Aquifer

The Ericson Sandstone is generally made up of massive sandstones and conglomerates in the vicinity of the project area. The unit is up to 700 feet thick and is laterally continuous in the region. It is considered the best aquifer in the area relative to production and water quality (Ogle and Wood 2004).

The water produced from the Ericson Sandstone has a reported TDS range from 500 to 1,200 mg/l. The predominant ions present are calcium, sodium, and sulfate. Wells at the Black Butte Mine exceed Class I and Class II requirements for sulfate, iron and manganese. The water generally falls in the livestock class (Class III) (Ogle and Wood 2004).

3.5.1.4 Groundwater Recharge

Low annual precipitation (8.84 inches) combined with a high annual evaporation rate (45 inches) limits potential aquifer recharge in the project area (USFWS 2002). Recharge occurs primarily in upland areas where bedrock is exposed at or near the ground surface. Groundwater recharge in the vicinity of the Black Butte Mine is estimated to be about 0.01 inch per year (BBCC 2004b) In the project area, the bedrock formations with the greatest potential for groundwater storage and transmission are generally located on the topographic highs further reducing potential recharge by limiting the amount and duration of surface water contact with the formations.

3.5.1.5 Water Rights

A search of groundwater rights by well location was conducted using the Wyoming Sate Engineer's Office records. The search identified five wells in the vicinity of the project area. Two of the wells are

Black Butte Mine monitoring wells and are completed 102 and 124 feet bgs. One is listed as a monitoring well with a completion depth of 224 feet bgs. The remaining two are listed as stock/irrigation/domestic use and are reported to be completed 400 feet bgs.

3.5.2 Surface Water Quality and Quantity

The assessment area for surface water includes the two 5th order watersheds that include the project area and the affected portion of the 6th order watershed within the two 5th order watersheds, Bitter Creek – Patrick Draw and Black Butte Creek (**Figure 3.10**). The assessment area is 271,169.23 acres in size, and includes 131,351.02 acres of BLM-administered land, 137,834.22 acres of private land, and 1,983.99 acres of State of Wyoming land. Total estimated existing disturbance is 14,611 acres or 5.39 percent of the assessment area.

The Bitter Creek drainage basin is within the Upper Green River drainage basin, a tributary of the Colorado River. Bitter Creek is considered an intermittent stream that carries water most of the time over most of its length, although there are periods and reaches of no flow. Most flow within the vicinity of the project area occurs in the spring during snowmelt or after storm events. The Bitter Creek watershed (approximately 2,200 square miles) discharges into the Green River near the town of Green River, Wyoming.

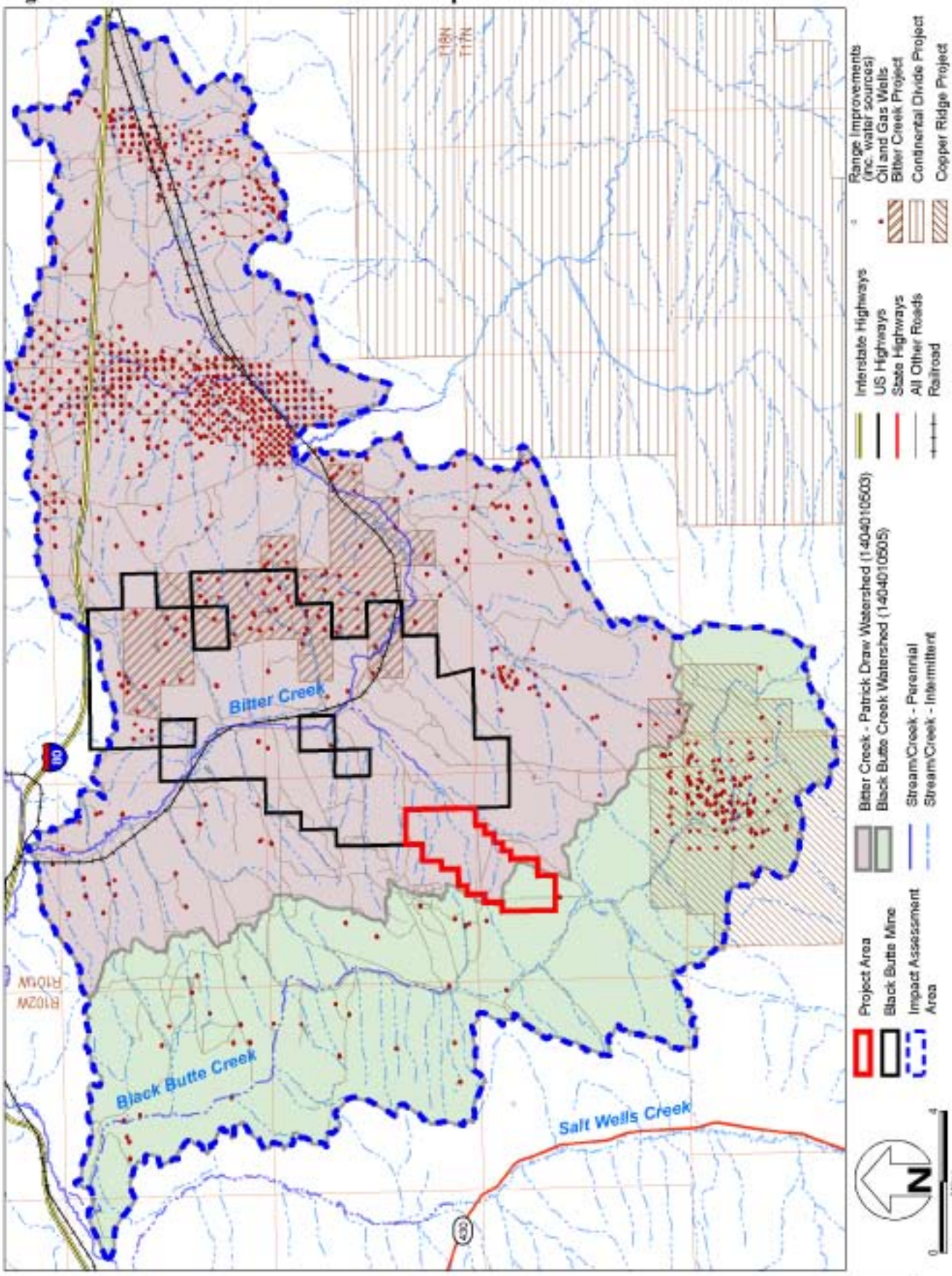
Multiple ephemeral stream channels that generally drain to the southeast incise the topography of the project area. No perennial or intermittent streams exist within the project area. Ten ephemeral drainages that flow only in response to rainfall or snowmelt events have been identified within the project area. These drainages have been identified as jurisdictional "Other Waters of the U.S," in accordance with 33 CFR 328.3 (BBCC 2004b). No wetlands or riparian vegetation are associated with these drainages (BBCC 2004b). No wetlands were identified within the project area on the National Wetland Inventory maps. Wetland inventories of the Project Area in 2002 and 2005 did not indicate the presence of wetlands. The northern portion of the project area drains into an ephemeral stream channel that flows northeast to Bitter Creek.

The southern portion of the project area drains into an ephemeral channel that flows southeast to Black Butte Creek, an intermittent tributary to Bitter Creek. Minor flows from the project area result from snowmelt during the late winter and early spring. More voluminous flows result from rainfall events. No surface water storm event or snowmelt flow gauging has been conducted in the project area.

USGS Gauging Station 09216562, Bitter Creek above Salt Wells Creek near Salt Wells, Wyoming, was maintained from 1975 through 1981. The mean annual streamflow recorded at this location on Bitter Creek, which was immediately upstream of the Salt Wells Creek confluence, ranged from 3.6 cubic feet per second (cfs) (in 1978) to 15.7 cfs (in 1980). The average flow for the record period is 6.4 cfs with an average annual runoff of 4,800 acre-feet. The median unit area annual runoff was 3.5 acre-feet per year. The minimal flow for the record period was 0 cfs. Instantaneous peak discharges at this site ranged from 280 cfs (in 1980) to 888 cfs (in 1979).

Surface water samples collected at the gauging station indicate that the water quality in Bitter Creek downstream of the project area is generally suitable for livestock. The water quality of Bitter Creek over the six-year period studied is classified as sodium sulfate type with an average TDS concentration of 3,670 mg/l, average total suspended solids (TSS) concentration of 5,130 mg/l and average sodium and sulfate concentrations of 720 mg/l and 1,780 mg/l, respectively (Ogle and Wood 2004). Bitter Creek is classified as a non-game fishery (Class 2C) and is listed as a 303(d) impaired water body (due to fecal coliform and chlorides) downstream of the project area below the confluence with Killpecker Creek, over 40 miles west of the project area (WDEQ 2004b).

Figure 3.10 Surface Water Locations and Impact Assessment Area



3.6 VEGETATION

The assessment area for vegetation, including special status plants and invasive species, is the project area (**Figure 3.11**). The assessment area is 4,359 acres in size, and includes 2,199.20 acres of BLM-administered land and 2,159.40 acres of private land. Total estimated disturbance is three acres or 0.07 percent of the assessment area.

3.6.1 Vegetation Range Sites

A vegetation inventory of cover and production within the project area was conducted in 2001 and 2002 (**Figure 3.11**). Three vegetation types (hereafter referred to as range sites) occur within the project area including shallow loamy - big sagebrush shrubland, saline upland - subshrub, and rocky/shale - shrubland (BBCC 2004c). These range sites, and their associated acreages and percentages, are listed in **Table 3.13**. No wetland or riparian vegetation is associated with the ephemeral drainages within the project area (BBCC 2004a; 2004b). Accordingly, wetlands and riparian areas are not further discussed in this document.

Table 3.13 Range Sites Found Within the Project Area

Range Site	Approximate Acres	Approximate Percentage of the Project Area
Shallow Loamy - Big Sagebrush Shrubland	3,429	80
Saline Upland - Subshrub	478	10
Rocky/Shale - Shrubland	452	10
Total	4,359	100
Source: BBCC 2004b		

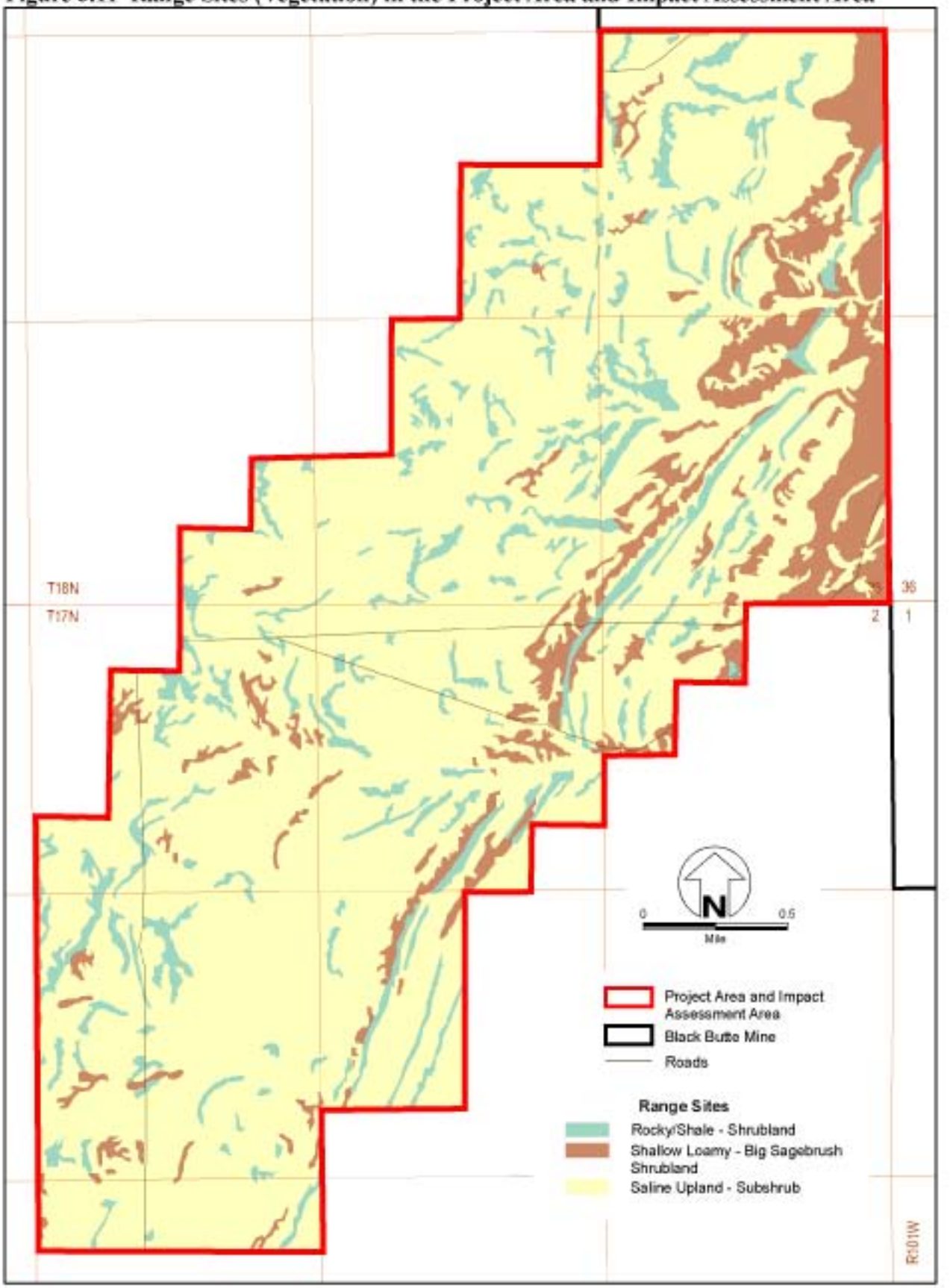
3.6.1.1 Shallow Loamy - Big Sagebrush Shrubland

The shallow loamy - big sagebrush shrubland range site is comprised of approximately 60 percent shrubs, 29 percent perennial grasses, six percent perennial forbs, four percent subshrubs, and less than one percent each of annual grasses and annual forbs (BBCC 2004b). The dominant shrub species is big sagebrush (*Artemisia tridentata*), and associated shrub species include Douglas rabbitbrush (*Chrysothamnus viscidiflorus*) and spiny hopsage (*Grayia spinosa*). Dominant perennial grasses and forbs include western wheatgrass (*Agropyron smithii*), Sandberg bluegrass (*Poa secunda*), Indian ricegrass (*Oryzopsis hymenoides*), and Hood's phlox (*Phlox hoodii*). Annual vegetation production was the lowest of all three range sites for shallow loamy – big sagebrush shrubland, and dominated by perennial grasses (BBCC 2004b).

3.6.1.2 Saline Upland - Subshrub

The saline upland - subshrub range site is comprised of approximately 58 percent subshrubs, 36 percent perennial grasses, two to three percent each of perennial forbs and shrubs, and one percent succulents (BBCC 2004b). Dominant subshrub species include Gardner's saltbush (*Atriplex gardneri*), fringed sagebrush (*Artemisia frigida*), and winterfat (*Krascheninnikovia lanata*). Dominant perennial grasses include Sandberg bluegrass, western wheatgrass, and Indian ricegrass. The succulent is an *Opuntia* species. Annual vegetation production was the highest of all three range sites for saline upland - subshrub, and dominated by subshrubs (BBCC 2004b).

Figure 3.11 Range Sites (Vegetation) in the Project Area and Impact Assessment Area



3.6.2 Rocky/Shale - Shrubland

The rocky /shale - shrubland range site is comprised of approximately 38 percent shrubs, 36 percent perennial grasses, 13 percent perennial forbs, 12 percent subshrubs, and less than one percent each of annual forbs and succulents (BBCC 2004b). The dominant shrub species is big sagebrush, and associated shrub species include Douglas rabbitbrush and shadscale (*Atriplex confertifolia*). Dominant perennial grasses include bluebunch wheatgrass (*Agropyron spicatum*), Sandberg bluegrass, western wheatgrass, and Indian ricegrass. Dominant perennial forbs include Hooker's sandwort (*Arenaria hookeri*) and tufted milkvetch (*Astragalus spatulatus*), while dominant subshrub species include Gardner's saltbush and fringed sagebrush. The succulents were an *Opuntia* species. Annual vegetation production was the second highest of all three range sites for rocky/shale – shrubland, and split almost evenly by perennial grasses and subshrubs (BBCC 2004b).

3.6.3 Special Status Plant Species

The BLM identified four plants with potential to occur within the project area. These species include one federally threatened species, the Ute ladies'-tresses (*Sprinathes diluvialis*), and three BLM sensitive plants species, including the Nelson's milkvetch (*Astragalus nelsonianus*), Ownbey's thistle (*Cirsium ownbeyi*), and Wyoming tansymustard (*Descurainia torulosa*).

Nelson's milkvetch occurs on poorly developed soils and on erodible alkaline slopes, shale bluffs, ridgetops, gullies and flats. The known Wyoming occurrences are found in sparsely vegetated sagebrush plant communities at elevations of 5,200 to 7,600 feet (Heidel 2003). Ownbey's thistle is found on similar sparsely vegetated slopes in juniper and sagebrush communities (Wyoming Rare Plant Technical Committee 1994). Suitable riparian and wet meadow habitat for the Ute ladies'-tresses does not occur within the project area, and Wyoming tansymustard occurs only at high elevations (8,300 to 10,000 feet), much higher than the project area (Wyoming Rare Plant Technical Committee 1994).

Vegetation surveys in 2001 and 2002, and wetland inventories in 2002 and 2005 did not indicate the presence of any of these special status plants. In coordination with the Wyoming Natural Diversity Database (WNDD) via letter dated July 12, 2005 (**Appendix H**), BLM has concluded that no special status plant species occur within the project area.

Because special status plant species were not found during site-specific inventories, they are not affected or impacted. Therefore, this resource is dropped from further consideration in this EIS.

3.6.4 Invasive Species

Three species of noxious weeds were observed during vegetation inventories conducted in 2001 and 2002 (BBCC 2004b). Canada thistle (*Cirsium arvense*), perennial pepperweed (*Lepidium latifolium*), and black henbane (*Hyoscyamus niger*) are currently found within the project area. Black henbane is included on Wyoming's 2005 Declared Weed and Pest List (Wyoming Weed and Pest Council 2005). Noxious weeds are not abundant within the project area (BBCC 2004c).

3.7 WILDLIFE AND FISHERIES

For the purpose of this document, wildlife and fisheries refers to both general and special status wildlife and fisheries. General wildlife and fisheries refers to species or groups of species that do not have federal status (as defined in the BLM 6840 Manual, including ESA-related species) but may have other federal or state protection (e.g., under the federal Migratory Bird Treaty Act) and are of concern to management authorities, Native American tribes, the general public, or groups (e.g., birders, hunters, etc.) with particular interest in a species. Special status refers to ESA-related species and BLM sensitive species.

Wildlife and fisheries groups considered in this document include big game, raptors, special status (ESA-related and BLM sensitive) wildlife species, and fisheries.

Amphibians are found in and adjacent to aquatic habitats including wetlands, rivers and streams, mountain lakes, run-off pools in rock formations, and both ephemeral and permanent livestock watering ponds. Water sources are lacking within the area of project area, and limited within the assessment area as a whole. Accordingly, it is unlikely that amphibians are found within the project area. Therefore, they are not further discussed. Five migratory species (four passerines and one raptor) listed by the BLM as sensitive, or wildlife of special concern, have been identified in the project area and are discussed further in the special status species analysis in Section 3.7.3.1. Numerous raptor species identified through annual raptor monitoring have been identified as well. These species are discussed in Section 3.7.2 (Raptors).

3.7.1 Big Game

Three big game species are known to occur within the project area including the pronghorn (*Antilocapra americana*), mule deer (*Odocelius hemonius*), and elk (*Cervus elaphus*). Big game populations are managed by the WGFD, which delineates two scales of management units including herd units and hunt areas. Herd units, the larger of the two, encompass most of the year-long seasonal use ranges for particular herds. The smaller hunt areas are administratively designated, found within herd units, and are the level at which site-specific harvest regulations are managed.

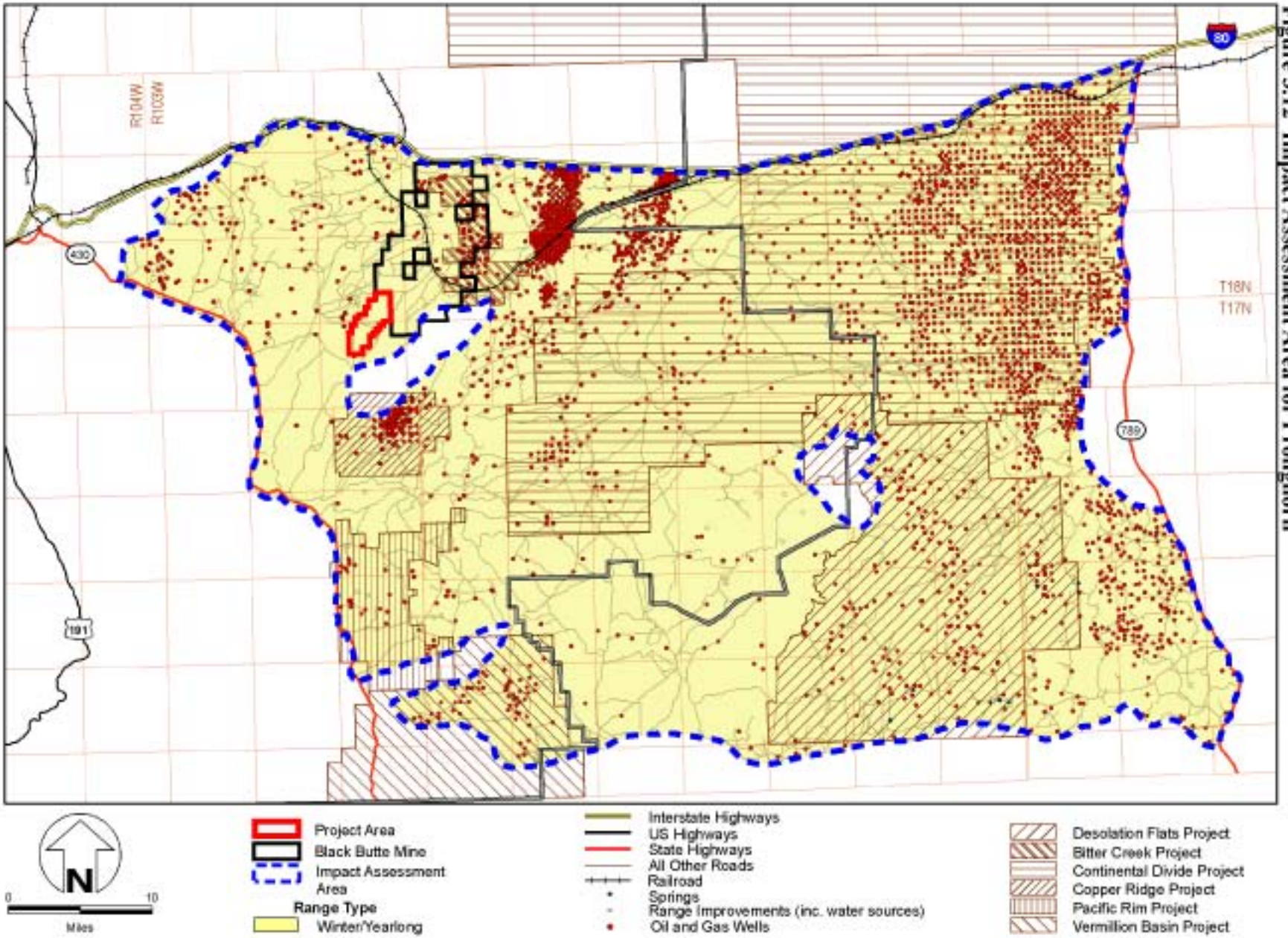
In addition to management units, WGFD has designated seasonal use ranges. Five big game seasonal use ranges occur within the vicinity of the project area, including yearlong, winter/yearlong, crucial winter/yearlong, crucial winter, and undetermined. Definitions of the terms used to designate these seasonal use ranges follow:

- Spring/Summer/Fall – Spring/Summer/Fall seasonal use areas are occupied during spring calving, summer feeding, and/or fall breeding. In the Green River RMP and ROD (BLM 1997), big game calving and fawning areas are protected to ensure continued utilization by limiting disruptive activities in seasons critical for big game, and limiting the amount of habitat that is disturbed.
- Yearlong - Yearlong ranges (yearlong, winter/yearlong, crucial winter/yearlong) are occupied throughout the year and there is not an influx of additional animals from other areas in the winter.
- Crucial - Crucial range (crucial winter/yearlong and crucial winter) has been documented as a determining factor in a population's ability to maintain itself at a specified level (theoretically, at or above the population objective) over the long term. The BLM considers all state-designated crucial ranges to be high-value habitat, and the Green River RMP and ROD (BLM 1997) provides seasonal restrictions and rehabilitation standards for these habitats.
- Crucial Winter – Crucial winter range is an area that is available, relatively intact, and supports most of the local population at its target abundance and in adequate body condition. These areas are typically used eight or more out of 10 winters (BLM 1997). In the Green River RMP and ROD (BLM 1997), big game crucial winter ranges are protected to ensure continued utilization by limiting disruptive activities during critical seasons of big game use and limiting the amount of habitat that is disturbed.
- Undetermined – Undetermined areas have not been evaluated for their seasonal importance to population maintenance.

3.7.1.1 Pronghorn

The assessment area for pronghorn is the affected habitat in the project area, in the Bitter Creek Herd Unit (Herd Unit 414) (**Figure 3.12**). The assessment area is 1,603,167 acres, and includes 1,075,789.95 acres

Figure 3.12 Impact Assessment Area for Pronghorn



of BLM-administered land, 501,967.71 acres of private land, and 25,409.34 acres of State of Wyoming land. Total estimated existing disturbance is 35,083 acres or 2.19 percent of the assessment area.

The Bitter Creek Herd Unit includes 1,835,828 acres of habitat (WGFD 2003), and the population objective of 6,500 animals (WGFD 2004). The 2003 post-hunt population estimate was 4,900 (WGFD 2004). The entire project area is winter/yearlong pronghorn range, which accounts for 0.5 percent of the total assessment area winter/yearlong range within the Bitter Creek Herd Unit. Though no designated crucial winter range or calving areas have been identified for pronghorn within the project area, crucial winter/yearlong range for the pronghorn occurs does occur within the assessment area (**Figure 3.12**).

3.7.1.2 Mule Deer

The assessment area for mule deer is the affected habitat, as it occurs in the project area, in the South Rock Springs Herd Unit (Herd Unit 424) (**Figure 3.13**). The assessment area is 1,134,282 acres, and includes 752,877.12 acres of BLM-administered land, 22,567.53 acres of Forest Service-administered land, 306,198.39 acres of private land, 1,217.99 acres of open water, and 51,420.96 acres of State of Wyoming land. Total estimated existing disturbance is 14,108 acres or 1.24 percent of the assessment area.
This entire South Rock Springs Herd Unit includes 1,378,461 acres of habitat, with a population objective of 11,750 mule deer (WGFD 2004). Animals in this migratory herd move between Wyoming, Colorado, and Utah. Accordingly, it is difficult to estimate abundance of the Wyoming portion of the population. However, the 2003 post-hunt population estimate was approximately 7,200 mule deer (WGFD 2004).

The entire project area provides mule deer habitat, including crucial winter/yearlong and winter/yearlong seasonal use ranges. One-quarter (approximately 25.3 percent or 1,102.7 acres) of the project area (along the western portion) is classified as crucial winter/yearlong range. The remaining portion of the project area (approximately 74.7 percent or 3,256.3 acres) is classified as winter/yearlong range. Together, these designated habitats within the project area comprise less than one percent of the crucial winter/yearlong, and winter/yearlong range within the South Rock Springs Herds Unit. No designated mule deer fawning areas have been identified within the project area.

3.7.1.3 Elk

The assessment area for elk is the affected undetermined habitat, as it occurs in the project area, in the entire Petition Herd Unit (Herd Unit 430) (**Figure 3.14**). The assessment area is 1,453,728 acres, and includes 933,993.63 acres of BLM-administered land, 499,561.00 acres of private land, and 20,173.37 acres of State of Wyoming land. Total estimated existing disturbance is 18,574 acres or 1.28 percent of the assessment area.

The Petition Herd Unit (Herd Unit 430) for elk includes 903,863 acres of habitat within the assessment area. The population objective has been determined to be 300 elk (WGFD 2004). The 2003 post-hunt population estimate was 300 elk (WGFD 2004). Elk in the Petition Herd Unit consist of isolated groups that use higher elevation ridges and adjacent habitats within a matrix of desert. Because the animals are spread out over a large area, and a portion of the migratory herd intermixes with animals in Colorado, this population size is difficult to estimate.

The project area accounts for 0.6 percent of the total 1,453,728 acres of undetermined elk habitat within the Petition Herd Unit. No designated crucial winter range or calving areas have been identified for elk within the project area.

Figure 3.13 Impact Assessment Area for Mule Deer

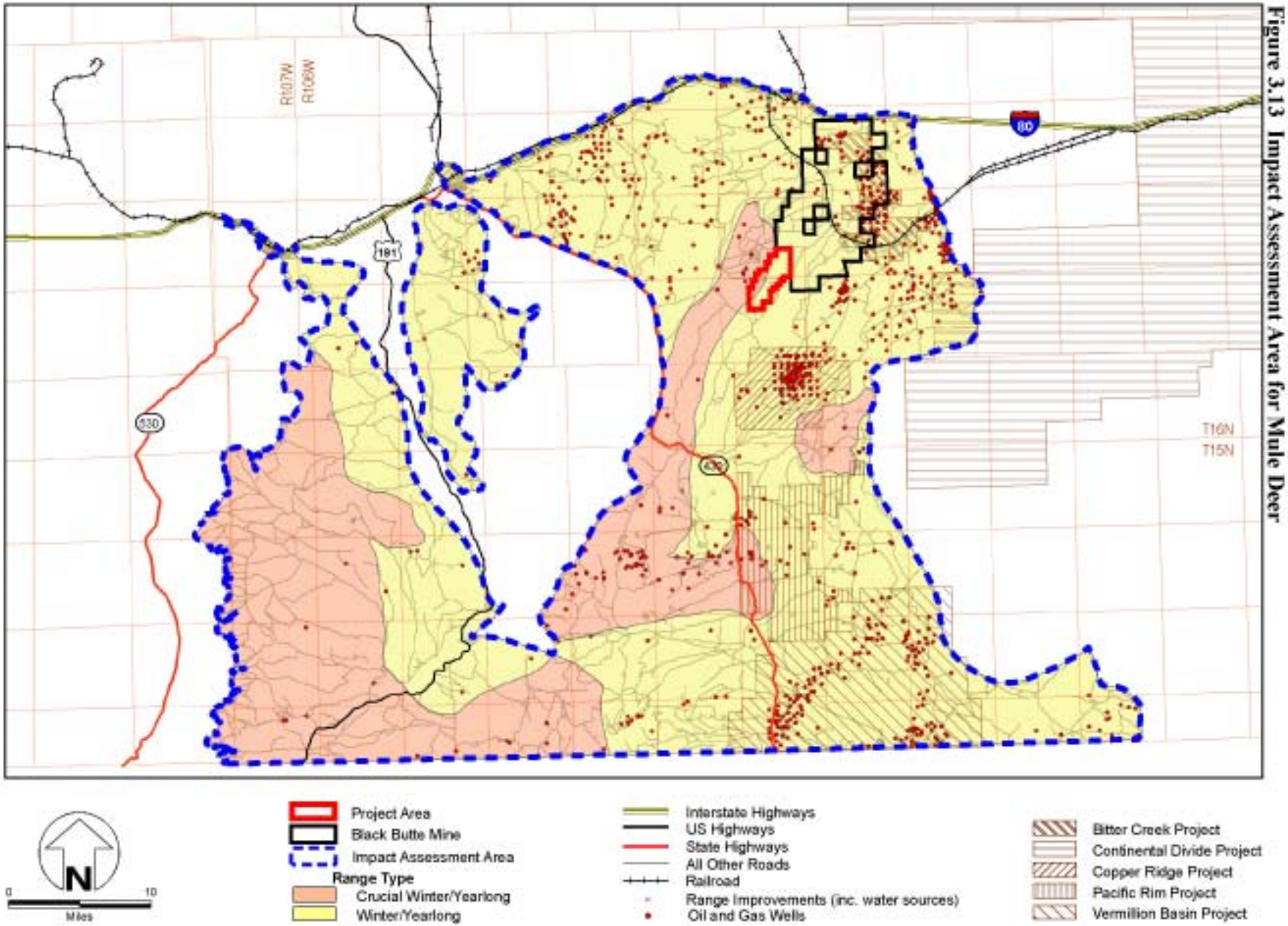
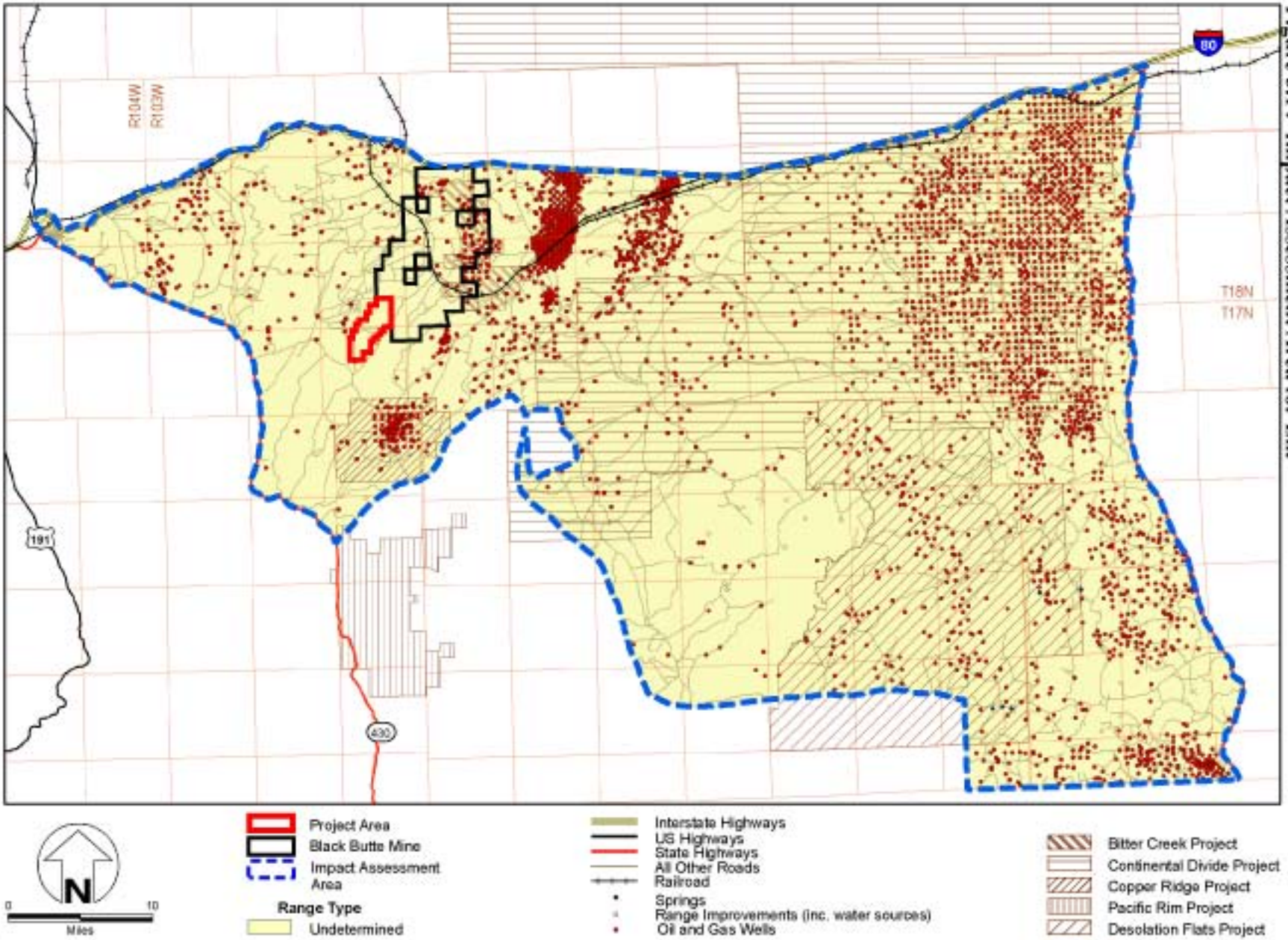


Figure 3.14 Impact Assessment Area for Elk



3.7.2 Raptors

The assessment area for raptors (birds of prey) comprises the project area, the existing Black Butte Mine, and a two-mile buffer (**Figure 3.15**). The assessment area is 107,860 acres in size, and includes in this area are 53,006.11 acres of BLM-administered land, 54,694.31 acres of private land, and 159.39 acres of State of Wyoming land. Total estimated existing disturbance is 9,812 acres or 9.10 percent of the assessment area.

Raptors found in and around the project area include hawks, eagles, falcons, and owls. These species inhabit a variety of ecosystems and consume a wide range of prey species. Some raptor species and individual pairs are sensitive to disturbance from human and other sources, particularly during the breeding season. Accordingly, raptors are protected from disturbance by the following federal acts: the Migratory Bird Treaty Act of 1918, Eagle Protection Act of 1962 (as amended), and ESA of 1973 (as amended; for federally listed species only). In addition, the BLM has developed spatial buffers designated to protect raptors during nesting, usually between February 1 and July 31. For bald eagles and ferruginous hawks, the buffer is one mile; for all other raptors, the buffer is 0.5 mile (Dunder 2005a).

For proposed disturbances occurring outside of the nest-building and incubation period, a No Surface Occupancy stipulation is applied within 1,968 feet of any active golden eagle nest, 1,313 feet of active ferruginous hawk nests, and 815 feet for all other active raptor nests (Dunder 2005a).

Raptor monitoring by BBCC for the Black Butte Mine permit area has been ongoing for approximately 30 years. The BBCC Raptor Protection and Mitigation Plan for the existing Black Butte Mine permit area (approved by the USFWS, BLM, WGFD, and Wyoming DEQ/LQD), is based upon a regional Raptor Special Studies Plan developed in the 1980s by USFWS and WGFD. This plan currently requires raptor monitoring within the Black Butte Mine permit area and adjacent proposed Pit 14 Coal LBA. Monitoring includes nest monitoring, territory assessment, and prey-base analysis.

Table 3.14 and **Table 3.15** lists the nesting raptor species, and number of active nests per year, that have been recorded within the vicinity of the project area (BBCC 2004d). Confirmed raptor species actively nesting within the vicinity of the project area are shown on **Figure 3.15**. It should be noted that an active nest in a given year may or may not be the same active nest in a subsequent year. An active nest refers to a nesting attempt, regardless of success, that took place in any of 2003, 2004, or 2005.

3.7.3 Special Status Wildlife and Fisheries Species

Eleven special status wildlife species with potential to occur within the sagebrush-steppe habitats within the project area, and two special status fish species that may be present within watersheds in the project area are included in **Table 3.16**. These species are listed as wildlife species of concern by the BLM in Wyoming. Several special status species will not be further discussed due to the relative improbability of occurrence within the project area and assessment areas, or the likelihood of negligible effect on them. These species and the reason for dismissal are presented in **Table 3.17**.

Table 3.14 Active Raptor Nests within the Project Area

Species of Raptor		Number of Active Nests		
		2003	2004	2005
Golden Eagle	*Aquila chrysaetos*	2	1	2
Prairie Falcon	*Falco mexicanus*	2	2	2
Red-tailed Hawk	*Buteo jamaicensis*	1	2	3
Great Horned Owl	*Bubo virginianus*	1	0	1
American Kestrel	*Falco sparverius*	1	1	1

Figure 3.15 Known Active Raptor Nests in the Raptor Impact Assessment Area

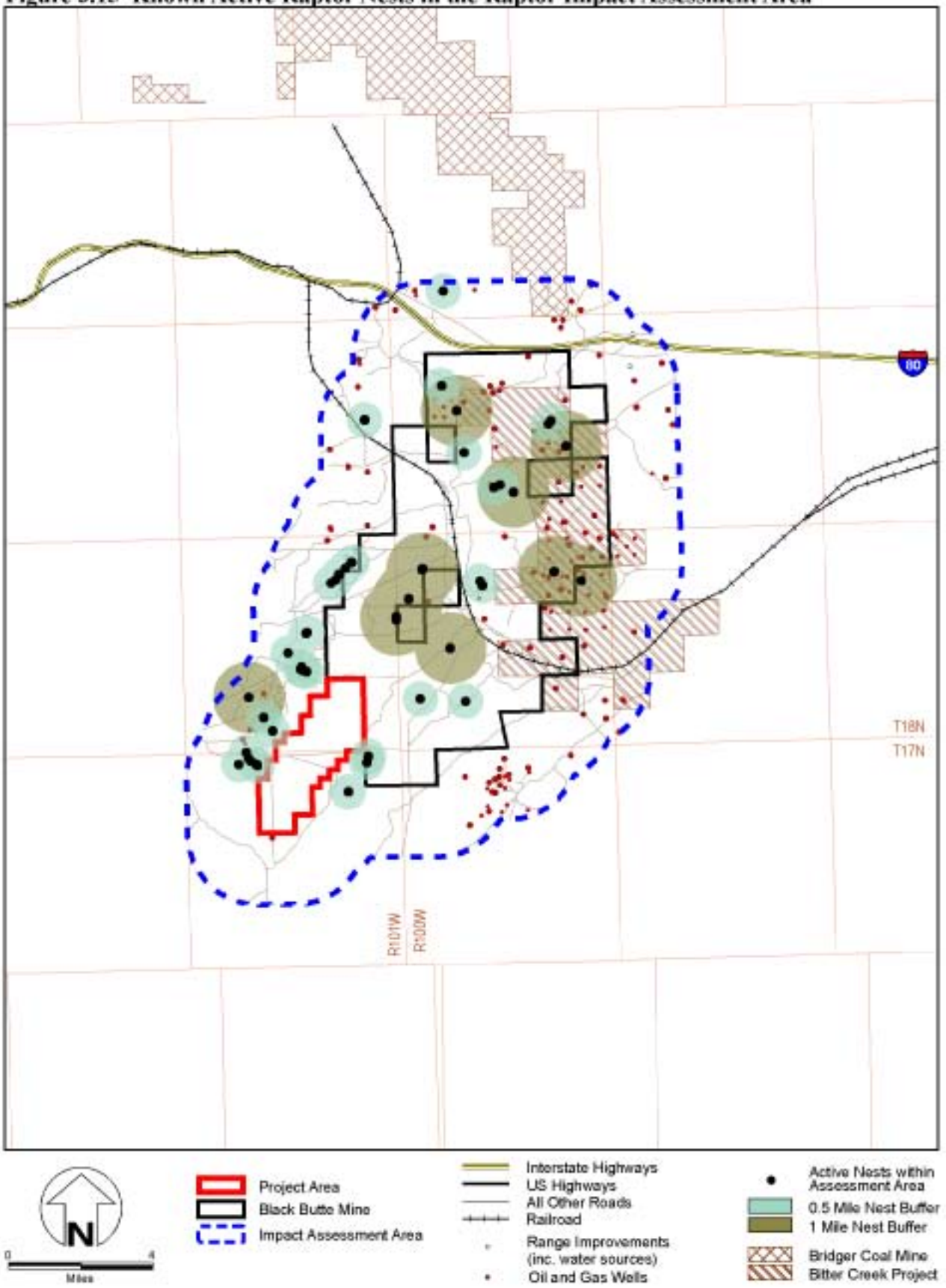


Table 3.15 Active Raptor Nests within the Assessment Area

Species of Raptor		Number of Active Nests		
		2003	2004	2005
Golden Eagle	*Aquila chrysaetos*	6	4	13
Prairie Falcon	*Falco mexicanus*	2	2	7
Ferruginous Hawk	*Buteo regalis*	5	8	5
Red-tailed Hawk	*Buteo jamaicensis*	3	4	12
Great Horned Owl	*Bubo virginianus*	1	0	2
American Kestrel	*Falco sparverius*	5	5	8
Unknown		0	1	0

Table 3.16 Wildlife Species of Concern with Potential to Occur in the Project Area

Species Common Name	Scientific Name
Birds	
Sage Sparrow	*Amphisiza belli*
Burrowing Owl	*Athene cunicularia*
Ferruginous Hawk	*Buteo regalis*
Greater Sage-Grouse	*Centrocercus urophasianus*
Mountain Plover	*Charadrius montanus*
Loggerhead Shrike	*Lanius ludovicianus*
Sage Thrasher	*Oreoscoptes montanus*
Brewer's Sparrow	*Spizella breweri*
Mammals	
Pygmy Rabbit	*Brachylagus idahoensis*
White-Tailed Prairie Dog	*Cynomys leucurus*
Swift Fox	*Vulpes velox*
Fish	
Bluehead sucker	*Catostomus discobouls*
Flannelmouth sucker	*Catostomus latipinnis*

The assessment areas for special status wildlife and fish species vary by species. The following BLM-sensitive species have been carried forward for analysis: migratory birds (sage sparrow, Brewer's sparrow, loggerhead shrike, and sage thrasher), ferruginous hawk, greater sage-grouse, mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, swift fox, and fisheries. No ESA-related species have been carried forward for analysis.

The assessment area for the sage sparrow, Brewer's sparrow, loggerhead shrike, and sage thrasher is the project area. The assessment area is 4,359 acres in size, and includes 2,199.20 acres of BLM-administered land and 2,159.40 acres of private land. Total estimated existing disturbance is three acres or 0.07 percent of the assessment area.

The assessment area for the ferruginous hawk comprises the project area and existing Black Butte Mine, plus a two-mile buffer. The assessment area is 107,860 acres, and includes 53,006.11 acres of BLM-administered land, 54,694.31 acres of private land, and 159.39 acres of State of Wyoming land. Total estimated existing disturbance is 9,812 acres or 9.10 percent of the assessment area.

Table 3.17 Special Status Species Eliminated From Detailed Analysis

Species	Scientific Name	Reason Eliminated
Bald Eagle	*Haliaeetus leucocephalus*	The bald eagle, a federally threatened species, is not known to nest or roost within the project area, and the lack of suitable nesting or winter roosting habitat likely precludes the use of this area for such activities by bald eagles. Accordingly, the bald eagle is not further discussed. The Green River, Flaming Gorge Reservoir, Big Sandy Reservoir, and Seedskadee National Wildlife Refuge provide the nearest favorable nesting, roosting, and foraging habitat for bald eagles. The nearest of these areas is the Green River, approximately 30 miles west of the project area. Bald eagles were observed by BLM staff foraging around 10-Mile Marsh (approximately 17 miles north of the project area) during the winter of 1978 (Dunder 2005b).
Black-Footed Ferret	*Mustela nigripes*	The project area was surveyed for white-tailed prairie dog colonies (i.e., potentially suitable habitat for the federally endangered black-footed ferret) in 2001 and 2002. Several active colonies were identified. Although potentially suitable habitat for the black-footed ferret may occur within these towns, no black-footed ferret individuals or sign were observed during the prairie dog surveys (BBCC 2004e), and this portion of Wyoming has been cleared by the USFWS so that no black-footed ferret surveys are required in order to assure their lack of occurrence. Therefore, the black-footed ferret is not discussed further.
Long-Billed Curlew	*Numenius americanus*	The long-billed curlew is often found in grassland habitat throughout the arid west (Kaufman 1996). A limited amount of potentially suitable habitat exists within the project area, and no curlews were observed during baseline wildlife inventories that were conducted in 2001 and 2002 (BLM 2005c).
Dwarf Shrew	*Sorex nanus*	The dwarf shrew is found in woodland, grassland, and tundra, feeding primarily upon insects, worms, and other invertebrates (UDWR 2005a). The dwarf shrew is common within the project area (Dunder 2005d). However, to the extent that suitable habitat is available surrounding the project area and assessment areas, any effect on this species would be negligible.
Long-Eared Myotis	*Myotis evotis*	The long-eared myotis is found in a variety of habitats throughout the western U.S. (Harvey et al. 1999). The long-eared myotis is common within the project area (Dunder 2005d). However, to the extent that suitable habitat is available surrounding the project area and assessment areas, effects on this species would be negligible.
Fringed Myotis	*Myotis thysanodes*	The fringed myotis is found most commonly in oak and pinyon woodlands throughout the western U.S. (Harvey et al. 1999). The WNDD database shows no records of occurrence of the fringed myotis within the project area.
Spotted Bat	*Euderma maculatum*	The spotted bat is found in a variety of habitats throughout the western U.S. It is most closely associated with rough, rocky, arid, and semi-arid terrain (Harvey et al. 1999). The WNDD database, show no records of occurrence of the spotted bat within the project area.
Townsend's Big-Eared Bat	*Plecotus townsendii*	The Townsend's big-eared bat is found in cool, well-ventilated caves and mines throughout the western U.S. (Harvey et al. 1999). The WNDD database shows no records of occurrence of the Townsend's big-eared bat within the project area.
Wyoming Pocket Gopher	*Cratogeomys clusius*	The Wyoming pocket gopher prefers loose, gravelly, upland soils associated with greasewood (Smithsonian 2005). The Wyoming pocket gopher is common within the project area (Dunder 2005d). However, to the extent that suitable habitat is available surrounding the project and assessment areas, effects would be negligible.
Great Basin Spadefoot Toad	*Spea intermontana*	The Great Basin spadefoot toad prefers drier habitats than most amphibians and is found in grassland and open woodland with loose soils for burrowing. It does need a water source for breeding, so potentially suitable habitat is limited to that found near water (Ministry of Environment 2005). This toad is common within the project area and to the extent that suitable habitat is available surrounding the project area and assessment areas (Dunder 2005d), effects on this species would be negligible.

Table 3.17 (cont.) Special Status Species Eliminated From Detailed Analysis

Species	Scientific Name	Reason Eliminated
Spotted Frog	*Rana luteiventris*	The spotted frog is an aquatic specialist and is more dependent upon permanent aquatic habitats than other frogs in the same genus (Federal Register 2002). Aquatic habitats may include ponds, streams, lakes, and springs adjacent to conifer and subalpine forest, grassland, and shrubland (Federal Register 2002). The WNDD database shows no records of occurrence of the spotted frog within the project area.
Northern Leopard Frog	*Rana pipiens*	The northern leopard frog is found in a variety of aquatic habitats, particularly near cattails and other aquatic vegetation. However, it may be found foraging relatively far from water sources. During the cold winter months, this species is inactive and remains sheltered under water or in damp burrows (UDWR 2005b). The WNDD database shows no records of occurrence of the northern leopard frog within the project area.

The assessment area for the greater sage-grouse includes potentially suitable habitat within the following borders: Interstate 80 on the north, the Wyoming/Colorado state line on the south, the Baggs Road on the east, and Flaming Gorge Reservoir and the Green River on the west (**Figure 3.16**). The assessment area is 711,526 acres, and includes 443,365.57 acres of BLM-administered land, 10,054.49 acres of Forest Service-administered land, 231,617.60 acres of private land, and 26,488.34 acres of State of Wyoming land. Total estimated existing disturbance is 13,830 acres or 1.94 percent of the assessment area.

The assessment area for the mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, and swift fox is the project area. The assessment area is 4,359 acres in size and includes 2,199.20 acres of BLM-administered land and 2,159.40 acres of private land. Total estimated existing disturbance is three acres or 0.07 percent of the assessment area.

The assessment area for fisheries comprises the project area, existing Black Butte Mine, and the combined Black Butte Creek and Bitter Creek – Patrick Draw fifth order watersheds. The assessment area is 271,169.23 acres, and includes 131,351.02 acres of BLM-administered land, 137,834.22 acres of private land, and 1,983.99 acres of State of Wyoming land. Total estimated existing disturbance is 14,611 acres or 5.39 percent of the assessment area.

3.7.3.1 Special Status Migratory Birds

Migratory birds travel from one region to another, usually annually, for breeding or feeding purposes. Generally, they nest in temperate North America and over-winter in the New World tropics, including portions of Mexico and Latin America. Migratory birds represent a diversity of species, including shorebirds, waterfowl, passerines (perching birds), and raptors. Migratory birds may nest in any or all of the vegetation types within the project area, though habitat for shorebirds and waterfowls is nonexistent within the project area. Sagebrush-steppe habitat within the project area does provide nesting and foraging habitat for a variety of migratory birds in the project area.

The sage sparrow, Brewer's sparrow, loggerhead shrike, and sage thrasher are associated with large expanses of sagebrush, grasslands in the open desert and along foothills characteristic of the project area (Kaufman 1996). Each of these species utilizes the sagebrush-steppe habitats in different ways. The sage sparrow and Brewer's sparrow are generalists and utilize a wide-array of habitat within sagebrush and grassland communities. The loggerhead shrike requires open country with hunting perches such as posts, wires, trees, etc. where is feeds primarily on small birds, rodents, and large insects. The sage thrasher is sagebrush-obligate and therefore, prefers areas dominated by heavy concentrations of mature sagebrush (Kaufman 1996).

Surveys for migratory birds, and surveys along designated transects for migratory birds of high federal interest have been conducted by BBCC in accordance with WDEQ/LQD mine permit requirements for the Black Butte Mine, and as approved by the USFWS (BBCC 2005b). These four species were observed during baseline inventories conducted in the vicinity of the Black Butte Mine and the project area in 2001and 2002 (BBCC 2004e). During surveys conducted by BBCC in the Black Butte Mine area and project area, no migratory birds of high federal interest were identified (BBCC 2005b), nor were these four species identified within the project area.

3.7.3.2 Burrowing Owl

The burrowing owl is a long-legged owl that inhabits open grassland and disturbed areas. It often lives in abandoned prairie dog burrows, is diurnal, and eats mostly insects and small mammals (Kaufman 1996). In surveys conducted during the summer of 2005 by BBCC in accordance with WDEQ/LQD mine permit requirements for the Black Butte Mine, and as approved by the USFWS (BBCC 2005b), five active burrowing owl locations within active prairie dog towns were observed on the existing Black Butte Mine. Prairie dog towns and burrowing owl presence were not observed within the project area.

3.7.3.3 Ferruginous Hawk

The ferruginous hawk is a raptor that inhabits semi-arid and arid landscapes of the western U.S., and feeds on small to medium-sized prey (Kaufman 1996). The entire project area is suitable ferruginous hawk habitat for foraging, nesting, and roosting. As discussed in the raptors subsection, above, surveys for this hawk and other raptors have been ongoing for approximately 30 years. During the 2003, 2004, and 2005 surveys conducted by BBCC in accordance with WDEQ/LQD mine permit requirements for the Black Butte Mine, and as approved by the USFWS (BBCC 2005b), no active ferruginous hawk nests were found within the project area. However, five active nests in 2003, eight active nests in 2004, and five active nests in 2005 were identified within the two-mile buffer of the project area.

3.7.3.4 Greater Sage-Grouse

Approximately 80 percent of the project area consists of sagebrush-dominant habitats. The greater sage-grouse, primarily found within this habitat, relies upon sagebrush for food (leaves and buds), shelter and nesting. Strutting grounds (or leks), nesting and brood-rearing sites, or wintering locations, consist of a single area or many smaller areas distributed throughout sagebrush habitat.

The Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004) evaluates a variety of factors contributing to the migratory or residential status of greater sage-grouse populations throughout the western United States. Although migratory populations may travel much farther distances between seasons, it was concluded that the majority of individuals within a migratory population nest within 11 miles of strutting grounds. Within the 11-mile buffer established within and around the project area, approximately 101,336 acres of potentially suitable habitat for leks, nesting/brood-rearing, and wintering has been identified (BLM 2005b) (**Figure 3.16**). The greater sage-grouse populations found around the project area (i.e., within approximately 11 miles) are likely migratory, and could make year-round use of strutting grounds and wintering habitats that are located between five and 11 miles apart (Dunder 2005c).

Records of known lek locations provided by the BLM RSFO (in cooperation with WGFD) show one active lek located outside, but within two miles, of the project area. Approximately 1,568 acres, or 36 percent, of the project area occurs within two miles of this active lek.

BBCC in accordance with WDEQ/LQD mine permit requirements for the Black Butte Mine, and as approved by the USFWS (BBCC 2005b), conducted a survey of the project area in April of 2005; the

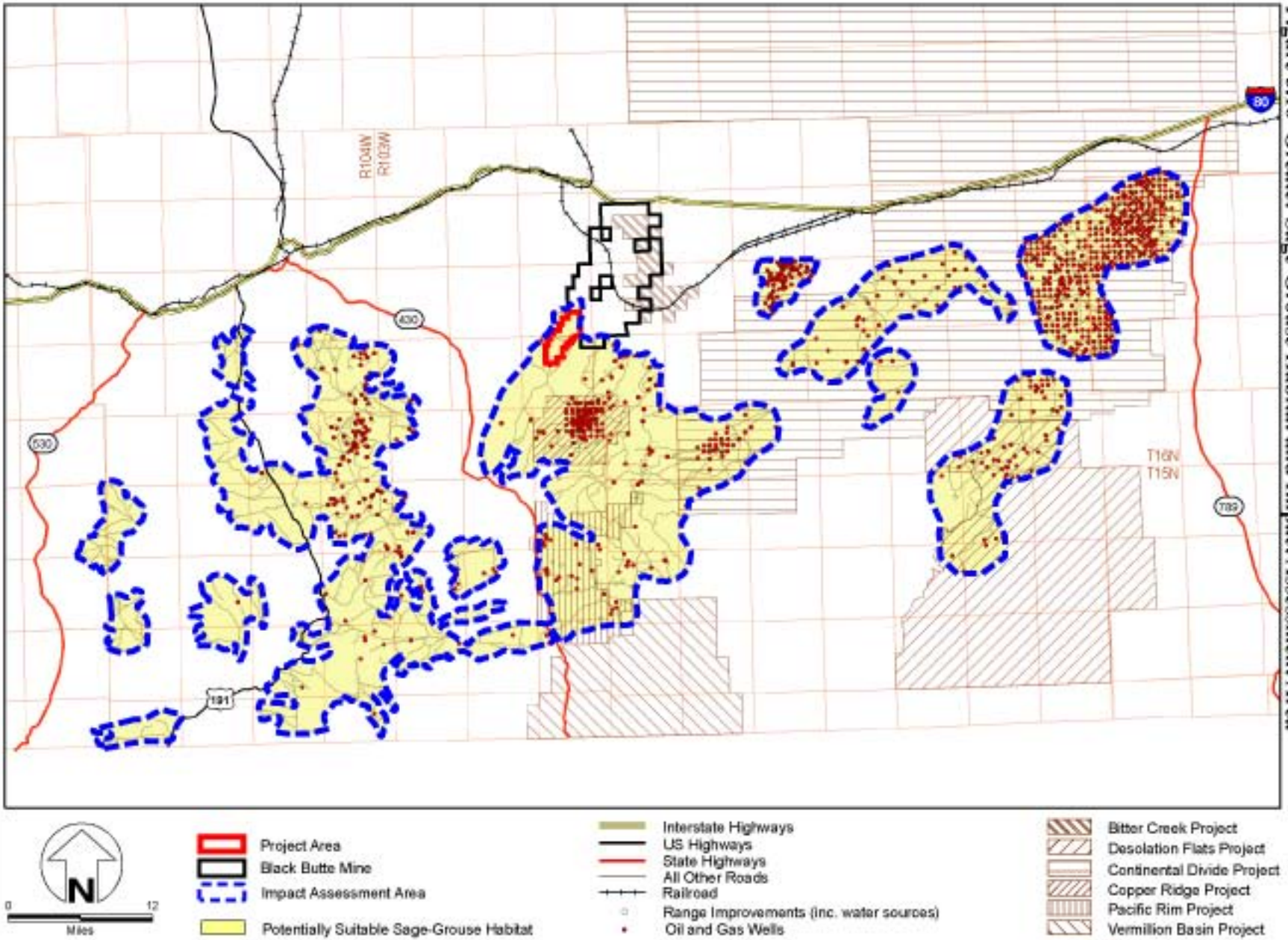


Figure 3.16 Greater Sage-Grouse Habitat and Impact Assessment Area

existing lek was confirmed as active and no additional strutting grounds were detected within the project area. Approximately five additional leks are located within the assessment area. In the Green River RMP and ROD (BLM 1997), leks located within the project area are to be avoided by approximately ¼ mile from 6:00 pm until 9:00 am between March 1 and June 15, and nesting habitat located within two miles of a lek is to be avoided between March 1 and June 30 (BLM 1997).

3.7.3.5 Mountain Plover

The mountain plover nests throughout Wyoming and prefers breeding sites of sparsely vegetated habitat, such as sagebrush and areas with perennial grasses (Kaufman 1996). BBCC conducted mountain plover surveys within the project area in 2001, 2002, and 2004. Although no individuals were observed during the survey efforts, potentially suitable grassland habitat was noted within the project area (BBCC 2004e).

3.7.3.6 Pygmy Rabbit

As the name suggests, the pygmy rabbit is the smallest rabbit in North America. It is dependent upon sagebrush for food, and digs its own burrows in deep, loose soil (Pacific Biodiversity Institute 2005). Potentially suitable habitat for the pygmy rabbit exists within the project area (Dunder 2005d).

3.7.3.7 White-Tailed Prairie Dog

The white-tailed prairie dog inhabits grassland and shrubland, often with loose, sandy soils (WNDD 2005). It is diurnal, almost exclusively vegetarian, and hibernates during the winter (Desert USA 2005) between November and February (Dunder 2005b). The project area was surveyed for white-tailed prairie dog towns in 2001 and 2002, and four active towns were identified adjacent to the project area, one of which enters the project area at three different locations (BBCC 2004e).

3.7.3.8 Swift Fox

The swift fox is the smallest canid in North America. It is native to the Great Plains and prefers grassland with little or no shrub component. It is nocturnal, non-territorial, and feeds on a variety of prey species, including rabbits, prairie dogs, ground squirrels, mice, birds, reptiles, amphibians, and insects, as well as berries and seeds. Three swift fox sightings occurred near Interstate 80 (outside of the project area), and potentially suitable habitat exists within the project area (Dunder 2005d).

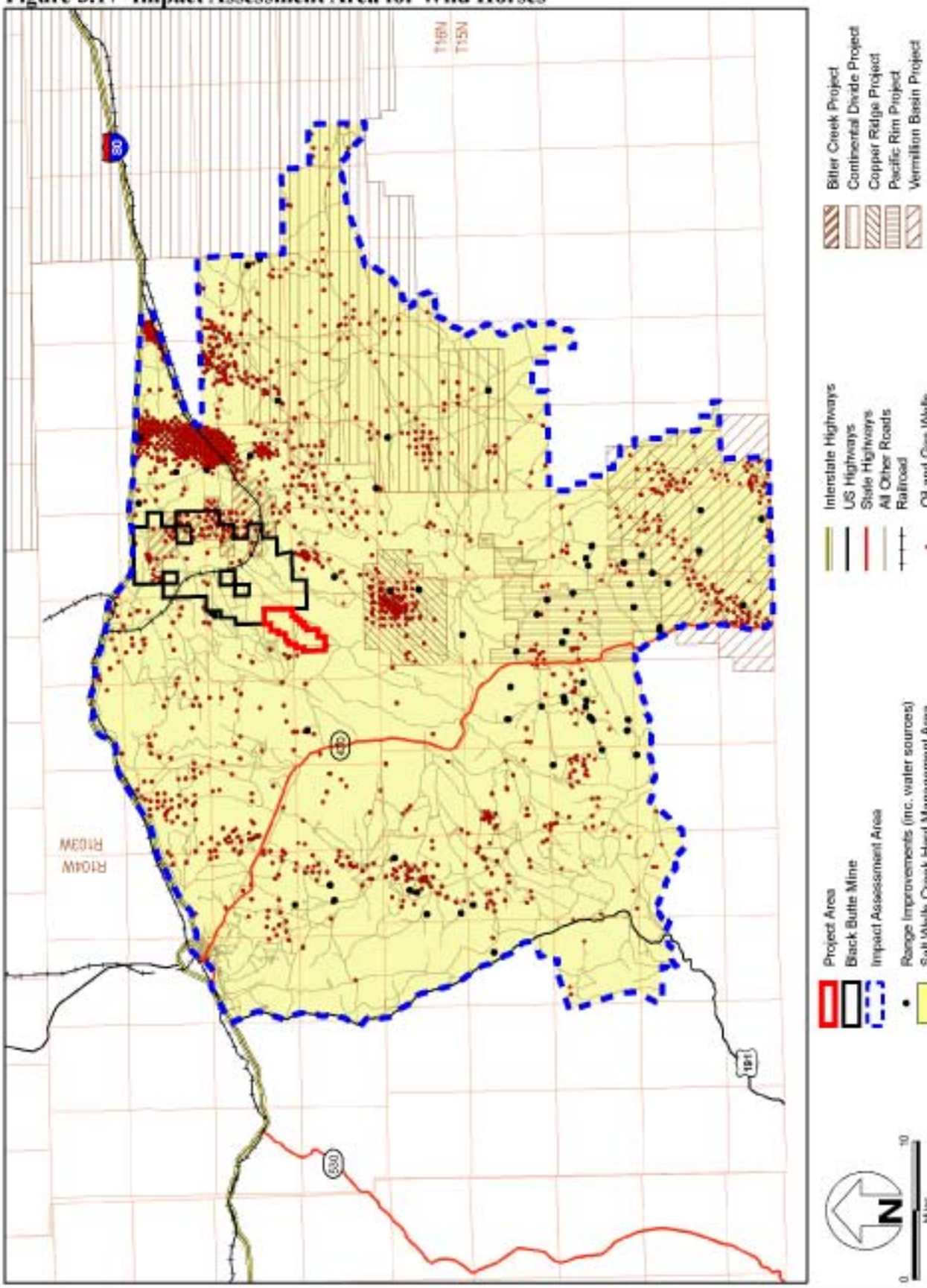
3.7.3.9 Fisheries

Two BLM sensitive fish species, the bluehead and flannelmouth suckers, are known to occur within the Green River watershed, which is supported, via the perennial Bitter Creek, by ephemeral flows from within the project area. The Green River watershed is a component of the Upper Colorado River Basin. The bluehead sucker is found in larger rivers and streams of the Green River watershed, but has not been recorded within the portion of Bitter Creek that runs through the existing Black Butte Mine and near the project area. The flannelmouth sucker is known to occur within the portion of Bitter Creek between the towns of Bitter Creek and Rock Springs, Wyoming. However, in a search conducted by the WNDD for this project, no records of occurrence of the flannelmouth sucker were identified in that portion of Bitter Creek.

3.8 WILD HORSES

The assessment area for wild horses is the Salt Wells Creek Herd Management Area (HMA) (**Figure 3.17**). The Salt Wells Creek HMA for wild horses extends from Interstate 80 on the north to the

Figure 3.17 Impact Assessment Area for Wild Horses



Wyoming/Colorado border on the south, and from Highway 191 on the west to a RSFO boundary - Kinney Rim on the east, approximately 15 miles from the project area. The assessment area is 1,170,717 acres, and includes 690,356.63 acres of BLM-administered land, 441,091.98 acres of private land, and 39,268.38 acres of State of Wyoming land. Total estimated existing disturbance is 21,014 acres or 1.79 percent of the assessment area.

The appropriate herd management level for the Salt Wells Creek HMA, as determined by the BLM, is 251-365 horses (BLM 1997). As of the summer of 2005, the population estimate of the wildhorse herd was approximately 600 wild horses. In the fall of 2005, the herd was reduced, via gathering, to the herd management level of 251 horses (D'Ewart 2005).

3.9 LAND USE

3.9.1 Land Status and Prior Rights

The land status and prior rights assessment area is the project area (**Figure 1.2**). The assessment area is approximately 4,359 acres in size, and includes 2,200 acres of BLM-administered land and 2,159 acres of private land. Total estimated existing disturbance is three acres or 0.07 percent of the assessment area.

The surface ownership pattern within and adjacent to the project area is checker boarded (**Figure 1.2**), with even numbered sections being federally owned (BLM), and odd-numbered sections being privately owned. Generally, the surface owner in this area owns mineral rights. Anadarko is the private owner.

Major land uses in the project area and surrounding land include domestic grazing and wildlife habitat. A secondary land use is dispersed recreation. Areas of disturbance within the project area include multiple two-track dirt roads. There are no utilities/easement corridors, ranch access roads, or mine monitoring access roads.

Parts of five oil and gas leases overlie the project area. If productive wells are not established on these leases they will expire at the end of their 10-year terms. The lease expiration dates range between 2006 and 2011. The leases can be developed for conventional oil and gas or for CBNG.

The U.S. Supreme Court has ruled that CBNG rights belong to the owner of the oil and gas rights (Ruling No. 98-830). Therefore, the oil and gas lessees have the right to develop the CBNG in the coal as well as the right to develop conventional oil and gas on the tract. The development of a surface coal mine would not preclude the development of oil and gas resources in a project area except on active areas of a mine. Development conflicts between coal and oil and gas production would require the two holders of the valid rights to resolve any land use conflict.

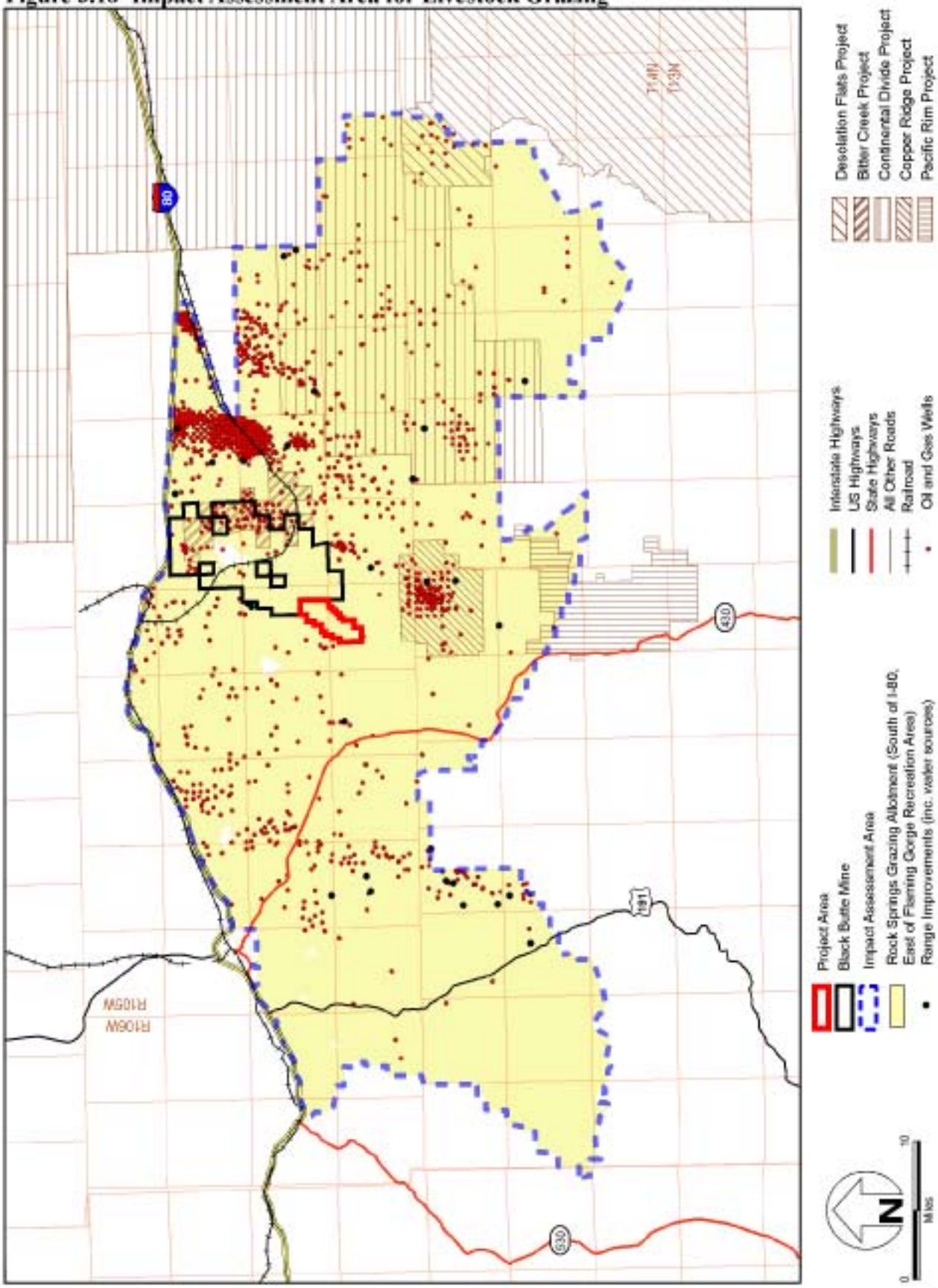
The BLM Wyoming Reservoir Management Group indicates that it has not been advised that CBNG development has been proposed for the project area. The nearest producing CBNG wells are more than four miles away from the project area (BLM 2005b).

Coal mining is a dominant land use in the area surrounding the project area. The Black Butte Mine is an operating coal mine located just north of the project area. Sweetwater County has no applicable countywide land use plans, and the project area has no designated zoning classification. The Sweetwater County Comprehensive Plan (Sweetwater County 2002) provides general land use goals and policies for state and federal coal leases in the county.

3.9.2 Livestock and Grazing Management

The assessment area for livestock and grazing is the portion of the Rock Springs Allotment south of Interstate 80 and east of the Flaming Gorge National Recreation Area, which encompasses the checkerboard lands within the RSFO area (**Figure 3.18**). The assessment area is 1,011,718 acres and

Figure 3.18 Impact Assessment Area for Livestock Grazing



includes 514,899.91 acres of BLM-administered land, 39.55 acres of Forest Service-administered land, 478,247.53 acres of private land, 18,486.93 acres of State of Wyoming land, and 44.09 acres of water. Total estimated existing disturbance is 17,964 acres or 1.78 percent of the assessment area.

Livestock grazing is a major land use in the region and the project area. The Rock Springs Allotment (#13018) is utilized by 21 individual permittees and one association which are authorized for grazing. Livestock use is authorized according to number of livestock by class (sheep, cattle, and/or horses), timing of start and finish, and animal unit months (AUMs). Permitted livestock use in the Rock Springs Allotment allows for a maximum of 342,912 sheep; 23,909 cattle; and 15 horses to graze during various periods between March 1 and February 28, with most use occurring during the winter months. Currently, active AUMs for the allotment total 108, 021, with an additional 40,564 AUMs suspended.

3.9.3 Recreation

The assessment area for recreation includes the project area, Black Butte Mine, and Southern Sweetwater County south of Interstate 80 (**Figure 3.19**). The assessment area is 1,572,997 acres, and includes 1,046,565.37 acres of BLM-administered land, 499,555.16 acres of private land, and 26,876.46 acres of State of Wyoming land. Total estimated existing disturbance is 18,329 acres or 1.17 percent of the assessment area.

Hunting is the principal recreational activity in the project area. Game includes pronghorn, mule deer, elk, coyotes, ground squirrels, prairie dogs, cottontails, greater sage-grouse, and mountain lions. Pronghorn are the predominant species hunted (BBCC 2004a). Hunting is managed by WGFD, which delineates two scales of management units including herd units and hunt areas. (See Section 3.7.1 for more information.) **Table 3.18** portrays the WGFD Big Game (pronghorn, mule deer, and elk) Demand Index for non-residents and residents in hunting areas that include the project area.

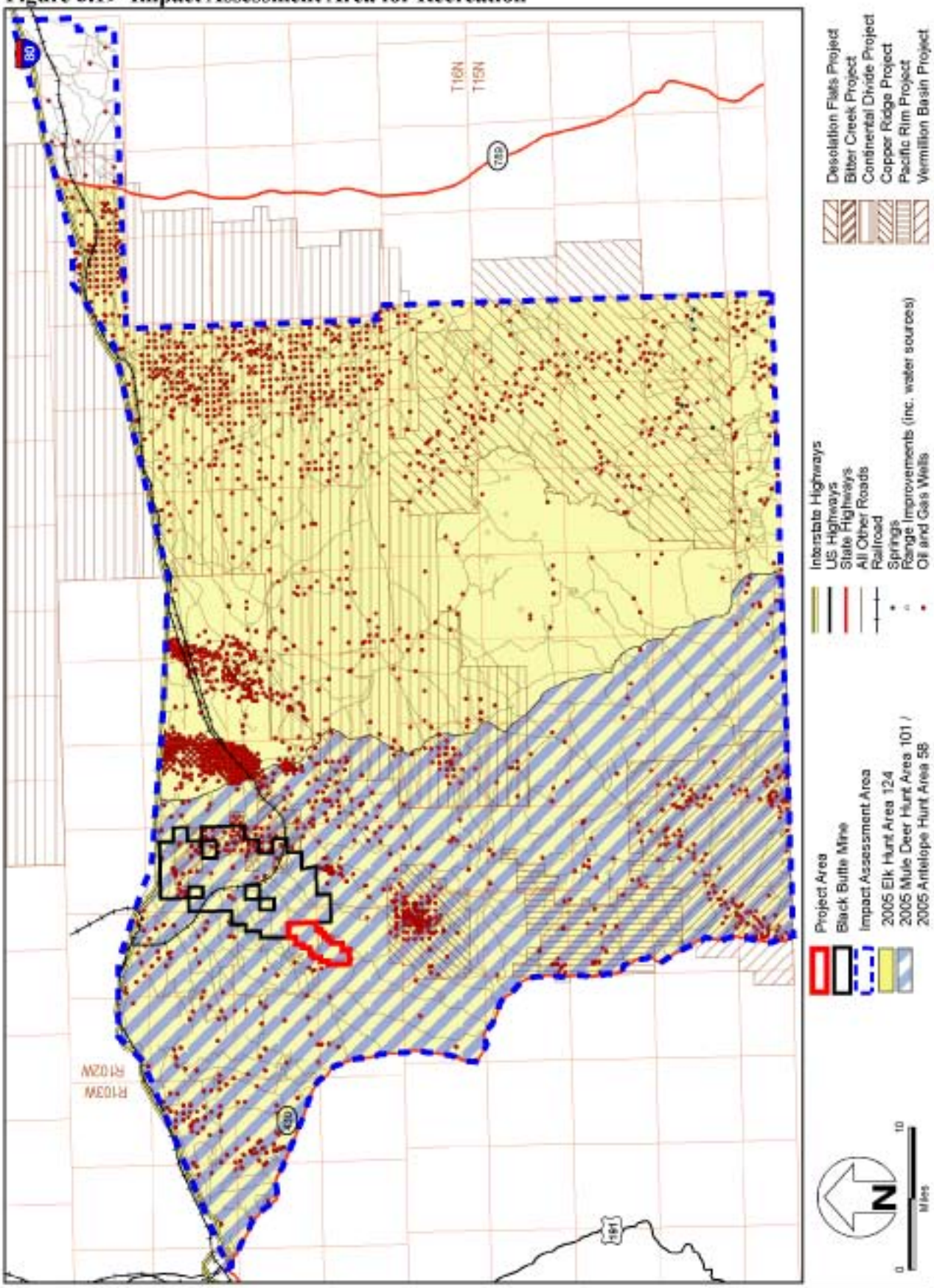
Table 3.18 Wyoming Game and Fish Big Game Demand Index

	Hunt Area	Type[1]	Quota	1st Choice	2nd Choice	3rd Choice	Odds (%)
Pronghorn							
2005 Non-Resident Antelope	58	1	18	154	148	135	11.69
2005 Resident Antelope	58	1	117	363	253	146	32.23
Mule Deer							
2005 Non-Resident Deer	101	1	14	143	179	17	9.79
2005 Resident Deer	101	1	98	443	908	58	22.12
2005 Resident Deer	101	2	0	0	2	0	0
Elk							
2005 Non-Resident Elk	124	1	1	48	15	5	2.08
2005 Non-Resident Elk	124	2	6	0	3	0	100
2005 Resident Elk	124	1	8	168	176	111	4.76
2005 Resident Elk	124	2	57	52	86	29	100

Source: http://gf.state.wy.us/wildlife/hunting/stats/demand/index.asp

[1] The number in the type column indicates a limitation for that license. The limitation may restrict the hunter to the taking of a specific sex of animal, a specific season, a specific type of weapon, or a portion of the area. If there is no type number opposite the hunt area number, the area is valid for general license.

Figure 3.19 Impact Assessment Area for Recreation



The project area is located entirely within Hunt Area 58 for pronghorn. Hunter success in this hunt area during the 2003 season was 84 percent, with a harvest of 158 pronghorn (WGFD 2003). Of the total pronghorn harvested in the Bitter Creek Herd Unit (424 animals), Hunt Area 58 accounted for approximately 37 percent of the harvest (WGFD 2003). For mule deer, the project area is located entirely within Hunt Area 101. Hunter success in this area during the 2003 season was seven percent, with a harvest of 87 bucks (WGFD 2003). For elk, the project area is located entirely within Hunt Area 124, which includes all of the Petition Herd Unit. Hunter success in this hunt area during the 2003 season was 70 percent, with a harvest of 53 elk (WGFD 2003).

Coyotes are classified as predators in Wyoming and therefore, no data exist for the project area. Due to the relatively small population in this area, greater sage-grouse hunting has been considered poor (BBCC 2004a). Fall hunting of greater sage-grouse is regulated by the WGFD, and occurs in Upland Gamebird Management Areas (UGMAs). The project area is within UGMA 6, and WGFD estimates that 186 birds were harvested in this UGMA during the 2003 season, which accounts for 3.5 percent of the estimated total state harvest (WGFD 2003).

Secondary recreational uses include dispersed mountain biking and OHV, use including snowmobiling. OHV use is limited to existing roads and trails. The most popular road is an unimproved road about 10 miles long, extending along the eastern edge of the project area from the Overland Stage Trail to County Road 4-26 (Foster 2005). It is locally referred to as the Salt Wells Road (**Figure 3.20**). Camping, hiking, and mountain biking generally occur near, or along, existing roads as well. There are no developed recreational sites within the project area. Non-consumptive uses of wildlife, such as bird watching and nature photography are becoming increasingly popular, and it is possible that lands within the project area could be used for this purpose (BBCC 2004a).

Secondary recreational uses are largely unregulated and therefore difficult to quantify. Due to mixed federal, state, and private land ownership with limited access for recreation, and availability of other, potentially more appealing and better developed places for nearby recreation (e.g., Flaming Gorge), secondary recreational use within the project area is likely to occur only at low levels.

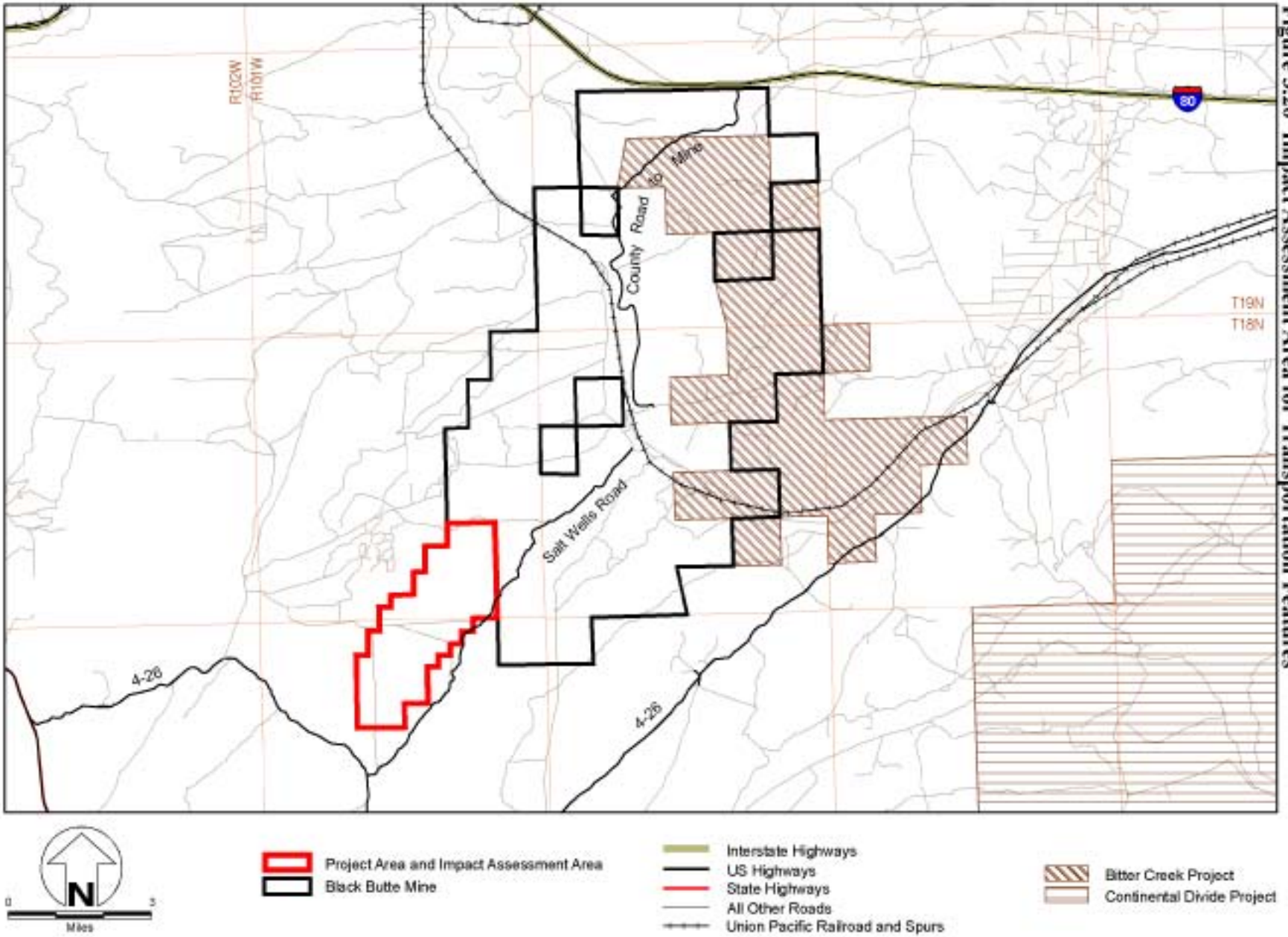
3.9.4 Transportation and ROWs

The assessment area for transportation and ROW is the project area (**Figure 3.20**). The assessment area is 4,359 acres in size, and includes 2,199.20 acres of BLM-administered land and 2,159.40 acres of private land. Total estimated disturbance is three acres or 0.07 percent of the assessment area.

Transportation resources near the project area include Interstate 80, Black Butte Road (i.e., County Road to Mine), County Road 4-26, and several unimproved two-track roads (i.e., “Salt Wells Road”) (**Figure 3.20**). Interstate 80 is about 10 miles north of the project area. The Interstate is a paved four-lane road that generally runs east-west. Black Butte Road is a paved two-lane county road, which runs south from Interstate 80 to the Black Butte Mine office and is located approximately four miles north to northeast of the project area. County Road 4-26 is located south of the project area, and trends east and west. The two-track, unimproved dirt roads include one that runs north and south from the Black Butte Mine east of the project area (i.e., “Salt Wells Road”), and 2.4 miles of road in the project area that are used for recreation and livestock grazing permittees.

The nearest railroad facilities are the Union Pacific Railroad and spurs accessing the Black Butte Mine approximately four miles northeast of the project area. Oil and gas pipelines, power lines, and associated ROWs are found to the north of the project area. A ROW is a legal right for use, occupancy, or access across land or water areas for specified purposes. However, no ROWs are located within the project area.

Figure 3.20 Impact Assessment Area for Transportation Features



3.10 VISUAL RESOURCES

The assessment area for visual resources is the checkerboard lands south of Interstate 80 and within the RSFO (**Figure 3.21**). The assessment area is 697,910 acres, and includes 342,110.12 acres of BLM-administered land, 349,316.16 acres of private land, and 6,483.72 acres of State of Wyoming land. Total estimated existing disturbance is 17,570 acres or 2.52 percent of the assessment area.

Visual sensitivity levels are determined by people's concern for what they see and the frequency of travel through an area. Rolling sagebrush and short-grass prairie are commonly viewed throughout the project area. Existing surface mines form a somewhat continuous band on the north and south side of Interstate 80 east of Point of Rocks, Wyoming. The Black Butte Mine and Leucite Hills Mine facilities and mining activities are visible from Interstate 80, as well as from surrounding roads, including the Black Butte Road and the Jim Bridger Power Plant Road.

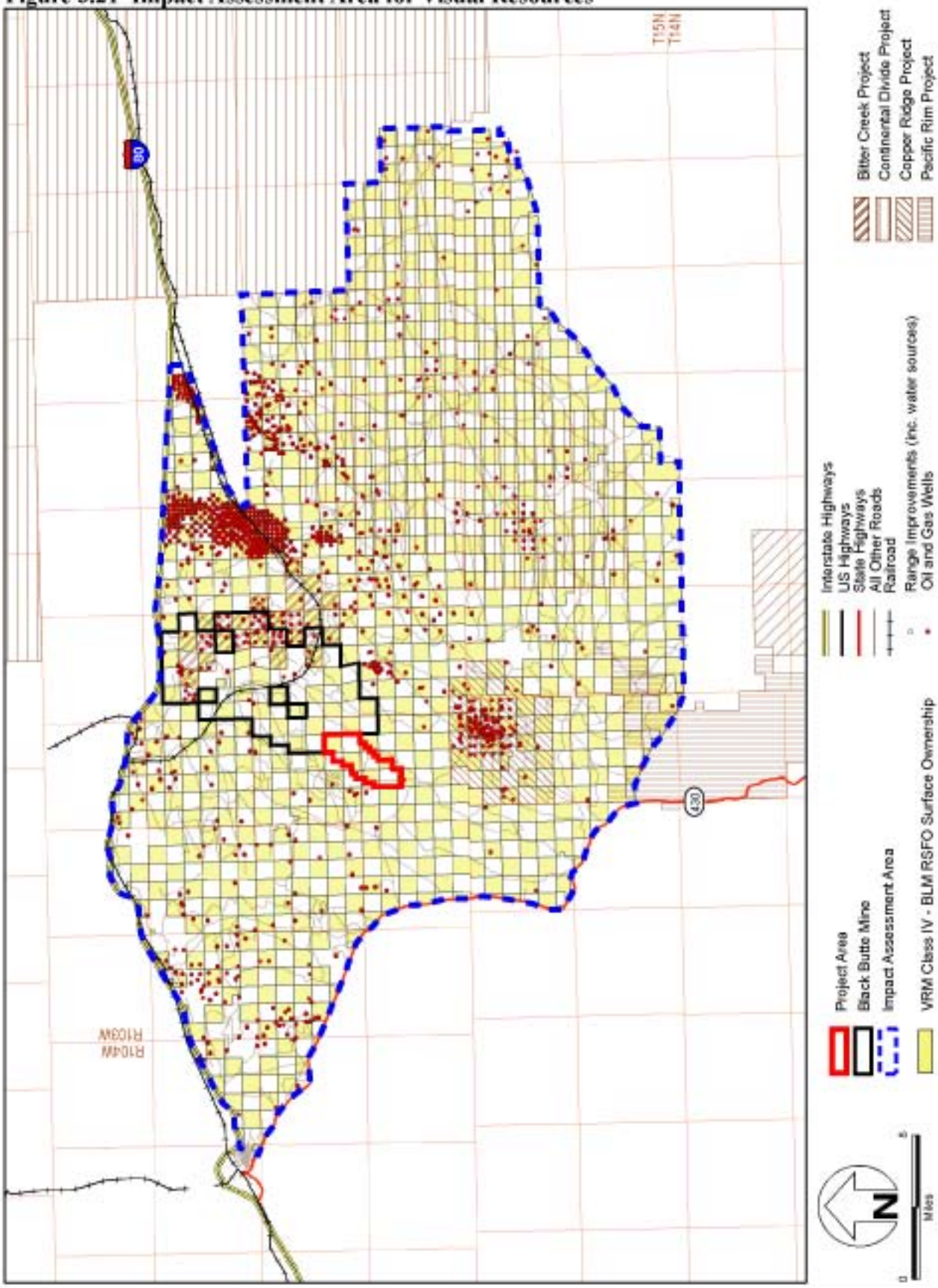
Other artificial visual intrusions in the project vicinity include signs of grazing (fences, trailers, and livestock) and oil and gas development (pumpjacks, pipeline ROWs, well shelters, and compressor stations). Transportation facilities (roads and railroads), and electric power transmission lines can also be seen. The natural scenic quality in the immediate project area is relatively low due to the above intrusions and the existing surface coal mining operations.

For management purposes, BLM evaluated the visual resources on lands under its jurisdiction in the Green River RMP and ROD (BLM 1997).

The inventoried lands were classified into visual resource management (VRM) classes as follows:

- Class I - The objective of this class is to maintain a landscape setting that appears unaltered by humans. It is applied to wilderness areas, some natural areas, wild portions of the wild and scenic rivers, and other similar situations where management activities are to be restricted.
- Class II - The objective of this class is to design proposed alterations so as to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- Class III - The objective is to design proposed alterations to partially retain the existing character of the landscape. Contrasts to the basic elements (form, line, color, and texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape. However, the changes should remain subordinate to the existing characteristic landscape.
- Class IV - The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements (form, line, color, and texture) inherent in the characteristic landscape. The District Manager is required to determine whether the structure(s) meet the acceptable VRM class standards, and if not, whether they add acceptable visual variety to the landscape.
- Rehabilitation Area - Change is needed or change may add acceptable visual variety. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it into character with the surrounding landscape. This class would apply to areas identified where the quality class has been reduced because of unacceptable modification. The contrast is inharmonious with the characteristic landscape. It may be applied to areas that have the potential for enhancement; i.e., add acceptable visual variety. It should be considered an interim or short-term classification until another VRM class objectives can be reached through rehabilitation or enhancement. The desired VRM class should be identified.

Figure 3.21 Impact Assessment Area for Visual Resources



Lands in and adjacent to the project area are classified as VRM Class IV. The existing mining activity is visible from several sites in the project area. VRM Class III is present along the Interstate 80 corridor. The closest VRM Class II area is 11 miles southeast of the project area.

3.11 CULTURAL RESOURCES

3.11.1 Cultural Historic Context and Chronology

The assessment area for cultural resources includes the portion of the east flank of the Rock Springs Uplift overlapping the Black Butte, Leucite Hills, and Bridger Coal mines (**Figure 3.22**). The assessment area is 277,120 acres, and includes 131,872.61 acres of BLM-administered land, 144,411.27 acres of private land, and 836.11 acres of State of Wyoming land. Total estimated existing disturbance is 21,931 acres or 7.91 percent of the assessment area.

Archaeological investigations in the Rock Springs Anticline (see Section 3.3) indicate humans have inhabited the area for at least 12,000 years. The accepted cultural chronology of the Rock Springs Uplift is based on a model for the Wyoming Basin by Metcalf (1987), revised by Thompson and Pastor (1995).

The Wyoming Basin prehistoric chronology is documented in **Table 3.19**. Cultural resources, protected under the National Historic Preservation Act of 1966, as amended, are defined as the nonrenewable remains of past human activity.

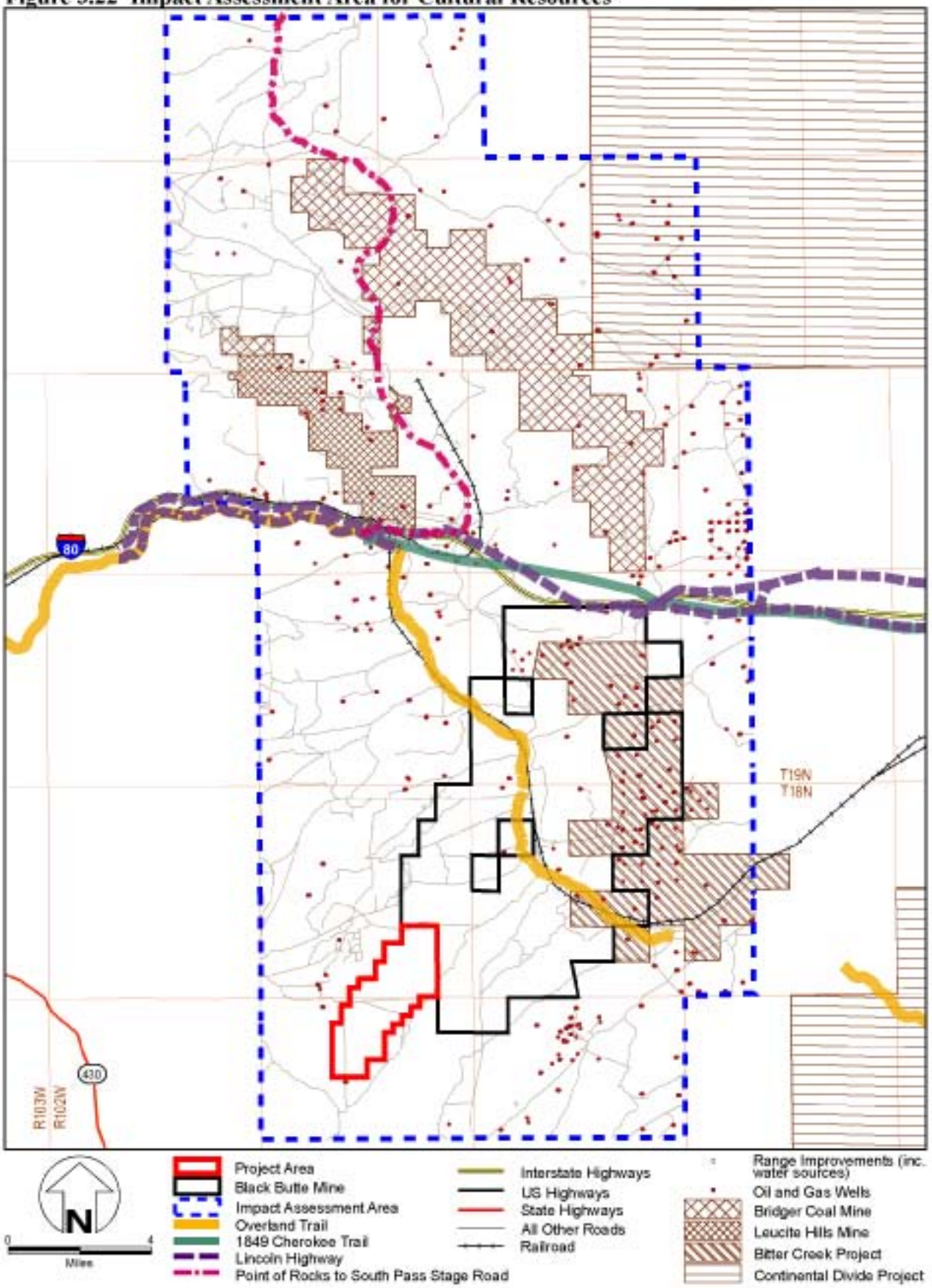
Table 3.19 Prehistoric Chronology of the Wyoming Basin

Period	Phase	Years Before Present (b.p.)
Paleoindian		12,000 – 8,500
Early Archaic	Great Divide	8,500 – 6,500
	Opal	6,500 – 4,300
Late Archaic	Pine Spring	4,300 – 2,800
	Deadman Wash	2,800 – 2,000/1,800
Late Prehistoric	Uinta	2,000/1,800 – 650
	Firehole	650 – 300/250
Source: (Metcalf 1987), as modified by (Thompson and Pastor 1995)		

Known Paleoindian sites are rare in southwestern Wyoming. However, isolated surface finds of Paleoindian projectile points are not uncommon, which suggests that site preservation or visibility may be a major factor affecting the number of known sites. The Paleoindian period includes a series of cultural complexes identified by distinctive large projectile points (spear points) often associated with the remains of large, extinct mammals (e.g., mammoth, bison, camel) (BLM 2004a). The Archaic period is characterized by large side- and corner-notched dart points, slab-lined features, and housepits. It is also characterized by more generalized subsistence pursuits including gathering plants (Newberry and Harrison 1986). This lifestyle continued until the Late Prehistoric period, which is marked by a technological change (from dart projectiles to bows and arrows) and by the appearance of ceramics. Large-scale seed processing and an increase in the number of features including housepits and roasting pits is also noted in the Late Prehistoric period.

The Proto-Historic period began sometime after 300 b.p. with the first European trade goods to reach the area, and ends with the development of the Rocky Mountain fur trade approximately 150 years ago. The most profound influence on native cultures during this time was the introduction of the horse, which enabled Native Americans to expand their range. All forms of rock art denoting horses, metal implements, and other European American goods are associated with the Proto-Historic period.

Figure 3.22 Impact Assessment Area for Cultural Resources



Historic use (**Table 3.20**) of the area by European immigrants is associated with limited ranching and grazing activities. Filing on water rights occurred as early as 1906 on Black Buttes Creek. Filing on water rights for mineral development occurred as early as 1924, west of the project area.

Table 3.20 Historic Chronology

Phase	Age a.d.
Proto-Historic	1720-1800
Early Historic	1800-1842
Pre-Territorial	1842 –1868
Territorial	1868-1890
Expansion	1890-1920
Depression	1920-1939
Modern	1939-Present
Source: Massey 1989	

3.11.2 Site Types

Information was obtained from the Wyoming Cultural Records Office for previously documented projects and cultural resources in the project area. Records at Western Archaeological Services (WAS) were reviewed for previous work in the project area and consultation with the RSFO archaeologist was conducted. There have been 13 projects conducted in the project area resulting in the recordation of 76 sites. Of these projects, there were 10 Class III surveys, including one seismograph survey, one road survey, one well survey, two pipeline surveys, one historic overview, one survey for core holes, and three mine block surveys. Three Class II sampling surveys have been conducted in the project area including one well and access road survey and two mine block surveys. Field work in the project area has resulted in the documentation of cultural resources through survey, testing, examination of ethnographic records, and historic record research. Five excavations have been conducted in the project area. The historic assessment of the Road to Black Butte documents historic use of the area.

In 2001 and 2002, WAS conducted the Class III inventory and testing for the BBCC Salt Wells Mine Expansion Project (Stainbrook et al. 2002), now known as the Pit 14 LBA. Thirty-five of the seventy-six recorded sites have been evaluated as not eligible for inclusion to the National Register of Historic Places (NRHP), and 41 sites have been evaluated as eligible for inclusion. **Table 3.21** includes a summary of the results of the Class III Cultural Resource Inventory. The site types include 44 prehistoric camps (58 percent), two prehistoric camps with living structures (2.6 percent), one prehistoric camp/historic cairn (1.3 percent), one prehistoric camp/historic debris (1.3 percent), 19 lithic scatters (25 percent), eight historic cairns (10.5 percent), and one historic scatter (1.3 percent).

The Overland Trail, 48SW1226, parallels the Union Pacific Mainline Railroad, 48SW6357, north and east of the project area. Both these historic linear sites have been evaluated as eligible for inclusion in the NRHP. The segment of the Overland Trail in the assessment area follows the Bitter Creek valley to the Green River. The historic trail has been, in some areas, replaced by modern transportation routes such as crowned and ditched roads. Accordingly, the majority of the trail within the assessment area has been determined to be non-contributing to its overall eligibility for inclusion to the NRHP. The Overland Trail was a major wagon and stage route through southern Wyoming beginning in the late 1850s and continuing through 1869 with completion of the Transcontinental Railroad. Stage stations were important to westward migration. The Black Buttes (48SW1821) and the Point of Rocks (48SW802) stage stations, located north of the project area, were stops along the Overland Trail. In addition to the trail and railroad

line, two other historic transportation routes exist within the assessment area. These include the Point of Rocks to South Pass Stage Road and Lincoln Highway

Table 3.21 Results of the Class III Cultural Resource Inventory of the Project Area and the Surrounding Analysis Area

Type	Location
Prehistoric Sites 1. housepits 2. lithic scatter 3. pottery fragment sites 4. bone bead production	1. 48SW13504, 48SW13901, 48SW13509, 48SW13552, 48SW270, 48SW5057, 48SW1090, & 48SW5655 2. 19 lithic sites 3. 48SW13490,48SW13896, 48SW13908, & 48SW6287 4. 16 bone bead production areas
Historic Sites 1. debris scatter 2. cairns 3. trails 4. stage stations 5. rail stations 6. mines and coal camps 7. inscriptions 8. airmail navigation beacon	1. one site 2. eight sites 3. 48SW1226, 48SW3680, 48SW6357, & 48SW1834 4. 48SW1821 & 48SW802 5. 48SW3464, 48SW6359, & 48SW7770 6. 48SW1823 & 48SW1822 7. 48SW4037 & 48SW13775 8. 48SW15990
Sources: McKibbin et al. 1989, McNees et al. 1992, Harrell 1987, Darlington et al. 2004, Stainbrook et al. 2002	

The Cherokee Trail (48SW3680) was used in the 1850s by members of the Cherokee Tribe en route from the Oklahoma Reservation to the California gold fields. The Queensbury and Mitchell route trended west crossing the northern edge of the Haystacks, then turned northwest crossing north of Sand Butte and Quaking Aspen Mountain, crossed Little Bitter Creek, then turned north on the east flank of Wilkins Peak and joined the Overland Trail near Kanda (Fletcher et al. 1999). The Road to Black Buttes (48SW12421) is an expansion era road that connected the rural population of Vermillion Creek/Coyote Creek area of southern Sweetwater County with the Union Pacific Railroad. Portions of the Road to Black Buttes skirt the eastern boundary of the project area. A historic overview of the Road to Black Buttes determined the road is not eligible for nomination to the NRHP (Johnson 2001).

3.11.3 Native American Sensitive Sites and Traditional Cultural Properties

Consultation with Native American tribes pertaining to areas of concern for traditional, cultural, and religious purposes occurred in accordance with the American Indian Religious Freedom Act of 1978, as amended, and BLM Manual 8160-1 Handbook. Native American consultation occurred within the context of specific development proposals, but is also an ongoing process among BLM and affected Indian tribes and traditional cultural leaders (BLM 1997).

Human burials, rock alignments, and rock art have been identified as sensitive or sacred to Native Americans. Although human burials or rock art have not been documented in the project area, it is important to be cognizant of the possibility that such resources could exist. Several such sites have been documented in areas surrounding the project area. Project boundaries were changed to remove site 48SW6287 and the associated land from the project area because the site is sensitive to Native American concerns and contains prehistoric cairns (Stainbrook et al. 2002). The Tolar Inscriptions (48SW13775) is another Native American sensitive site, and contains prehistoric, proto-historic, and historic inscriptions. The Tolar Inscriptions site is located north of the project area and west of Point of Rocks, Wyoming.

3.12 SOCIAL AND ECONOMIC VALUES

The assessment area for social and economic resources is Sweetwater County, Wyoming. The assessment area is 6,720,899.60 acres in size and includes 4,397,739.98 acres of BLM-administered land, 1,830,561.45 acres of private land, 187,135.01 acres of State of Wyoming land, 54, 816.04 acres of Forest Service land, 202,017.80 acres of Bureau of Reclamation land, 15,786.65 acres of Fish and Wildlife Service land, and 32,842.68 acres of open water.

Socioeconomic conditions potentially affected by the project and existing Black Butte Mine operation include the local economy (primarily employment and earnings in the mining industry and other sectors of the economy), population, housing, community services, and local, state, and federal tax revenues.

A comprehensive analysis (Socioeconomic Analysis Technical Support 2005) of the socioeconomic condition found in western Wyoming was prepared for the Jonah Infill Project. A summary of that analysis was published in the Final EIS for the Jonah Infill Project and can be found on the internet at http://www.wy.blm.gov/nepa/pfodocs/jonah/index.htm. The discussion below incorporates by reference and summaries that socioeconomic data in the Jonah Infill Project to the extent it pertains to Sweetwater County. Information from other sources is also used in the discussion.

3.12.1 Social Life

Sweetwater County is the largest county in Wyoming and the third most populous. Sweetwater County is also the most industrialized county in Wyoming, due to the local abundance of coal, natural gas, oil, and trona (soda ash). According to the Sweetwater Economic Development Association (SWEDA), over half of the workforce is employed by industry, principally trona mining/soda ash manufacturing, coal mining, petroleum, and power generation related services.

Rock Springs and Green River are the two largest cities in the county and are located approximately 12 miles apart. Rock Springs claims to be home to over 56 nationalities. The town was founded in 1868 with the coming of the Transcontinental Railroad. The original settlers came to the area to work the coal mines and were largely of European origin. Many of their descendants remain in the area. Local residents take pride in that the various ethnic groups were generally desegregated and that historically, there was very little conflict between groups (Radosevich 2005).

Green River is historically a railroad town, but much of the town's (and county's) economy is based on trona and coal production. The abundance of trona has brought in national and international chemical and manufacturing industries. Trona is used in manufacturing glass, baking soda (including Arm & Hammer, which is produced in the area), fertilizer, fabric softener, and other commodities.

Until recently, the county has experienced a net loss of population. However, according to Dorothy Radosevich at SWEDA, in the past couple of years the area has seen "tremendous growth" (Section 3.12.2). Many of the newcomers are moving into the area to work in mining, natural gas extraction, and related services. Migration from the southeastern oil patch states of Texas and Louisiana is reportedly apparent (Radosevich 2005). The county is now facing the challenge of recruiting a workforce to provide labor to the growing economy, particularly in the areas of trucking, manufacturing, construction, wholesale trade, health care (Radosevich 2005 and WDE 2004), and retail trade (Allen 2006).

Cattle and sheep ranching occur in the unincorporated, rural parts of Sweetwater County. There is little crop production due to the region's arid climate.

Residents of Sweetwater County enjoy the region's many amenities such as the Flaming Gorge National Recreation Area, fishing, and hunting. Other opportunities include urban-based amenities such as the golf courses, indoor ice skating facilities, recreation centers, and Green River's developed Whitewater Park (Radosevich 2005).

3.12.2 Demographics

The population of Sweetwater County in 2000 was 37,613, down from 38,823 in 1990 and 41,723 in 1980. Thus, the decrease over the 20-year period was 9.9 percent. According to the most recent population data available from the Wyoming Division of Economic Analysis, the population in the county has increased slightly between 2000 and 2005 (**Table 3.22**). Recent estimates indicate the county population has grown to approximately 38,076 people, representing a net gain of 2.4 percent in the past two years. This compares to a statewide population increase of 1.6 percent. The most recent population forecasts available from the Wyoming Division of Economic Analysis projects that population levels in Sweetwater County would increase by 1.3 percent by 2010, to 38,558.

Table 3.22 Historic and Projected Population in Sweetwater County

	Population			Projected Population		
Location	**1990**	**2000**	**2004**	**2010**	**2015**	**2020**
Sweetwater County	38,823	37,613	37,758	38,558	34,293	39,485
Rock Springs	19,050	18,657	18,746	19,132	17,670	19,592
Green River	12,711	11,808	11,807	12,057	12,205	12,347

Rock Springs, the closest major city to the project area, is the largest incorporated city in the county. In 2000, it had a population of 18,657. The second largest Sweetwater County population center is Green River, which had a population of 11,808 in 2000 (U.S. Census Bureau 2000a). The 2005 Wyoming Division of Economic Analysis estimates now indicate the populations of Rock Springs and Green River are 18,893 and 11,907, respectively.

The median age of the population in Sweetwater County was 34.2 in 2000. The age profile of Sweetwater County shows that in 2002, a little more than half the population was between the ages of 25 to 64 years old. The second largest age group is made up of those 24 and under (38 percent), followed by those 65 and older (U.S. Census Bureau 2000a).

The majority of the population (91.6 percent) of Sweetwater County is made up of white persons (**Table 3.23**). Ten percent of the county's population at that time was Hispanics (of any race), while very small percentages of the population (generally less than two percent) were made up of black, Asian, American Indian, or Pacific Islander persons (Wyoming Housing Database Partnership 2005a).

Table 3.23 2004 Population of Sweetwater County by Ethnicity

Ethnicity	2004 Population[1]	Percent of Population
African American	263	0.7
American Indian	376	1.0
Asian	226	0.6
White	34,454	91.6
Other	1,354	3.6
Persons reporting two of more races	903	2.4
Source: U.S. Census Bureau 2005 – These numbers could have at least a 0.1 percent error.		

3.12.3 Community Services

3.12.3.1 Education

Sweetwater County has two school districts that provide services to approximately 5,536 students. Average student to teacher ratios in the two districts are about 25.5:1. Expenditures per pupil are

approximately $8,400 (SWEDA 2005). A downward trend in school enrollment has been experienced in Sweetwater County over the last few years resulting in the closure of a couple of elementary schools. Reasons for this trend are unknown but it is likely caused by a decline in mining jobs which provide stable year-round employment for local residents. The recent increases in fluid mineral drilling has resulted in a influx of temporary workers whose families live elsewhere (Allen 2006).

Western Wyoming Community College is located in Rock Springs and has a satellite campus in Green River. Total student count is approximately 1,030 (SWEDA 2005). The Community College also hosts outsourcing classes for the University of Wyoming.

In-town facilities for young children include the Children's Discovery Station in Rock Springs. This is a facility created by the Children's Discovery Foundation to promote learning through hands-on interactive exhibits. Head Start, serving development needs of preschool children, and their low-income families, is also present in Rock Springs.

3.12.3.2 Law Enforcement

Green River, the county seat, is home to the District and Circuit courts. The Green River Police Department has 36 full-time employees, four part-time employees, and several seasonal employees to assist with nuisance abatement. Rock Springs has 31 full-time police officers.

The Sweetwater County Sheriff's Office provides public safety services to the remainder of the unincorporated county. The office is located in Green River. The Wyoming State Highway Patrol has an office in Rock Springs that serves the western two-thirds of Sweetwater County.

Crime in Sweetwater County

A thorough discussion of crime can be found in the Jonah Infill Project Final EIS (2006). Violent and property crime rates for Sweetwater County were 598.5 for violent crimes and 4,558 for property crimes in 2004, the latest year data is available. The crime rate in Sweetwater County is higher than the overall crime rate in Wyoming of 228.6 and 3,352 respectively in 2004. There were 2,773 arrests made in 2004 in Sweetwater County (Wyoming Attorney General 2004). Generally speaking, arrest totals have decreased for a majority of crimes since 1999; however, the number of arrests for aggravated assault, burglary, and drug offenses and driving under the influence has increased possibly due to the influx of temporary workers (Allen 2005). For further information on area crime, access an article written by J. Jacquet (Jacquet 2005) at www.sublet-se.org and click on the crime link.

Sweetwater County uses a 911 emergency system. Emergency management in Sweetwater County is coordinated by the Sweetwater County Emergency Management Agency (SCEMA), which operates under Federal Emergency Management Agency and EPA guidelines. SCEMA is the agency designated by the Sweetwater County Commissioners to analyze potential hazards, assess emergency response capabilities, plan for and respond to potential events and mitigate the effects of emergencies or disasters. SCEMA coordinates with response agencies, industry, elected officials and volunteer agencies to accomplish its mission of limiting injuries, loss of life, and damage to property. The portion of Sweetwater County that includes the project area is served by emergency response organizations (fire suppression, emergency, medical, and ambulance) located in Rock Springs. Routine injuries are treated at Memorial Hospital of Sweetwater County. Cases requiring specialized treatment are transported to Salt Lake City by air ambulance services dispatched from Salt Lake City, Craig, or Grand Junction in Colorado. All emergency situations at the Black Butte Mine are handled by their own emergency response teams. Calls to Rock Springs emergency management personnel would only be made if the mine could not handle the situation.

3.12.3.3 Fire Protection

The Sweetwater County Fire Department consists of three full-time employees and 23 volunteer safety officers and firefighters. In addition, there are 10 seasonal wildland firefighters. All members of the Sweetwater County Fire Department are trained and must comply with the Standards for Rural Firefighting set forth by the Wyoming Fire Marshall's Office, Wyoming Division of Forestry, National Wildfire Coordination Group, and the National Fire Protection Association. The county's fire equipment consists of three equipment trucks, two 750-gallon water trucks, one 1,000-gallon water truck, and a 3,000-gallon pumper tanker truck.

The towns of Superior, Wamsutter, Little America, Farson-Eden, Granger, and Reliance have volunteer fire departments. Rock Springs and Green River have municipal fire departments.

3.12.3.4 Ambulance

Castle Rock Medical Center in Green River and Vase Emergency Medical Services in Rock Springs provide ambulance services. Mining companies also maintain company ambulance services in case of an emergency requiring medical transport. Air-Med, a life flight plane, provides service to out-of-area hospitals (such as Salt Lake City) for specialized care.

3.12.3.5 Health Care

There is one primary hospital in the county (Memorial Hospital of Sweetwater County) that contains 100 beds and provides 24-hour emergency care and physician staffing. The Rock Springs Outpatient Clinic located in Rock Springs is also available for emergency needs. Castle Rock Medical Center is a five-physician care center in Green River that provides family and internal medicine, pediatrics, lab, x-ray services; physical, occupational, and speech therapy; and ambulance services. Sage View Manor and Castle Rock Convalescent Center each provide short- and long-term rehabilitation and nursing care services. The Villa is a personal care center for the elderly (SWEDA 2005).

3.12.3.6 Public Assistance

There are numerous social services and welfare organizations located in Green River and Rock Springs. Services offered cover a broad range of health and welfare, including senior services, youth organizations, family support services, food banks, domestic violence crisis centers and safehouses, mental health counseling, substance abuse treatment and support groups, communicable disease testing and counseling centers, family planning, financial counseling centers, etc.

3.12.3.7 Libraries, Parks, Recreation

Recreation opportunities include two indoor recreation centers in Rock Springs and one in Green River, a golf course in each of those cities, a white water park in Green River, and 18 community parks between the two communities with tennis courts, baseball diamonds, and swimming pools. Green River also has a greenbelt walkway and other pedestrian friendly municipal amenities. Flaming Gorge National Recreation Area is located south of the two cities and provides a venue for fishing, boating, swimming, camping, picnicking, and hiking. Other dispersed recreation in the county is described more completely in Section 3.9.3 of this document.

There are three libraries and five rural branch libraries in the county operating under the Sweetwater County Library System.

Other cultural amenities in the county include the Rock Springs Community Fine Arts Center, Rock Springs Civic Center, the Rock Springs Historical Museum, the Sweetwater County Historical Museum, the Sweetwater Events complex, and the Western Wyoming Community College Art Gallery and Dinosaur Exhibit.

3.12.3.8 Waste

Water

Green River and Rock Springs have wastewater treatment facilities that have available capacity.

Solid

Solid waste is disposed of at Sweetwater County's municipal landfills. The county landfill does allow medical waste, however; there are no other types of hazardous waste disposal facilities located in the county.

3.12.3.9 Employment and Income

An area's economic base is made up of activities which bring money into the local economy from other areas of the state, nation, and world. Sweetwater County has a diversified natural resource-based economy. Basic sectors include oil and gas production and processing, coal mining, electric power generation, trona mining and the manufacturing of soda ash and related products, fertilizer manufacturing, agriculture, and transportation (primarily the Union Pacific railroad). Also, the portions of the retail and service sectors that serve visitors (travel, tourism and recreation) can be considered basic.

The number of people employed full-time and part-time in Sweetwater County was 21,505 as of March 2005 (WDE 2005). The composition of this workforce includes approximately 7,700 employees in the natural resources and mining, construction, and manufacturing sector, 10,600 in the services sector, and 4,400 employed by the government. The unemployment rate reported for March 2005 was 3.2 percent, or about 705 workers. This rate continues an overall downward trend in unemployment from rates that reached more than six percent during the late 1990s.

Recently, employment conditions in Sweetwater County have been changing. Oil and gas service firms are adding employees, both from the local labor pool and from outside of the county. At the same time, the trona/soda ash industry is undergoing a reduction in workforce.

The top employers in the county (SWEDA 2003) include FMC Wyoming Corporation (trona mining and processing), the Sweetwater County School District No. 1, General Chemical Company (trona mining and processing), OCI Chemical Corporation (trona mining and processing), and Halliburton (oil field services). In general, trona and coal mining and related mining support services account for a large portion of the region's existing economy.

The U.S. Department of Housing and Urban Development estimated Median Family Income (MFI) for Sweetwater County was $65,300 in 2005. Note that starting in 2003, the Housing and Urban Development MFI estimates were re-benchmarked using 2000 Census income limits, hence the unusual increase in estimates compared to earlier years (Wyoming Housing Database Partnership 2005a). The MFI for Sweetwater County compares to Wyoming's MFI of $55,250. The reported annual per capita income in Sweetwater County in 1990 was $16,810 compared to $30,880 in 2001 – an 84 percent increase in unadjusted dollars (Wyoming Department of Administration and Information 2002). The cost of living index for Sweetwater County was 99 during the fourth quarter of 2004, compared to a statewide average for Wyoming of 100 (Wyoming Division of Economic Analysis 2005). In 2003, the average annual wage for coal miners in Wyoming (not including benefits) was approximately $64,000 (WMA 2004). The average wage of all other types of employment in Wyoming in 2003 was $29,924. **Appendix**

I presents the cumulative personal income levels by employment sector for the year 2000 in Sweetwater County.

3.12.4 Past and Current Coal Production Activity

Approximately 34.6 million tons of in-place minable coal is present in the project area. The value of this coal under current market conditions would be between $467 million and $1.2 billion.

There are three producing coal mines near the project area. These three mines include the existing Black Butte Mine, Leucite Hills Mine, and the Bridger Coal Mine. The project area has not been involved in mining activities in the past. The Leucite Hills and Bridger Coal Mines are located north of the project area on the north side of Interstate 80. Black Butte Mine is located immediately north of the project area (**Figure 1.2**).

Total coal production from the Black Butte Mine through 2002 was approximately 84 million tons with an expected production of 97.2 million tons through the year 2008 (BBCC 2005a). In-place minable reserves in the existing Black Butte Mine permit area beginning in 2005 are estimated at 8.9 million tons of coal. The value of the existing reserves based on current market prices of $13.50 (8,800 btu) to $34.35 (11,100 btu) per ton (Argus 2005) would be between $120 and $305 million.

The Leucite Hills Mine produces coal from the Almond Formation and has an estimated 3.8 million tons of in-place minable coal (McCarthy 2005). The value of this coal at current market prices would be between $51 and $130 million.

The Bridger Coal Mine produces five to 5.5 million tons per year from the Fort Union Formation, and has an estimated 121 million tons of in-place minable coal (BLM 2004b). The value of this coal at current market prices would be between $1.6 and $4.1 billion.

The percentage of revenue from the sale of coal going to pay federal/state/private royalties, severance taxes, and ad valorem is approximately 25 percent (WMA 2004). Coal is ranked third in valuation for Sweetwater County, with a 2004 value of over $95 million (WDE 2004).

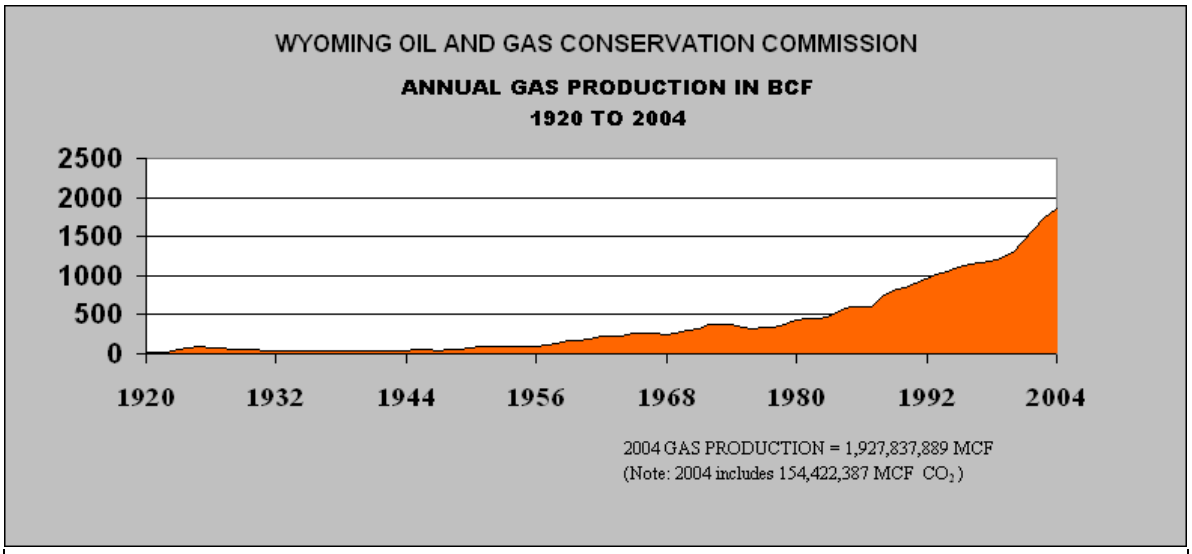
3.12.5 Other Economic Activities Near the Project Area

Production and approved Applications for Permit to Drill (APDs) are two measures of oil and gas activity. As shown in the table below, annual natural gas production in Sweetwater County has generally increased over the past five years. Natural gas production in 2003 was 237 MCF and in 2004 it was 233 MCF. Sweetwater County production accounted for approximately 13 percent of all natural gas produced in Wyoming during 2004 (Wyoming Oil & Gas Conservation Commission 2004). Approved APDs reflect both current and potential future oil and gas activity. Increased drilling could result in increased production if drilling efforts are successful and commodity prices increase or stabilize at economic levels. There were 511 approved APDs in Sweetwater County during 2004.

In 2004, there were a total of 2,501 producing wells (oil and gas) in Sweetwater County. The relatively high levels of natural gas exploration, drilling and production that have occurred in Sweetwater County in recent years have sustained an active natural gas service industry (Robbins 2003). **Table 3.24** presents natural gas production through 2004. Additionally, contractors operating out of Casper, Rawlins, Kemmerer, and Evanston, Wyoming, and Craig, Colorado serve natural gas development in the county.

Sweetwater County produces oil, natural gas, coal, trona, uranium, and sand and gravel, producing a total valuation of $1,212,609,757 for 2004. **Table 3.25** provides the 2004 taxable valuation, approximate percent of statewide valuation, and statewide county rank for production. Each of these is broken out by mineral type.

Table 3.24 Natural Gas Production through 2004



Wyoming Oil and Gas Conservation Commission 2005

Table 3.25 State-Assessed Mineral Valuations in Sweetwater County During 2004

Mineral	Taxable Valuation	Percent of Statewide Valuation	Statewide County Rank
Oil	16,735,848	1	4 out of 20
Natural Gas	879,077,282	13	3 out of 19
Coal	116,658,528	6	2 out of 5
Trona	198,943,291	100	1 out of 1
Uranium	119,911	13	3 out of 4
Sand and Gravel	1,074,897	7	4 out of 23
Source: Wyoming Department of Revenue 2005			

3.12.6 Housing

Based on the Wyoming Housing Database Partnership's report entitled A Profile of Wyoming Demographics, Economics, and Housing Semiannual Report, Ending June 30, 2005, Volume I of II, August 2005, p. 143, the average sales price of existing, detached, single-family homes provided by the County Assessor's office in 2004 was $142,688 (Wyoming Housing Database Partnership 2005b). This represented an increase of 17.29 percent from the previous year. In contrast, the State of Wyoming's average was $147,588, an increase of 11.21 percent over the previous year. This report went on to show a comparison of Sweetwater County and Wyoming's average sales prices between 1997 and 2004, which is displayed in **Table 3.26** below.

The Wyoming Rental Rate Vacancy Survey discussed in the report entitled A Profile of Wyoming Demographics, Economics, and Housing Semiannual Report, Ending June 30, 2005, Volume I of II, August 2005, p. 144, has completed a total of 24 surveys that were conducted nine times semiannually during the past four and half years (Wyoming Housing Database Partnership 2005b). Those signified as 'a' in the "year" column of **Table 3.26** are conducted in June/July of each year. Those signified as 'b' are conducted each December**. Table 3.27** summarizes those results.

The most recent survey completed in Sweetwater County was conducted in July 2005. The results of that survey indicated that out of the 1,440 rental units surveyed, 34 were vacant, which translates into a 2.36 percent vacancy rate. This compares to a 0.88 percent vacancy rate one year ago, and a July 2005 vacancy rate of 3.3 percent statewide.

Table 3.26 Average Sales Prices Reported by Assessors, Sweetwater County, 1997 Through 2004

County	1997	1998	1999	2000	2001	2002	2003	2004
Sweetwater ($)	106,000	105,356	108,324	108,633	111,056	114,838	121,652	142,688
% Change		-0.61	2.82	0.29	2.23	3.41	5.93	17.29
Wyoming ($)	91,714	96,906	101,517	111,437	116,469	121,140	132,708	147,588
% Change		5.66	4.76	9.77	4.52	4.01	9.55	11.21

The fiscal year 2005 Housing Needs Assessment Survey discussed in the above referenced report had 777 respondents in Sweetwater County (Wyoming Housing Database Partnership 2005a). Of the incoming population who were unsatisfied with their current housing, 83.8 percent said they were seeking to own a home and 16.2 percent wished to rent. Of those who expressed an interest in owning a home, 65.0 percent indicated a desire to buy existing units. The percentage breakout of those indicating a desire to purchase homes are as follows: 9.0 percent wanted to purchase homes for less than $50,000, 37.3 percent indicated they would be interested in purchasing homes in the range of $50,000 to $99,999, and 53.7 percent were willing to pay more than $100,000. The 35.0 percent remainder of those seeking to own a home indicated a desire to build, of which 8.3 percent expected to build for less than $50,000, another 33.3 percent for less than $100,000 and 58.3 percent for more than $100,000. Given the current home prices in Sweetwater county, a significant portion of those that wish to own a home do not appear to have expectations in line with market realities.

Table 3.27 Semi-Annual Rental Vacancy Survey, Sweetwater County, 2001 Through 2005

Year	Sample	Total Units	Vacant Units	Vacancy Rates (%)
2001a	16	821	67	8.16
2001b	19	1,083	49	4.52
2002a	20	1,060	65	6.13
2002b	21	1,439	65	4.52
2003a	24	1,620	34	2.10
2003b	33	1,942	18	0.93
2004a	29	1,369	12	0.88
2004b	28	1,264	20	1.58
2005a	24	1,440	34	2.36

Of those currently renting or seeking to rent, 20.0 percent hoped to spend less than $365 per month, 45.0 percent anticipated spending $366 to $474, about 30.0 percent were willing to spend $475 to $599, and 5.0 percent over $600.

Housing costs for Sweetwater County were fairly constant until 2002, with the average cost of a single family home from $106,000 in 1997, increasing to $114,838 in 2002 (Allen 2005) when the growing economy contributed to a sharp rise in housing costs (9.3 percent increase from 2002 to 2003, and 11.6 percent increase in 2004 over 2003 prices). The average sales price for houses sold in the Rock Springs/Green River area in 2004 was $142,688 (SWEDA 2005). Most of the growth is being realized in Rock Springs, as illustrated in the number of building permits issued over the past several years. So far, in 2005, less than 10 were issued in Green River compared to over 40 in Rock Springs. In 2004, there were

almost three times as many building permits issued in Rock Springs as there were in Green River (SWEDA 2005). More than twice as many building permits were issued in 2004 (approximately 75) than in 2002 (approximately 30) in Rock Springs (SWEDA 2005).

Most individuals working in the mining industry where they have year-round employment tend to buy homes in the community. Due the increase of work outside the mining industry, temporary workers must rent. The latest data available shows that as of 2000, there were approximately 3,600 units available for rent (Sonoran Institute 2006) with a vacancy rate of 16.2 percent. Vacancy rates in 2005 have fallen to 2.36 percent. Average rental rates between 1998 and 2004 are shown in **Table 3.28**.

Table 3.28 Average Rental Rates

Monthly Rental Rates	1998	1999	2000	2001	2002	2003	2004
Sweetwater							
House	$470	$474	$497	$533	$516	$595	$635
Apartment	$358	$363	$333	$390	$392	$412	$427
Mobile Home	$406	$360	$402	$422	$422	$457	$566
Mobile Home Lot	$188	$195	$196	$201	$197	$219	$212

In addition to the homes or rental units in the area, there are 31 hotels/motels and 11 private campgrounds/mobile home parks in Rock Springs and Green River. The occupancy rate for hotels and motels in Sweetwater County has been between 82 percent and 100 percent for the period beginning June 2004 and ending in September 2005. Another hotel with 90 rooms will be opening in 2005; however the rate would probably stay the same once this opens. This rate is high right now because there is a large in-migration in Green River and Rock Springs due to the many oil and gas development projects in the area.

3.12.7 Government and Public Finance

The major governing bodies in Sweetwater County include the city governments of Rock Springs and Green River, the school districts, and the Sweetwater County Commissioners.

According to the Wyoming Mining Association (2004), coal mining contributed $535 million to state and local governments in 2003. This amount includes federal mineral royalties (30 percent), ad valorem property taxes levied by the county at six percent (two percent), ad valorem production taxes levied by the county at six percent (19.7 percent), abandoned mine land distributions (5.5 percent), severance taxes (23 percent), state rents and royalties (0.4 percent), lease bonus payments (13.8 percent), and sales and use taxes (5.6 percent). Mining sector sales and use tax collections in Sweetwater County totaled over $10.4 million in Fiscal Year 2003 (Wyoming Department of Administration and Information 2004). BBCC paid approximately $11.1 million in state and federal taxes and royalties in 2004 (McCarthy 2005).

Recipients of state severance tax and federal mineral royalty revenue distributions include cities and towns in the state, the state school foundation, University of Wyoming, state and federal highway funds, county government, community colleges, city/town/special district capital construction programs, state aid for county roads, and municipal water projects, among others (Wyoming Department of Administration and Information 2004).

3.12.8 Environmental Justice

Executive Order 12898 (Federal Register 1994) directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects that their programs might impose on minority and low-income populations. The data presented herein are drawn from the 2000 federal census. The EPA (EPA 1998) and CEQ (CEQ 1997) guidelines for conducting environmental

justice assessments were followed when preparing this analysis. Census data were reviewed for census tracts and/or the region of influence encompassing the project area.

Minority populations in the census include black, American Indian, Eskimo or Aleut, Asian or Pacific Islander, Hispanic, and other persons. A census tract will be defined as having a disadvantaged population if the proportion within any category equals or exceeds 1.5 times the percentage for the county as a whole. For example, if a countywide black population is nine percent, than any census tract or block in which the black population is 13.5 percent or higher will be considered as having a disadvantaged population. This method is considered to be a conservative approach for a screening level assessment such as this EIS.

The low-income level is defined in this analysis as the percentage of individuals reported in the 2000 U.S. census as living below the 1999 poverty level. In that year, the average poverty threshold for a family of four in the 48 contiguous states was $16,700 (Federal Register 1999).

3.12.8.1 Minority Composition

The project area is located in Census Tract 9716, which encompasses nearly two-thirds of the land area in the county. Information regarding the ethnic composition of populations located within the census tract is provided in **Table 3.29**. Comparative information is also provided for Sweetwater County and the State of Wyoming. As noted above, a census tract will be defined as having a disadvantaged population if the proportion of it population within the category equals or exceeds 1.5 multiplied by the percentage for Sweetwater County as a whole.

Census Tract 9716 and the county exhibit populations that are not diverse ethnically. Whites are predominant (89 percent within the tract, compared to 87 percent for Sweetwater County). The results show that none of the minority populations exceeds 1.5 times the percentage for the county as a whole; therefore, there are no environmental justice populations directly affected by the proposed project, and this section will not be carried forward into Chapter 4.0.

Table 3.29 Ethnic Composition of the Project Area and State of Wyoming Populations

Location	Percent of Total Population					
	White	**Black**	**American Indian, Eskimo, or Aleut**	**Asian or Pacific Islander**	**Hispanic**	**Other/Two or More Races**
Wyoming	88.9	0.8	2.3	0.7	6.4	4.3
Sweetwater County	87	0.7	0.8	0.7	9.4	6.0
Tract 9716	89	0.1	0.8	0.4	7.5	2.2
Sources: Quick Facts for Wyoming and Sweetwater County. U.S. Census Bureau 2000b.						

3.12.8.2 Economic Data

The second element of environmental justice is the potential for disproportionate impacts on populations living below the poverty level. Poverty data provided by the Census Bureau characterize only a portion of the overall population. Groups not included in the poverty data are unrelated individuals under the age of 15; individuals living in group quarters such as correctional centers, institutions, college dorms, or military barracks; or individuals in living institutions without conventional housing. Data on persons living below poverty level in and adjacent to the assessment area are presented in **Table 3.30**.

Table 3.30 Number of People in Assessment Area Living Below the Poverty Level (by Race) in 1999, Compared with State of Wyoming

	White	Black	American Indian, Eskimo, or Aleut	Asian or Pacific Islander	Hispanic	Other Race or Mixed Race	Total Population
People below Poverty Level in Wyoming	45,732	448	3,956	314	5,772	4,327	60,549
Below Poverty Level in Sweetwater County	2,520	69	17	9	353	256	3,224
Below Poverty Level in Tract 9716	133	0	0	9	4	8	154

Source: U.S. Census Bureau 2000b. Census 2000 Summary File three (SF-3)-Sample Data, Detailed Tables P159A-H, Poverty Status in 1999 by Age and Race. Numbers were obtained from Detailed Tables P159A-H as follows for each geographic unit. Quantity below Poverty Level: Taken directly from "Income in 1999 below poverty level" line on each table by race.

CHAPTER 4.0 - ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

In accordance with 40 CFR 1502.16, this chapter of the EIS includes a discussion of the potential environmental consequences of implementing the Proposed Action and the No Action Alternative. An environmental impact is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment resulting from project-related activities. Impacts may be beneficial or adverse, may be a primary result or secondary result of an action, and may be permanent or temporary in a long- or short-term duration. Impacts may vary in degree from a slightly discernible change to a total change in the environment. The significance of these impacts is determined using the criteria set forth by the CEQ (40 CFR 1508.27) and the professional judgment of the specialists doing the analyses. Impact significance may range from negligible to substantial and may be significant during mining but reduced to less than significant following reclamation. The context where impacts occur can be local, regional, and national.

4.2 TYPES OF IMPACTS

Direct and indirect impacts are the primary and secondary results, respectively, of the Proposed Action or No Action Alternative. In other words, direct impacts are caused by the action and occur at the same time and place. Indirect impacts from an action are later in time or farther removed in distance. An example of an indirect impact would be an increase in the demand for housing due to the direct impact of an increase in employment resulting from a project. The impact assessment area (IAA) for direct impacts for the majority of resources analyzed is the project area. Indirect IAAs for most resources include the project area and the adjoining Black Butte Mine. However, many resource analyses consider indirect impacts over a larger IAA, particularly where the mobility or interconnected nature of a resource makes the potential indirect impacts on the resource more widespread. The assessment areas identified in Chapter 3 include the IAAs for direct, indirect, and cumulative impacts anticipated by the alternatives associated with this EIS.

Residual impacts are impacts resulting from the Proposed Action after the application of mitigation measures (BLM 1988). These impacts would remain for some period of time, but would eventually subside or would be ameliorated by natural conditions and would not be permanent. For example, increased surface water erosion would eventually be reduced after disturbed soils are stabilized, native vegetation becomes re-established, and stream channels are stabilized. Residual impacts are different from irreversible and irretrievable impacts. Residual impacts would eventually subside and no longer result in adverse conditions, whereas irreversible and irretrievable impacts are permanent conditions that cannot be altered after they have occurred (e.g., extraction and use of federal coal from the project area).

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts may result from individually minor, but collectively significant actions occurring over a period of time (40 CFR 1508.7). The boundaries of cumulative IAAs vary by the specific resource being analyzed. For example, the cumulative IAA for wild horses would include all project-specific, existing, and reasonably foreseeable future surface-disturbing activities on available forage within the Salt Wells HMA.

The relationship between the short-term use of the environment versus long-term productivity as it relates to the extraction of coal, and resource use sustainability are intertwined with direct and indirect effects. The mining of 34.6 million tons of coal from the project area would be a short-term use of the environment that would benefit the long-term productivity of the Black Butte Mine and the Coal Occurrence and Development Potential area (BLM 1997, Map 19) where the mine is located.

WDEQ/LQD permitting of the project area would be required prior to the beginning of mining. This permitting is designed to protect the long-term productivity of resources after the cessation of mining. Mining would alter many resources' ability to function naturally in the short term; however, the required topsoil salvaging and replacement, topographic recontouring, and revegetation would promote the following long-term resource effects:

- Soil productivity re-establishment;
- Native vegetation re-establishment;
- Wildlife rehabitation;
- Livestock grazing and wild horses use;
- Groundwater resource recovery;
- Surface water and watershed function stabilization; and,
- Recreational use.

Function of these resources and resource uses would return to a condition approximating pre-mine conditions. To provide a clear context of the relationship between short-term use of the environment and long-term productivity, further discussions of these relationships are presented in pertinent resource direct and indirect impact analysis sections in this chapter.

Effects are quantified where possible, primarily by using GIS applications. In the absence of quantitative data, resource specialists use their best professional judgment. The effects are sometimes described using a range of the intensity in qualitative terms. The following standard definitions for these terms are used in the analyses:

- Negligible: The impact is at the lower level of detection; there would be no measurable change.
- Minor: The impact is slight but detectable; there would be a small change.
- Moderate: The impact is readily apparent; there would be a measurable change that could result in a small, but long-term to permanent change.
- Substantial: The impact is severe; there would be a highly noticeable, long-term to permanent change.

4.3 MITIGATION AND MONITORING MEASURES

All mining and reclamation operations would comply with SMCRA, Wyoming statutes, and BLM special lease stipulations. These regulations are designed to ensure that surface coal mining impacts are mitigated. This impact assessment considers all standing measures required by federal and state regulatory authorities as part of the Proposed Action and No Action Alternative. **Appendix J** presents a table summarizing existing federal and state mitigation and monitoring requirements inherent to the Proposed Action and No Action Alternative. After consideration of these requirements as well as those required in current Black Butte Mine permits and historic monitoring results in the mine's annual reports (BBCC 2005), the BLM has not identified additional special stipulations, mitigation, or monitoring measures for this project.

4.4 ANALYSIS ASSUMPTIONS AND GUIDELINES

This EIS assumes that all applicant-committed measures, including federal and state mitigation and monitoring requirements, summarized in the Proposed Action and **Appendix J** would be successfully implemented. If such measures were not implemented, additional adverse impacts could occur.

Unless otherwise specified, "short term" is the period when the development of the mine and the mining of coal occurs and is anticipated to be 20 years. "Long term" is defined as those effects that would occur

or remain after the cessation of coal mining and during the reclamation and monitoring period, also referred to as the bond release period. Long-term effects would occur for 20 to 40 years, beginning with the onset of mine development.

4.5 CUMULATIVE IMPACTS

The cumulative impact analysis evaluates the potential impacts associated with the alternatives, in combination with the potential impacts associated with other relevant activities that have occurred, are occurring, or may occur in the vicinity of the project area. Each resource analyzed has its own unique cumulative IAA with the exception of a few resources that share a common assessment area. Cumulative surface disturbance acreages vary by resource.

Projects with similar surface disturbing impacts to the Proposed Action are included in the applicable resource's cumulative IAA and include mining activities at the Black Butte, Leucite Hills, and Bridger Coal Mines that were previously approved. Currently the total surface disturbance acreages within each mine's permit boundary are Black Butte (6,743 acres), Leucite Hills (1,772 acres), and Bridger (6,532 acres). Cumulative analyses include consideration of other projects with surface disturbances as well as unrelated actions such as grazing management and incremental air quality changes. A list of known surface disturbance acreages for each resource assessment area has been previously presented in **Table 3.3**. **Table 4.1** presents reasonably foreseeable future actions and their attributes that would occur in some of the cumulative IAAs. These proposed reasonably foreseeable future actions have, are, or will undergo separate NEPA and WDEQ analyses if applicable. **Table 4.2** presents an acreage summary by resource of known surface disturbances, surface disturbances associated with the Proposed Action, and the reasonably foreseeable future actions. A map showing the location of future reasonably foreseeable future actions is presented as **Figure 4.1**.

Table 4.1 Reasonably Foreseeable Future Actions

Project Name	Type of Disturbance	Acres Affected
Monell Enhanced Oil Recovery Project	126 wells	630 Acres
Creston/Blue Gap II Natural Gas Development Project[1]	1,000 well pads containing 1,250 wells	5,000 Acres
Oil Shale Research, Development, and Demonstration Program Lease (Anadarko Petroleum Corporation)[2]	160 Acres for research, development, and demonstration 4,889 Acres for Preference Right Lease	5,049 Acres within proposed leases
Hiawatha Regional Energy Project[3]	4,100 wells (2,600 wells in RSFO)	13,200 acres (does not account for the existing infrastructure)
Black Butte Mine[4]	Mine pits and roads	4,363 Acres
Bridger Coal Mine[4]	Mine pits and roads	48 Acres

[1] Project is within Rawlins Field Office but portions of the project boundary overlap certain resource values.
[2] BLM officials determined this application was incomplete and will not be given further consideration. This finding became known after preparation of the document. Although the disturbance associated with the action has been factored into the disturbance calculations, it is no longer considered a reasonable foreseeable action.
[3] Proposal extends into Colorado; approximately 2/3 of the wells proposed would affect IAAs in the RSFO.
[4] Approved under the existing mine permit but not yet constructed or developed.

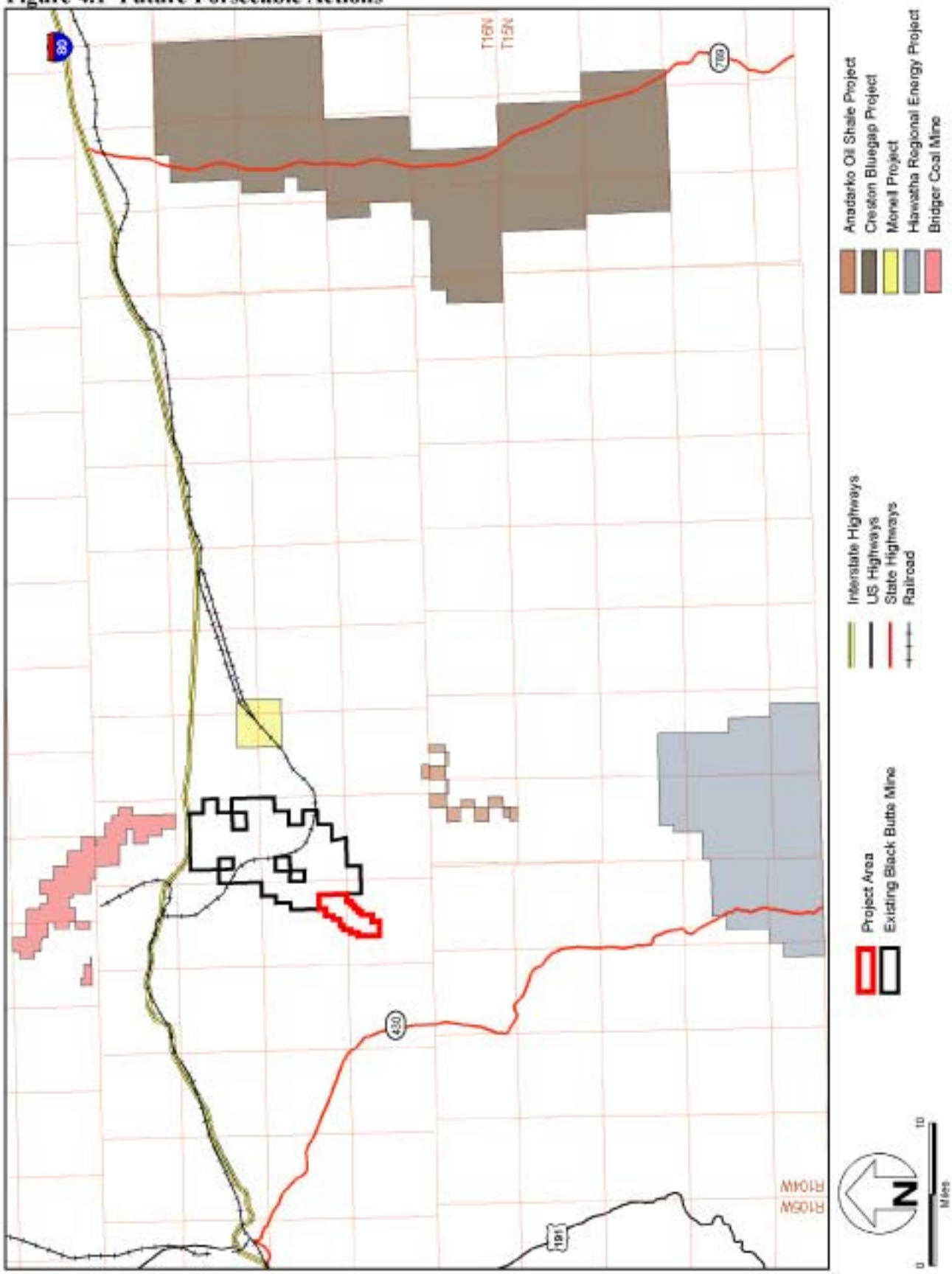
Table 4.2 Disturbance Levels for Existing Disturbance, Proposed Action, and Foreseeable Future Actions

Resource Value	IAA Size	Existing Disturbance		Proposed Action		Foresee-able Future Actions[1]		Totals		Percent Increase[2]
		Acres	%	Acres	%	Acres	%	Acres	%	%
Solid Leasable Minerals	277,120	21,931	7.91	2,250	0.81	4,411	1.59	28,592	10.32	30.37
Fluid Leasable Minerals	902,223	19,483	2.16	2,250	0.25	23,202	2.57	44,935	4.98	130.64
Soils	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Groundwater	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Surface Water	271,169	14,611	5.39	2,250	0.83	4,624	1.71	21,485	7.92	47.05
Vegetation (Including Special Status Plant Species and Invasive Species)	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Pronghorn	1,603,167	35,083	2.19	2,250	0.14	17,552	1.09	54,885	3.42	56.44
Mule Deer	1,134,282	14,108	1.24	2,250	0.20	19,077	1.68	35,435	3.12	151.17
Elk	1,453,728	18,574	1.28	2,250	0.15	7,754	0.53	28,578	1.97	53.86
Raptors	107,860	9,812	9.10	2,250	2.09	4,411	4.09	16,473	15.27	67.89
Special Status Animal Species	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Greater Sage Grouse	711,526	13,830	1.94	2,250	0.32	4,205	0.59	20,285	2.85	46.67
Fisheries	271,169	14,611	5.39	2,250	0.83	4,624	1.71	21,485	7.92	47.05
Wild Horses	1,170,717	21,014	1.79	2,250	0.19	23,202	1.98	46,466	3.97	121.12
Land Status and Prior Rights	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Livestock and Grazing	1,011,718	17,964	1.78	2,250	0.22	10,002	0.99	30,216	2.99	68.20
Recreation	1,572,997	18,329	1.17	2,250	0.14	23,379	1.49	43,958	2.79	139.83
Transportation and ROWs	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Visual Resources	697,910	17,570	2.52	2,250	0.32	10,002	1.43	29,822	4.27	69.73
Cultural Resources	277,120	21,931	7.91	2,250	0.81	4,411	1.59	28,592	10.32	30.37

[1] BLM officials determined this application was incomplete and will not be given further consideration. This finding became known after preparation of the document. Although the disturbance associated with the action has been factored into the disturbance calculations, it is no longer considered a reasonable foreseeable action.

[2] Represents percent increase in surface disturbance if Proposed Action and foreseeable future actions are implemented

Figure 4.1 Future Forseeable Actions



4.6 AIR QUALITY

4.6.1 Regulatory Framework

Air pollution impacts are limited by local, state, tribal, and federal air quality regulations and standards, and implementation plans established under the federal Clean Air Act (CAA) and the Clean Air Act amendments (CAAA) of 1990. As presented in Chapter 3, air pollution impacts in Wyoming are managed by WDEQ/AQD under the Wyoming Air Quality Standards and Regulations (WAQSR) and the EPA-approved state implementation plan. A fundamental requirement of both federal and state regulations is that ambient concentrations of specific criteria pollutants not exceed allowable levels, referred to as the National and Wyoming Ambient Air Quality Standards (NAAQS and WAAQS, respectively). The NAAQS and WAAQS are health-based criteria for the maximum acceptable concentrations of air pollutants at all locations to which the public has access. Selected ambient air standards were presented in **Table 3.5.**

The WDEQ/AQD administers a permitting program to assist the agency in managing the state's air resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit. This requirement applies to coal mines.

In addition to the designations relative to attainment of the WAAQS and NAAQS, the CAA requires the EPA to place each airshed within the U.S. into one of three PSD area classifications. PSD Class I is the most restrictive air quality category. It was created by Congress to prevent further deterioration of air quality in national parks and wilderness areas of a given size which existed prior to 1977 or those additional areas which have since been designated Class I under federal regulations (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II areas, which allow deterioration of air quality over that in existence in 1977, although still within the NAAQS. No Class III areas, which would allow air quality to degrade to the NAAQS, have been designated. The federal land managers have also identified certain federal assets with Class II status as "sensitive" Class II areas for which air quality and/or visibility are valued resources.

The federal CAA also provides specific visibility protection of mandatory federal Class I areas. Mandatory federal Class I areas were designated by Congress on August 7, 1977 and include wilderness areas greater than 5,000 acres in size and national parks greater than 6,000 acres in size. There are no mandatory federal Class I areas, tribal Class I areas, or sensitive Class II areas identified within 50 kilometers of the project area. Cumulative Impacts on air quality in the Bridger Wilderness have been identified as a concern for the Proposed Action. As shown in **Table 3.5**, the allowable incremental impacts for NO_2, PM_{10}, and SO_2 within PSD Class I areas are very limited.

All of southwest Wyoming outside of designated PSD Class I areas is designated as PSD Class II. Even though the development activities being considered in this EIS would occur within areas designated PSD Class II, potential impacts are not allowed to cause incremental effects greater than the stringent Class I thresholds to occur inside any distant PSD Class I area.

Existing surface coal mining operations and those proposed for this project are not currently affected by the PSD regulations for two reasons. Surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation, and point-source emissions from individual mines do not exceed the PSD emissions threshold. A new mine would be classified as a major source and subject to PSD review if potential emissions of any regulated pollutant equal or exceed 250 tons per year (tpy). Fugitive emissions are not included in the definition of potential emissions except for certain specified source types [40 CFR 52.21, (b)(1)(iii)]. Mining related fugitive emissions are exempt from the applicability determination. This NEPA analysis presents the modeled impacts for the proposed mine in terms of pollutant concentration.

Any comparisons with PSD increments do not constitute a regulatory PSD analysis. The modeling results for this project are presented strictly for informational purposes (**Appendix K**).

All sources being permitted within Wyoming must utilize best available control technology (BACT), not just sources subject to PSD review. During the NSR permitting process, a BACT analysis is performed for the proposed construction or modification. The BACT process evaluates possible control technologies for the proposed project on the basis of technical feasibility and economic reasonability. Decisions are made on a case-by-case basis of which technology to apply, and are mandated through the permit.

Major sources of air pollutants must obtain an operating permit from the WDEQ/AQD Operating Permit Program (also known as Title V). A "major source" is, generally, a facility that emits over 100 tpy of any criteria pollutant, 25 tpy of combined HAPs or 10 tpy of an individual HAP. The operating permit compiles all applicable air quality requirements for a facility and specifies compliance assurance in the form of testing, monitoring, reporting, and record keeping requirements. Currently, the Black Butte Mine does not have a Title V operating permit.

A new mine or a modification to an existing coal mine must be permitted by WDEQ/AQD under WAQSR Chapter 6, Section 2 and must demonstrate compliance with all applicable aspects of WAQSR.

When a company decides to construct a new surface coal mine or modify operations at an existing surface coal mine that would cause an increase in pollutant emissions, they must submit an application, which is reviewed by WDEQ/AQD NSR staff and the applicable WDEQ/AQD Field Office. A surface coal mining application would include the standard application, BACT measures that would be implemented, an inventory of point and fugitive sources in the area, and modeling analyses.

BACT must be used for all sources being permitted within Wyoming. WAQSR Chapter 6, Section 2(b)(v) lists BACT measures to be used (but not limited to) at large mining operations. An applicant uses these and other BACT measures in the development of their own PM_{10} and NO_2 point and fugitive source inventories (see Chapter 2 for a discussion of mining BACT resource protection measures). During the application review WDEQ/AQD can also require further control measures through the BACT review process.

For the modeling analyses, an applicant must put together an emission inventory of PM_{10} from their facility and surrounding sources. For PM_{10} both point sources and fugitive dust emissions are quantified. The emissions are based on the facility's potential to emit in the highest production year. The applicant also examines the surrounding coal facilities and their previous air quality permits to determine the worst case emission year for those facilities, based on the potential to emit. Coal mines are also typically required to quantify NO_2 emissions from their facility. Dispersion modeling is required to demonstrate compliance with the ambient standard.

Long-term PM_{10} modeling is conducted for the permit application to demonstrate compliance with the annual PM_{10} standard. For both point and area sources, the Industrial Source Complex Model-Long-Term version three (ISCLT3) is used. Short-term PM_{10} modeling is not required by WDEQ/AQD, nor does WDEQ/AQD consider it to be an accurate representation of short-term impacts. The CAAA (Section 234) mandates the administrator of the EPA to analyze the accuracy of short-term modeling in regard to fugitive particulate emissions from surface coal mines. A June 26, 1996 letter from EPA Region VIII to Wyoming State representatives detailed the results of a study where the short-term model failed to meet evaluation criteria and tended to over predict 24-hour impacts of surface coal mines. The memorandum of agreement of January 24, 1994 between EPA Region VIII and the State of Wyoming allows WDEQ/AQD to conduct monitoring in lieu of short-term modeling for assessing coal mining-related impacts. This regulatory procedure remains in place and in effect. Ambient particulate monitoring is required of each coal mine through conditions of their respective permits.

The application is reviewed by WDEQ/AQD to determine compliance with all applicable air quality standards and regulations. This includes review of compliance with emission limitations, review of compliance with ambient standards through modeling analyses, and establishment of control measures to meet BACT requirements. The WDEQ/AQD proposed permit conditions are placed on public notice for a 30-day review period after which a final decision on the permit is made.

4.6.2 Analysis Assumptions and Assessment Areas

An air quality impact assessment strategy was developed for quantifying potential air quality impacts from the Proposed Action and other development in the region. The criteria for evaluating the significance of potential air quality impacts were also addressed. The strategy was prepared with input and review from the State of Wyoming, EPA Region VIII, Forest Service, National Park Service and industry representatives, thereby ensuring that the assessment methodology was acceptable to federal land managers.

Potential impacts were analyzed for mining of up to seven million tons of coal per year (the maximum currently permitted coal production volume at Black Butte Mine). Two potential scenarios were examined: extension of the Black Butte Coal mining area in the project area (the Proposed Action), and no extension of mining activities (the No Action Alternative).

In order to demonstrate that mining operations would comply with all applicable aspects of the WAQSR, an air quality modeling analyses was conducted using the most recent mine plan data for planned and potential future mining activity at the Black Butte Mine as would be required by WDEQ/AQD for permitting.

The following assumptions were utilized in developing the model and assessing the direct, indirect, and cumulative impacts of the two alternatives:

Under the No Action Alternative, coal mining would continue at the Black Butte mine at current levels but would decrease as coal reserves were depleted.

Under the Proposed Action, the maximum permitted coal production level (seven million tons per year) was modeled to conservatively estimate the maximum emissions that could be potentially produced due to mining activities at the current Black Butte Mine and at the LBA tract. Because mining the LBA tract could not realistically result in coal production at the maximum permitted level, both reasonably foreseeable mining activities at the existing Black Butte Mine and mining at the LBA tract were modeled together with total production at the maximum permitted level (although the mine has never produced coal at that rate and does not foresee doing so).

The direct effects of the Proposed Action are assumed to be primarily PM_{10} and NO_2 emissions. Impacts on air quality due to PM_{10} and NO_2 emissions were assessed quantitatively using the ISC3LT model.

PM_{10} and NO_2 emissions were modeled using the current mine plan and proposed mining activities. An emissions inventory was completed for both point and area sources at the mine. The year with maximum emissions was modeled for ambient impacts. Modeling was conducted by IML Air Science in Sheridan, Wyoming. A more detailed discussion of modeling assumptions, protocols, and outputs developed by IML is presented in **Appendix K**.

Emission factors used to estimate emissions from various sources were derived from EPA AP-42 and Wyoming DEQ/AQD. Meteorological data utilized in the model were collected at the Black Butte Mine between January 1, 2002 and December 31, 2004. Near-field modeling using ISC3LT utilized a rectangular receptor grid extending at least 10 kilometers in all directions from the project area, with a fine receptor grid (500-meter receptor spacing) extending five kilometers from the project area. Model outputs include top 10 receptor concentrations of annual average PM_{10} and NO_2 in the maximum

emissions year and isopleth maps (contour lines of constant concentration) showing the extent and magnitude of near-field PM_{10} and NO_2 concentrations.

To assess direct near-field impacts, modeled PM_{10} concentrations were combined with mean annual ambient concentrations reported at the mine to evaluate impacts and compliance with annual WAAQS/NAAQS and PSD increments. Note that current ambient concentrations reported at the mine include impacts from current mining activity. Therefore, combining the model results with current monitoring data likely overestimates potential concentrations. When compared to annual WAAQS/NAAQS and PSD increments, the estimate of potential impacts is very conservative. Modeled NO_2 concentrations were combined with mean annual ambient concentrations reported for the region (BLM 2004b). The emissions inventory developed for PM_{10} and NO_2 was compared to the NSR permit and 1999 NEI emissions inventories discussed in Chapter 3, and changes in emissions were evaluated as compared to current levels.

The indirect impacts of the Proposed Action include SO_2, mercury, and CO_2 emissions, as well as potential impacts on regional visibility, and atmospheric deposition. These impacts are assumed to be primarily far-field impacts associated with coal combustion and electrical power generation at the nearby Jim Bridger Power Plant.

The far-field impacts on air quality due to the Proposed Action, as well as the cumulative impact assessment, were assumed to be within the range of impacts identified and evaluated in the regional air quality modeling performed for the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006). The cumulative IAA includes a 50-kilometer area around the project area, as well as more distant areas identified as a potential concern (Bridger Wilderness Area). Air quality resource protection measures, as presented in Chapter 2, would be implemented under both the No Action and Proposed Action Alternatives.

If potential impacts are estimated to be insignificant, then actual impacts are likely to be acceptable. If potential impacts are estimated to be significant, then actual impacts may not be acceptable. In this case, BLM would notify the jurisdictional agency(ies) of the potential impact, and may estimate the effect of various mitigation measures on the identified significant impacts. Potential impacts may be considered significant if:

- Potential total near-field concentrations are greater than WAAQS or NAAQS;
- Potential total near-field concentrations are greater than PSD Class II increments;
- Potential cumulative far-field concentrations in Parks and Wilderness Areas in the region are greater than PSD Class I increments;
- Potential decrease in visibility in Parks and Wilderness Areas in the regions are anticipated to be greater than BLM applicable thresholds (change in visibility of one deciview (dv));
- Potential decrease in ANC in sensitive lakes in the region are anticipated to be greater than levels of acceptable change (LAC); or
- Potential increases in total deposition from the Proposed Action are anticipated to be greater than the established “green line” levels (acceptable level of total deposition).

4.6.3 Air Quality Impact Summary

4.6.3.1 Concentrations

Potential concentrations under both alternatives would be in compliance with applicable WAAQS and NAAQS (**Tables 4.4** and **4.5**). The maximum PM_{10} concentration calculated in the model exceeds the PSD Class II increment (**Table 4.4**); therefore, impacts on air quality may be significant. The model

results, however, suggest that it would be unlikely that mining activities associated with the Proposed Action would have a significant impact on air quality beyond the project area boundary.

4.6.3.2 Visibility

Potential cumulative far-field impacts on visibility under both alternatives are anticipated to be greater than the BLM 1.0 dv threshold in the Class I Bridger Wilderness Area, but less than the threshold in the other Class I and sensitive Class II areas considered for this project (i.e., Yellowstone and Teton National Parks and Popo Agie and Fitzpatrick Wilderness Areas) (**Table 4.6**).

4.6.3.3 Atmospheric Deposition

Potential cumulative far-field atmospheric deposition and ANC impacts are anticipated to be less than deposition levels-of-concern and lake chemistry levels-of-acceptable-change under both alternatives (**Tables 4.7** and **4.8**).

4.6.4 Direct and Indirect Impacts of the Proposed Action

Direct impacts of the Proposed Action include near-field changes in PM_{10} and NO_2 concentrations due to surface coal mining activities in the project area. An estimated annual emissions inventory of potential project emissions was developed to model pollutant dispersion in the project area in association with projected activity at the existing Black Butte Mine. Mine activity (both from ongoing mining activities and the Proposed Action) and the resulting emissions were determined to be highest during the year 2010. Estimated 2010 PM_{10} and NO_2 emissions at the Black Butte Mine are presented in **Table 4.3**. Additional details of the Proposed Action and existing mine emissions inventory, as well as the model results, are presented in **Appendix K**.

4.6.4.1 Concentrations

The emissions inventory developed for 2010 (maximum emission year) was used to model pollutant dispersion in the project area and at Black Butte Mine.

Figures 4.2 and **4.3** present isopleth maps of average annual PM_{10} and NO_2 concentrations, respectively, in the project area and at Black Butte Mine. These maps are based on the combined impacts of existing mining activity at the Black Butte Mine and the Proposed Action. The isopleth concentrations do not account for background concentrations or for impacts from other regional emissions sources.

Estimated maximum PM_{10} and NO_2 on and within approximately 10 kilometers of the project area and Black Butte Mine (near-field) are included in **Table 4.4**. Estimated cumulative maximum PM_{10}, $PM_{2.5}$, NO_2, and SO_2 concentrations at the Bridger Wilderness Class I areas (far-field) as analyzed in the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006) are presented in **Table 4.5**).

The maximum project-specific near-field ambient PM_{10} concentration was 25.37 $\mu g/m^3$ and the maximum total near-field (project plus background) concentration was 48.29 $\mu g/m^3$ (**Table 4.4**). These concentrations would be located in an area where the public would not have access. As presented in **Figure 4.2**, PM_{10} concentrations greater than 0.5 $\mu g/m^3$ would not extend more than a few kilometers from the project area.

The maximum project-specific near-field ambient NO_2 concentration was 12.86 $\mu g/m^3$ and the maximum total near-field (project plus background) concentration was 16.86 $\mu g/m^3$ (**Table 4.5**). These concentrations also would be in an area where the public would not have access. As presented in **Figure**

4.3, NO_2 concentrations greater than 0.1 μg/m^3 would not extend more than a few kilometers from the project area.

Table 4.3 Total Estimated Maximum Black Butte Mine 2010 Annual Emissions

Area or Point Source Name	PM_{10} Emissions (tons per year)	NO_2 Emissions (tons per year)
Primary Crusher	1.53	--
Secondary Crusher	4.73	--
Train Loadout	29.4	--
Belt Transfer	12.06	--
Pit 8 Truck Dump	12.24	--
Main Stockpile	43.55	8.51
Pit 10 Haul Road	32.5	3.48
Pit 10 Production	4.19	0.19
Pit 11 Haul Road	62.5	4.23
Pit 11 Production	88.06	75.55
Pit 14 Haul Road	68.09	5.33
Pit 14 Production	88.31	46.35
Pit 3 Reclamation	6.58	4.24
Pit 8 Reclamation	1.14	0.74
Pit 8 Stockpile	42.34	0.53
Service Road	51.73	0.06
Access Road	--	0.06
Disturbed Acres	525.98	--
TOTAL	1,074.94	149.26

The far-field (and cumulative) effects of this project were not specifically analyzed; however, this proposed project is within the analysis domain of the Jonah Infill Drilling Project, and it is assumed that potential emissions impacts from this project are adequately included in the detailed analyses performed for the Jonah Infill Drilling Project (BLM 2006, TRC Environmental Corporation 2006).

While the Jonah project primarily assessed impacts of proposed natural gas drilling, it also included regional source scenarios (including existing and reasonably foreseeable developments) to evaluate cumulative impacts. Furthermore, the results of the Jonah Infill Drilling Project cumulative impact modeling and assessment address the far-field sensitive receptors and areas-of-concern identified for this Proposed Action. The results of the Jonah Infill Drilling Project impact analysis at selected far-field locations are provided herein as an assessment of the far-field cumulative impacts from this project.

Potential project near-field annual concentrations of criteria pollutants are in compliance with WAAQS and NAAQS. The maximum PM_{10} concentration calculated in the model exceeds the Class II increment of 17 μg/m^3. This suggests that a significant impact on air quality is possible due to the Proposed Action; however, as noted above, the model results indicate that it would be extremely unlikely that mining activities associated with the Proposed Action would have a substantial impact on air quality beyond the project area boundary.

Figure 4.2 Black Butte Mine Projected Average PM_{10} Dispersion

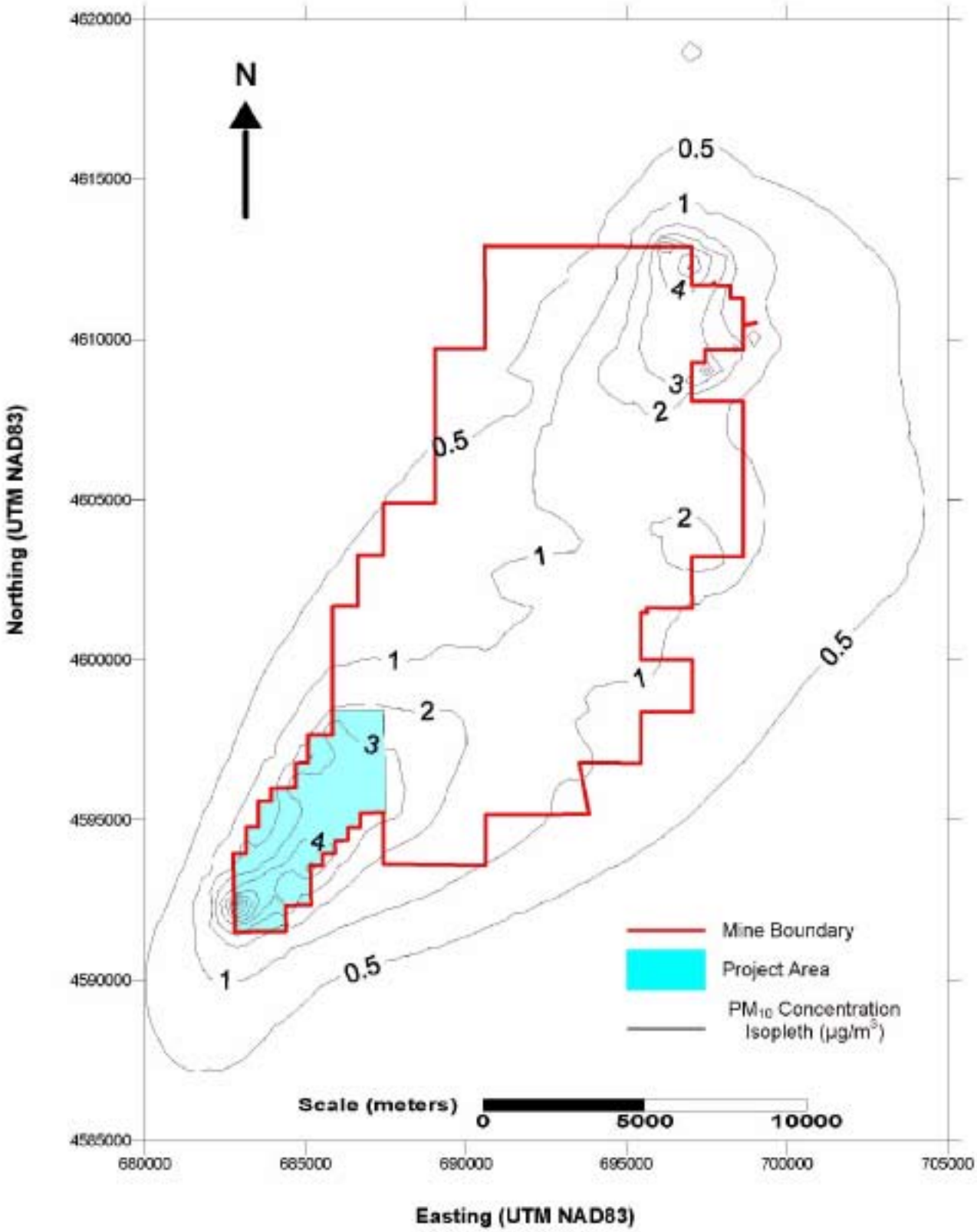


Figure 4.3 Black Butte Mine Projected Average NO_2 Dispersion

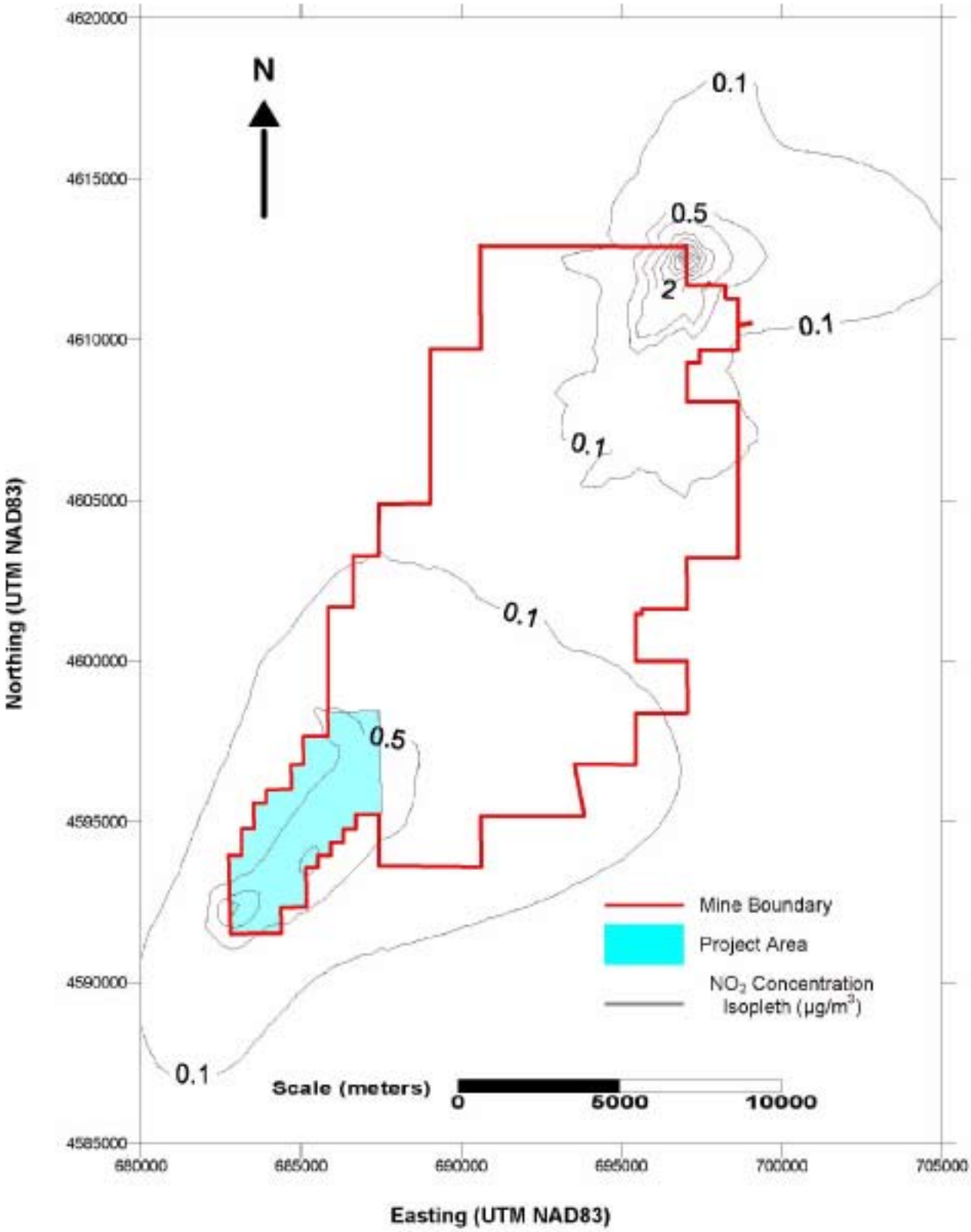


Table 4.4 Potential Near-Field Concentrations

Pollutant	Maximum Calculated Concentration µg/m^3	Monitored Background µg/m^3	Maximum Calculated + Monitored Background	NAAQS/ WAAQS (Annual µg/m^3	Class II PSD Increment (µg/m$^{3)}$
NO_2[1]	12.86	4	16.86	100	25
PM_{10}[2]	25.37	22.9	48.29	50	17
[1] Mean NO_x – Green River Visibility Study, period of record 1996-1999 (BLM 2004b) [2] Mean PM_{10} - Black Butte Mine, Site PM_{10}868-TEOM, from 2000 to 2004 (IML 2000-2004)					

It should be noted that the monitored background concentrations presented in **Table 4.4** include impacts from existing mining activity at the Black Butte Mine. Since the maximum modeled impacts also include existing activity at Black Butte, a portion of these impacts have been counted twice but still result in estimated pollutant concentrations below WAAQS/NAAQS. This provides an additional degree of conservatism.

Potential cumulative far-field concentrations of criteria pollutants (**Table 4.5**) are in compliance with WAAQS and NAAQS, as analyzed in the Jonah Infill Drilling Project DEIS for the PSD Class I Bridger Wilderness Area (BLM 2006, TRC Environmental Corporation 2006).

The indirect impacts of the Proposed Action may include changes in SO_2, mercury, and CO_2 emissions from coal combustion at the nearby Jim Bridger Power Plant. The Proposed Action is not likely to impact emission of these pollutants from Jim Bridger Power Plant due to numerous coal sources utilized by the power plant (if production at one facility decreases, other facilities would provide additional coal to meet the power plants needs). Changes in emission levels from the power plant are more likely to occur in response to changes in emissions regulations, such as the recent Clean Air Mercury Rule and Section 112 of the CAA or the installation of emission control devices at the facility, such as low NO_x burners.

Table 4.5 Estimated Potential Far-Field, Cumulative Concentrations at Bridger Wilderness

Pollutant	Averaging Time	Maximum Concentration µg/m^3	NAAQS µg/m^3	WAAQS µg/m^3
NO_2	Annual	3.52 - 3.64	100	100
PM_{10}	24 hour	33.79 - 34.82	150	150
	Annual	16.04 - 16.08	50	50
$PM_{2.5}$	24 hour	13.43 - 14.82	65	65
	Annual	5.02 - 5.08	15	15
SO_2	3 hour	132.16 - 132.26	1,300	1,300
	24 hour	43.04 - 43.08	260	365
	Annual	9.00	60	80
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.				

4.6.4.2 Visibility

Direct impacts of the Proposed Action on near-field visibility were not explicitly modeled. While visible dust and/or smoke plumes may periodically affect local visibility and views, model results for both PM_{10} and NO_2 dispersion (relatively low ambient pollutant concentrations) suggest that significant long-term impacts on local visibility beyond the project area due to the Proposed Action are unlikely (**Figures 4.2** and **4.3**). In addition, resource protection measures presented in Chapter 2 would mitigate potential short-term impacts on visibility resulting from the Proposed Action.

Potential project far-field cumulative visibility impacts, as presented in **Table 4.6**, are less than the BLM visibility thresholds in all sensitive areas except Bridger Wilderness, as analyzed for the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006). Visibility can be expressed in terms of dv, a measure for describing perceived changes in visibility. One dv is defined as a change in visibility that is just perceptible to an average person.

Far-field impacts on visibility are more closely associated with the indirect impacts of the Proposed Action (coal combustion) and are anticipated to remain at current levels regardless of activity in the project area.

Table 4.6 Potential Project Far-Field, Cumulative Visibility Impacts under the Proposed Action (FLAG background data)

Sensitive Area	Number of days with Δdv > 1.0	Maximum Δdv
National Park Service		
Yellowstone National Park	0	0.15 - 0.25
Grand Teton National Park	0	0.33 - 0.49
Forest Service		
Bridger Wilderness	3 - 11	1.69 - 3.65
Fitzpatrick Wilderness	0	0.42 – 0.76
Popo Agie Wilderness	0	0.49 – 0.85
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.		

4.6.4.3 Atmospheric Deposition

Direct impacts of the Proposed Action on near-field atmospheric deposition were not modeled. No areas sensitive to atmospheric deposition were identified in the project area or in the near-field assessment area.

Potential direct and indirect far-field cumulative atmospheric deposition impacts on sensitive lake ANC (**Table 4.7**) are less than the level of acceptable change at all sensitive lakes, as analyzed for the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006).

Table 4.7 Potential Project Far-Field Cumulative Aquatic Atmospheric Deposition Impacts under the Proposed Action

Lake	Existing ANC (μeq/L)	Level of Acceptable Change (μeq/L)	Potential ANC Decrease (μeq/L)	Percentage ANC Change (percent)
Bridger Wilderness				
Black Joe	67.0	6.7	0.085-0.185	0.127-0.276
Deep	59.9	6.0	0.087-0.196	0.144-0.327
Hobbs	69.9	7.0	0.042-0.062	0.060-0.089
Upper Frozen	5.0	1	0.091-0.227	1.826-4.532
Fitzpatrick Wilderness				
Ross	53.5	5.35	0.026-0.032	0.048-0.060
Popo Agie Wilderness				
Lower Saddlebag	55.5	5.55	0.096-0.222	0.174-0.397
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.				

Potential total (includes background) far-field cumulative direct and indirect impacts of atmospheric deposition (nitrogen and sulfur) on terrestrial ecosystems (**Table 4.8**) are less than "green line" levels (acceptable level of total deposition) at all analyzed areas, as identified in the Jonah Infill Drilling Project analyses (BLM 2006, TRC Environmental Corporation 2006).

Table 4.8 Potential Total Far-Field Cumulative Terrestrial Atmospheric Deposition Impacts under the Proposed Action

Location	Sulfur Deposition			Nitrogen Deposition		
	Total Impact (kg/ha-year)	"Green Line" Level (kg/ha-year)	Percent Green Line	Total Impact (kg/ha-year)	"Green Line" Level (kg/ha-year)	Percent Green Line
Bridger Wilderness	0.749	3	25.0	1.530 - 1.557	5	30.6 - 31.1
Popo Agie Wilderness	0.747 - 0.748	3	24.9	1.512 - 1.529	5	30.2 - 30.6
Fitzpatrick Wilderness	0.749	3	25.0	1.505 - 1.508	5	30.1 - 30.2
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.						

4.6.5 Direct and Indirect Impacts of the No Action Alternative

The No Action Alternative assumes that the existing air quality management on BLM-administered public land in the region would continue, the LBA tract would not be developed, and development would continue as currently approved on state, tribal and private land.

Direct and indirect impacts from the No Action Alternative on pollutant concentrations, visibility, and atmospheric deposition would occur due to ongoing regional surface coal mining, power plant operation, and other existing air quality management. These impacts would likely remain at current levels, with an eventual reduction of direct impacts in the area as coal reserves at Black Butte and other mines are depleted.

4.6.6 Cumulative Impacts

Assessment of the cumulative impacts of pollutant emissions in the immediate vicinity of the project were calculated by adding the potential emissions from the Proposed Action, reasonably foreseeable development sources (such as permitted disturbance that has yet to occur as the rest of the existing Black Butte Mine), known existing sources (such as Leucite Hills Mine, Jim Bridger Mine and Jim Bridger Power Plant, oil and gas exploration and production), and other reasonably foreseeable future action sources. Potential cumulative emissions identified as a concern for the Proposed Action include emissions of NO_x, PM_{10}, and SO_2 from sources that are within approximately 50 kilometers of the Proposed Action and for which detailed emission data are available.

Emissions inventory information for the Proposed Action and reasonably foreseeable development at the Black Butte Mine was developed to model pollutant dispersion as discussed above. As discussed in Chapter 3, an emissions inventory was compiled using the WDEQ/AQD NSR database identifying major and minor emissions sources within 50 kilometers (31.1 miles) of the project area. The emissions inventory identified facilities, facility owners, facility classification, most recent NSR permit or waiver number and issue date since 1996, as well as permitted (not actual) pollutant emissions for each facility (**Table 3.10**). A review of the 1999 NEI completed by the EPA was also conducted to assess estimated emissions and sources within Sweetwater County. The NEI is an estimate of actual emissions from each facility considered a major source and includes emissions sources not included in the NSR above. A comparison of the estimated Proposed Action emissions with the currently permitted (NSR) and reported (1999 NEI) emissions is presented in **Table 4.9**.

Table 4.9 Estimated Proposed Action Emissions versus Current Emission Levels

Pollutant	Proposed Action Emissions (tons per year)	NSR Permit Emissions (tons per year)	1999 NEI Reported Emissions (tons per year)
Particulate Matter (PM_{10})	1,075	233	10,508
Nitrogen Compounds (NO_x)[1]	1491	5,949	51,857
[1] Calculated for NO_2 for the Proposed Action			

The discrepancy between the NSR permit emissions and the 1999 NEI is believed to be due to the NSR database containing information regarding changes to permits recorded after 1996, whereas the 1999 NEI reports actual emission estimates. Based on a comparison with 1999 NEI information, the Proposed Action may represent a potential increase in cumulative PM_{10} and NO_2 emissions in the region of approximately 10 and 0.28 percent, respectively. This is likely a substantial overestimate of a cumulative increase due to the 1999 NEI only including the largest pollutant sources in Sweetwater County.

As previously described, the indirect impacts associated with changes in SO_2, Hg, and CO_2 emissions are generally the same for both alternatives. The cumulative impacts of changes in these pollutant concentrations are also likely to be similar, as both alternatives have minimal effect on the near-field, far-field, and cumulative concentrations of these pollutants.

Far-field cumulative effects have been presented previously utilizing the extensive modeling results performed for the Jonah Infill Drilling Project (BLM 2006, TRC Environmental Corporation 2006). The cumulative impact assessment for the Jonah Infill Drilling Project reported that:

- Far-field cumulative pollutant concentrations are all below NAAQS and WAAQS, as well as PSD Class I and II increments.
- Cumulative visibility impacts on PSD Class I and sensitive Class II areas are projected to impact visibility in the Bridger Wilderness Area (BLM 2006). Contributions to cumulative far-field visibility impacts from the Proposed Action are anticipated to be insignificant due to the distance between the project area and the Bridger Wilderness.
- Cumulative impacts on atmospheric deposition and ANC are projected to be below specified levels-of-concern and levels-of-acceptable change for both nitrogen and sulfur deposition.

4.6.7 Irreversible and Irretrievable Commitment of Resources

Impacts on air quality are generally considered reversible. While the magnitude of the temporary impacts on pollutant concentrations, visibility and atmospheric deposition vary between the two alternatives, neither alternative would result in an irreversible commitment of air resources.

With pollutant concentrations increases, visibility decreases and atmospheric deposition increases, and mining activities under both the No Action Alternative and the Proposed Action, would cause an irretrievable, but temporary, impact on air quality.

4.6.8 Potential Mitigation and Monitoring Measures

BLM has established goals and objectives to measure its performance in meeting air quality requirements. The goals are qualitative descriptions of BLM's desired condition of air quality, and the objectives are measurable benchmarks of BLM's attainment of the goals. The reader should note that attainment of these performance objectives requires actions by many agencies, as well as BLM. The intent of the air quality goals and performance objectives is that BLM will:

AQ Goal 1a: Minimize the impact of management actions in the planning area on air quality by complying with all applicable air quality laws, rules and regulations.

AQ Objective 1a.1: Maintain concentrations of criteria pollutants associated with management actions in compliance with applicable WAAQS and NAAQS.

AQ Objective 1a.2: Maintain concentrations of PSD pollutants associated with management actions in compliance with the applicable increment.

AQ Goal 1b: Implement management actions in the planning area to improve air quality as practicable.

AQ Objective 1b.1: Reduce visibility-impairing pollutants, in accordance with the reasonable progress goals and time frames established within the State of Wyoming's Regional Haze State Implementation Plan.

AQ Objective 1b.2: Reduce atmospheric deposition pollutants to levels below federally established levels of concern and LAC.

BLM will apply AQ Goal 1a to concentrations of criteria and PSD pollutants, and AQ Goal 1b to atmospheric deposition and visibility.

4.6.8.1 Concentrations

BLM will:

- Continue to rely on WDEQ/AQD to determine whether exceedances constitute violations of the NAAQS
- Continue to work cooperatively with WDEQ, EPA, United States Forest Service, and the National Park Service to maintain concentration monitoring in the RSFO area. Existing concentration monitoring includes the SLAMS ambient PM_{10} monitor in Rock Springs, as well as PM_{10} monitoring at Black Butte Mine.
- The BLM may impose mitigation measures on federal lands beyond those inherent to the Proposed Action. No additional mitigation measures, however, have been stipulated at this time.

Potential cumulative concentrations were below applicable PSD increments (BLM 2005a). As noted above, the comparison of potential concentrations to PSD increments does not constitute a regulatory PSD Increment Consumption Analysis.

4.6.8.2 Atmospheric Deposition

BLM plans no additional mitigation focused on atmospheric deposition.

4.6.8.3 Visibility

BLM plans no additional mitigation focused on visibility.

4.6.9 Residual Impacts

No residual impacts on air quality would occur.

4.7 GEOLOGY AND MINERAL RESOURCES

4.7.1 Regulatory Framework

Leasable minerals are those that can be explored for and developed under the MLA of 1920, as amended, other leasing acts, and regulations at 43 CFR 3100, 3200, 3400, and 3500. They include energy mineral resources, such as oil, gas, coal, and geothermal fluids, and some non-energy minerals (e.g., trona). The BLM uses discretionary authority to decide whether or not to lease mineral resources for exploration and development. The holder of a mineral lease or permit has a contractual agreement with the government that grants exclusive rights to reasonable exploration and development of the leased commodity.

SMCRA gives OSM the responsibility to administer programs that regulate surface coal mining operations. In November of 1980, a program was approved (Section 503 of SMCRA) in which WDEQ was given permanent authority to regulate surface coal mining operations on nonfederal lands within the state. Additionally, in January of 1987 [Section 523(c) of SMCRA], WDEQ entered into a cooperative agreement with the Secretary of the Interior that authorized WDEQ to regulate surface coal mining operations on federal lands within the state.

Pursuant to the cooperative agreement, a federal coal leaseholder in Wyoming must submit a permit application package to OSM and WDEQ for any proposed coal mining and reclamation operations in the state. WDEQ reviews the permit application package to ensure it complies with permitting requirements, and that the proposed coal mining operation meets the performance standards of the approved program. OSM, BLM, and other federal agencies review the permit application package to ensure it complies with the terms of the coal lease, the MLA, NEPA, and other federal laws and regulations. If the permit application package does comply, WDEQ issues the applicant a permit (the first of two enabling actions) to conduct coal mining operations. Following the issuance of the permit, the applicant submits a license application and upon its approval can proceed with the project.

4.7.2 Analysis Assumptions and Assessment Areas

The direct IAA is contained within the project area boundary for both fluid and solid leasable minerals. The indirect IAA for solid leasable minerals includes the project area and the existing Black Butte Mine. The indirect IAA for fluid leasable minerals encompasses the project area, the existing Black Butte Mine, and the Bitter Creek and Copper Ridge projects. The cumulative IAA for solid leasable minerals is that portion of the east flank of the Rock Springs Anticline containing the existing Black Butte, Bridger Coal, and Leucite Hills Mines. The cumulative IAA for fluid leasables includes lands south of Interstate 80, and east of Highway 430 within the BLM RSFO boundary area.

4.7.3 Direct and Indirect Impacts of the Proposed Action

4.7.3.1 Geology

The mining operation would remove the coal and return non-coal material back into the pit on an estimated 1,570 acres. Other surface disturbances such as haul roads, storm water conveyances, and retention ponds would also be present (680 acres). The geology of the mine pit area would be permanently altered. The replaced interburden and overburden material would be similar to pre-mining lithologies. However, the physical characteristics including the permeability and stratigraphy of the subsurface materials would be altered through the placement of a mixture of sizes and rock types back into the mined-out pit.

Exposure of unsuitable (due to high selenium or other potentially adverse chemical constituents) backfill materials to surface water and reclamation soils would be avoided through state-mandated analytical

testing and subsequent designs incorporated in the mine operating plan. The processes and procedures for this work would be as specified in the WDEQ/LDQ-approved mine permit.

The topographical expression of the land surface would be permanently altered. Post-mining topography would be determined during the WDEQ/LQD permitting process. Unless a variance or exemption is granted by the WDEQ, post-mine topography would approximate pre-mine conditions. Alterations in the final topography may be approved to improve wildlife habitat for species such as greater sage-grouse and mule deer.

4.7.3.2 Solid Leasable Minerals (Coal)

The direct impact of the Proposed Action would be the removal of up to approximately 34.6 million tons of in-place coal from federal and private mineral reserves and the associated removal and replacement of overburden and interburden material in the project area. This represents the removal of 80 percent of the total in-place minable coal reserves in the indirect impact area. The surface disturbance of the mine in the project area would represent 13 percent of all existing and foreseeable future, reclaimed and unreclaimed mine-related surface disturbances in the indirect IAA.

Under the Proposed Action, the initiation of project area mining would coincide with a decrease in coal removal rates at the existing Black Butte Mine. This would allow for a transition in mineral resource management from existing pits to the operation of the Proposed Action. A local coal source for the Jim Bridger Power Plant would continue and tax revenues from the sale of the coal would be realized.

4.7.3.3 Fluid Leasable Minerals

There are no known conflicts between mining and conventional oil and gas development in the project area, due to the low likelihood of economically recoverable oil and gas reserves. All conventional oil and gas development on nearby lands is from deeper formations that would not be directly affected by mining. Oil and gas development can occur simultaneously with mining, but would require placement of wells where they would not conflict with on-going mining operations. This may require the use of directional drilling technologies.

If natural gas or CBNG development was pursued on standard 160-acre spacings and natural gas or CBNG development was restricted to non-disturbed areas within the project area, the construction of 13 standard wells could potentially be postponed. As with conventional oil and gas development, a CBNG reservoir could be accessed using directional drilling if the depth to the reservoir were sufficient to allow the use of this drilling technology.

Since conventional oil and gas reservoirs would be unaffected by mining, potential oil and gas development would be delayed only while mining proceeds. In the simplest case, if mining is already in progress, drilling or other activities would not be initiated until the subject lands have been mined. This could require some adjustment of the oil and gas lease-development requirements or other action for the oil and gas lease (e.g., lease suspension). In cases where oil and gas development has preceded mining, more complex accommodations may be required. Well(s) could be temporarily abandoned while the lands are mined then re-entered to continue production. While technically feasible, this imposes economic costs on the oil and gas operator, mine operator, or both. It is possible (and has been done in the Powder River Basin) for the coal mine operators to purchase the wells/reserves from the oil and gas operators and permanently abandon the wells or delay production until mining is completed. This also entails economic costs.

It is also possible for oil and gas leases/reserves to be drained by production from surrounding wells. If production is established on surrounding lands, leases within the project area could be affected. Federal oil and gas leases are required to protect their leases from drainage, either by drilling wells or paying

compensatory royalties. Leases can be wholly or partially relinquished if drainage protection is not possible.

No effect on the conventional oil and gas Brady and Churchill Deep Units is anticipated from the Proposed Action. The distance of the project area from the units' target reservoirs both laterally and vertically precludes effects on those fields.

A higher potential for conflict exists with CBNG resources in the Almond Formation coals from the direct mining of those coals as part of the Proposed Action. The removal of the Almond Formation coals would directly remove the potential for capturing CBNG from the formation in the mine area. Dewatering that may occur from mine operations would lower the hydrostatic pressure of water in the coal seams adjacent to the pit and allow methane to desorb from the coal and escape. The distance from the mine pit where this effect may occur has not been determined due to insufficient site-specific data on Almond Formation hydrodynamics and its groundwater potentiometric surface.

However, only marginal economic CBNG production has been established in the Almond Formation to the east of the project area. The shallow depth of the Almond Formation in the proposed pit (corresponding to a lower hydrostatic pressure should groundwater be present), and the short duration of production and marginal reserves in wells closest to the project area indicate the Proposed Action would minimally alter CBNG potential in the direct impact area. In addition, due to the lateral distance to the Bitter Creek, North Copper Ridge, and Copper Ridge CBNG units and the separation depth between the proposed mine and the typical CBNG extraction depth in these units, hydrostatic pressures are not expected to be significantly altered as a result of the Proposed Action.

Conflicts between CBNG and the mining industry have continued for several years in the Powder River Basin. In the unlikely event that similar conflicts arise, some or all approaches employed to manage these conflicts could be applied in the project area. In some cases the CBNG and mine operators have negotiated advance compensation for the CBNG resource losses caused by mining. In other cases CBNG development has proceeded in advance of mining so that most of the CBNG is recovered before mining.

4.7.4 Direct and Indirect Impacts of the No Action Alternative

4.7.4.1 Geology

Impacts would be moderate and permanent on the existing mine. The geology of the project area would remain unaltered since proposed mining activities would not take place. Geomorphological surface features, subsurface stratigraphy, and chemical and physical characteristics would continue to function in their current state.

4.7.4.2 Solid Leasable Minerals (Coal)

Mining of coal as proposed in the Proposed Action would not occur at the project area. Revenue to the federal government from the mining of coal would not be realized. The management of coal resources in the area would be altered and a source of nearby coal for local power generating facilities would be eliminated. The ability to economically extract the coal may be hindered, if in the future, interest in developing the project area is revived and the existing Black Butte Mine infrastructure is not available to process the coal. Impacts would be moderate and permanent on the existing mine.

4.7.4.3 Fluid Leasable Minerals

Impacts would be negligible and short term on the existing Black Butte Mine. Both conventional oil and gas and CBNG exploration and production activities in the project area could continue without interference from mining activities. Should economical quantities of CBNG be found in the Almond

Formation in or immediately adjacent to the project area, that resource would not be lost due to mining activities.

4.7.5 Cumulative Impacts

4.7.5.1 Solid Leasable Minerals (Coal)

Under the Proposed Action, an additional 34.6 million tons of in-place minable coal reserves would be added to the existing permitted in-place minable reserves of 133.7 million tons of coal (No Action Alternative) in the cumulative IAA. This would amount to a 26 percent increase in the amount of coal available for mining in the cumulative IAA relative to the No Action Alternative. The mines included in this area are the Bridger Coal, Leucite Hills, and Black Butte Mines. Once the 168.3 million tons of coal in the cumulative IAA are mined, it would no longer be available for future use.

Surface disturbance in the cumulative IAA (277,120 acres) includes 21,931 acres of existing disturbance (7.91 percent if the IAA), 2,250 acres associated with the Proposed Action (0.81 percent), and 4,411 acres of foreseeable future disturbances (1.59 percent). These combined actions would result in 25,592 acres of disturbance, or 10.32 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 30.37 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 9.5 percent of the cumulative IAA would have surface disturbances. These impacts would be moderate to permanent in the cumulative IAA.

4.7.5.2 Fluid Leasable Minerals

Production of coal in the project area is not expected to decrease the potential for oil and gas and CBNG production in the immediate area. This is due to the marginal potential for economic recovery in the project area. However, the potential delay in the construction of 13 wells in disturbed areas would represent a temporary loss from production of approximately one percent of the existing and reasonably foreseeable future wells located in the cumulative IAA. Oil and gas resources could potentially be accessed beneath selected areas (e.g., coal production, unincorporated towns) using directional drilling technology.

Surface disturbances in the cumulative IAA include 19,483 acres of existing disturbances (2.16 percent of the IAA), 2,250 acres associated with the Proposed Action (0.25 percent), and 23,202 acres of foreseeable future disturbances (2.57 percent), would total 44,935 acres or 4.98 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 130.37 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 4.7 percent of the cumulative IAA would have surface disturbances. These impacts would be minor and short term in the cumulative IAA.

4.7.6 Irreversible and Irretrievable Commitment of Resources

The removal of up to 34.6 million tons of coal from the project area would represent an irreversible commitment of resources. The alteration of the Almond Formation geology in the mined and reclaimed pit would represent an irreversible change. CBNG that may potentially be present in the Almond Formation and that could be lost due to gas migration from dewatering, would represent an irreversible commitment of resources.

4.7.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures are proposed.

4.7.8 Residual Impacts

Topographic moderation would be a permanent consequence of mining. Geology from the base of the coal to the surface would be subject to permanent change. A loss of coal for future generations would occur.

4.8 SOILS

4.8.1 Regulatory Framework

Activities that affect soils are regulated through the WDEQ/LQD permitting process. The Green River RMP and ROD (BLM 1997) describe goals and objectives for the management of soil.

4.8.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative impact areas for soil resources are the project area. Soil protection measures would be incorporated into the Proposed Action through requirements specified in the WDEQ/LQD-approved mine permit.

4.8.3 Direct and Indirect Impacts of the Proposed Action

Activities occurring under the Proposed Action would result in approximately 2,250 acres of soil disturbance. Salvaged soils, stockpiled during mining and restored during reclamation, would have different physical, chemical, and biological characteristics than the pre-mining soils. Post-mining soil would be more uniform in type, thickness, and texture due to mixing soils during stockpiling and reclamation efforts. While WDEQ permit requirements would reduce erosion potential, direct impacts on soil resources from the Proposed Action would increase the potential for wind and water erosion and sedimentation until reestablishment of vegetation. Diversity of vegetation replaced during interim and final reclamation may be reduced due to the alteration of replaced soil physical and chemical components.

Average topsoil productivity in the project area would generally improve as soil that is not suitable for sustaining vegetation would not be salvaged and used in surface reclamation efforts. Chemistry and nutrient distribution would be more uniform within these soils. However, the diversity of vegetation the salvaged soil would support may be reduced. Special handling procedures for soils containing potentially harmful constituents (e.g., selenium) and the use of erosion control structures are required by state regulations and are considered part of the Proposed Action. The procedures would minimize mobilization of harmful constituents and erosion.

4.8.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no additional development beyond currently approved levels would occur; therefore, no additional impacts on soil resources would result. Within the adjacent Black Butte Mine Area, impacts to chemical and biological soil properties would continue to be moderate and long term to permanent. Some changes to physical properties would be beneficial. Existing two-track roads in the project area encompass three acres, which would continue to incur minor amounts of erosion related to OHV use on the roads.

4.8.5 Cumulative Impacts

Mining activities described in the Proposed Action are expected to have substantial long-term cumulative impacts on soil resources. Soil management practices required by state and federal agencies for mine permits stipulate that erosion control measures be incorporated in the mine operations plan. Soils within the disturbed area would eventually be able to support pre-mining uses. The majority of the two-track roads in the project area would be removed and eventually reclaimed. Following reclamation, erosion may occur due to OHV use or wildfire.

Surface disturbance in the cumulative IAA (4,359 acres) includes three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.26 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance, or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, no additional development beyond currently approved levels would occur in the cumulative IAA. Impacts to chemical and biological soil properties would continue to be moderate and long term to permanent within the adjacent Black Butte Mine area. Some changes to physical properties would be beneficial. Existing two-track roads in the project area encompass three acres, which would continue to incur minor amounts of erosion related to OHV use on the roads.

4.8.6 Irreversible and Irretrievable Commitment of Resources

Changes to the physical, chemical, and biological properties of the soil resources due to stockpiling and reclamation activities represent an irreversible change to soil resources. The soil property changes would incur an irreversible loss of soil productivity in some areas; however, soil productivity following reclamation could increase in some formerly low-productivity areas.

4.8.7 Potential Mitigation and Monitoring Measures

No additional mitigation and monitoring measures are proposed for soil resources, based on this analysis.

4.8.8 Residual Impacts

Salvaged soils would be mixed and redistributed, and mining would disturb soil-forming processes. This would result in long-term to permanent alteration of soil characteristics.

4.9 WATER RESOURCES

4.9.1 Groundwater Quality and Quantity

4.9.1.1 Regulatory Framework

In addition to the permitting requirements established by the WDEQ/LQD, the Wyoming SEO regulates the use of groundwater and would require an application to appropriate groundwater for a groundwater resources impacted by the Proposed Action. No dewatering wells are planned for the Proposed Action. The Green River RMP and ROD (BLM 1997) describe goals and objectives for the management of groundwater in the project area.

4.9.1.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for groundwater are the project area.

4.9.1.3 Direct and Indirect Impacts of the Proposed Action

Mining activities occurring under the Proposed Action would impact both the quantity and quality of groundwater resources in the Almond aquifer in the project area.

Mining the project area would disturb approximately 1,570 acres of Almond Formation to depths ranging from 25 to 200 feet bgs. The mined Almond Formation would be replaced with undifferentiated overburden and interburden consisting of shale, mudstone, siltstone, and sandstone. The mine pit would be completely dewatered. The lateral extent of drawdown related to the dewatering in the mine pit would be limited due to the lack of lateral continuity of the water-bearing units in the affected formation.

WDEQ/LQD permitting requires determination of the predicted five-foot drawdown contour. Therefore, the necessary groundwater studies would be conducted to evaluate the site-specific mining-related drawdown in the Almond Formation during permitting. However, using available water level data for the Almond Formation from the Black Butte Mine Pit 8 operations and the associated ratio of drawdown to distance from the pit of 0.004 to 0.019 (BBCC 2005a), an inference to the project area can be approximated. Assuming a similar water level drawdown at the project area, the five-foot drawdown contour would extend from 263 to 1250 feet from the pit walls at the pit's maximum depth (**Figure 4.4**).

Figure 4.5 shows a generalized cross section through the proposed pit area and the anticipated groundwater drawdown associated with the development of the pit (the pre-mining groundwater profile is provided in **Figure 3.9**).

Two concerns associated with potentiometric surface drawdown are: 1) the loss of use of individual wells, and 2) the length of time required for the aquifer potentiometric surface to recover following mining and backfilling activities. Wyoming Statutes 35-11-415 (b)(xiii) and 35-11-416 (b) require the replacement of a water supply affected by surface coal mining. The only listed Wyoming SEO wells in the vicinity are over two miles northwest of the project area. Groundwater recovery rates are unknown, however, once the backfilled aquifer water levels do recover, groundwater occurrence would approximate pre-mine conditions. Based on inferences from Black Butte Mine's existing permit, the drawdown of groundwater would likely have a negligible impact on existing wells and regional groundwater currently used.

Based on similar surface mining conditions in the Green River Basin, groundwater in the backfilled aquifer is predicted to exhibit an increase in TDS concentrations as backfilled materials are saturated. Over time the groundwater quality of the water in the backfill aquifer would return to near pre-mine conditions (Ogle and Wood 2004). It is expected that the water quality of the backfill aquifer would have the same use classification (Class III, livestock) as the groundwater in the area prior to mining.

The sub-coal aquifers in the Almond Formation and Ericson Sandstone would not be removed or disturbed by mining activities and, therefore, would not be directly impacted by the Proposed Action.

4.9.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no groundwater development would occur; therefore, no impacts on groundwater are anticipated. Within the existing mine, potentiomentric surface drawdown and groundwater quality impacts would be minor and long term due to on-going mining.

4.9.1.5 Cumulative Impacts

Surface disturbances in the cumulative IAA (4,359 acres) would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.26 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Figure 4.4 Groundwater Five-Foot Drawdown Impact Extent

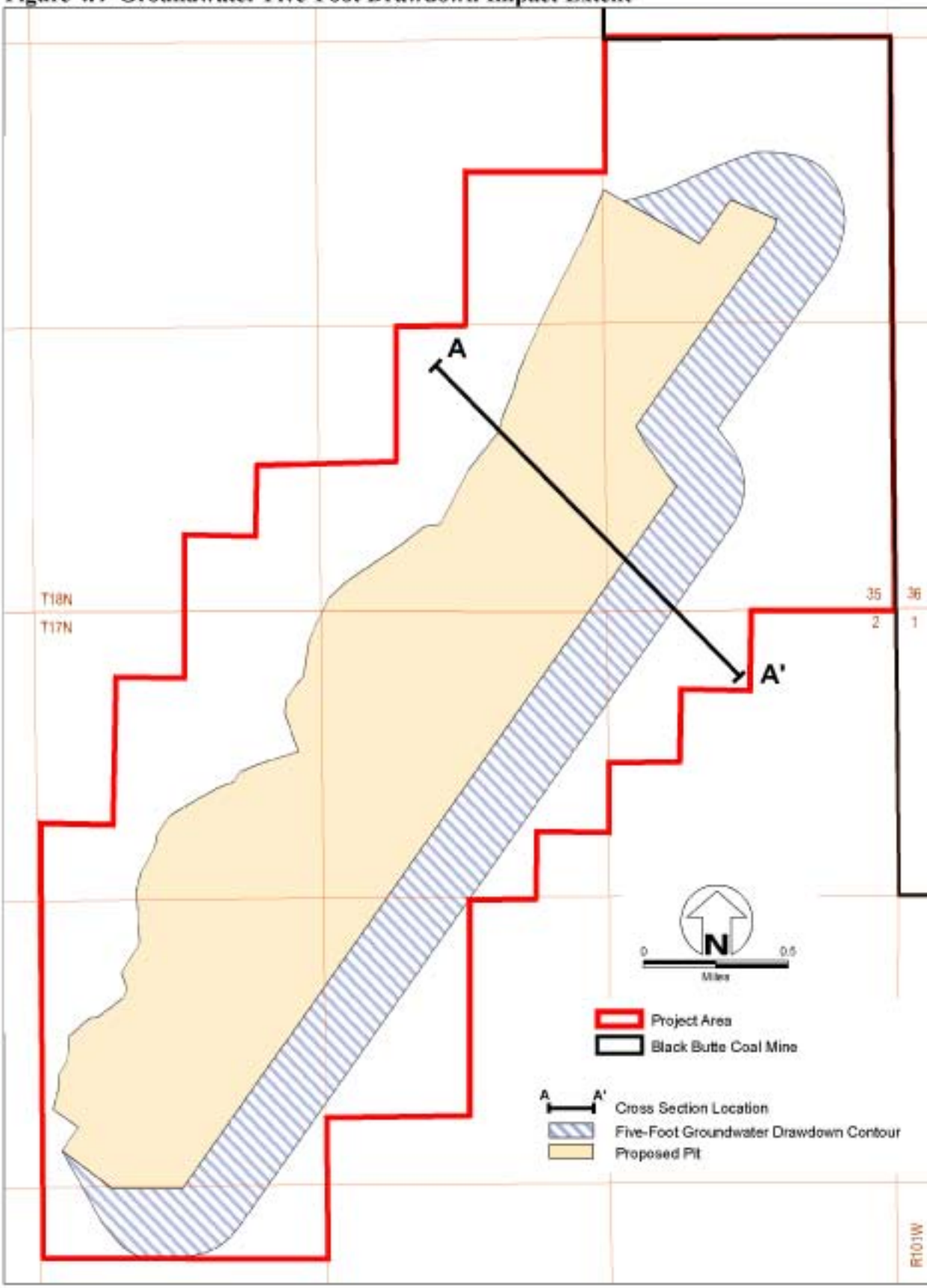
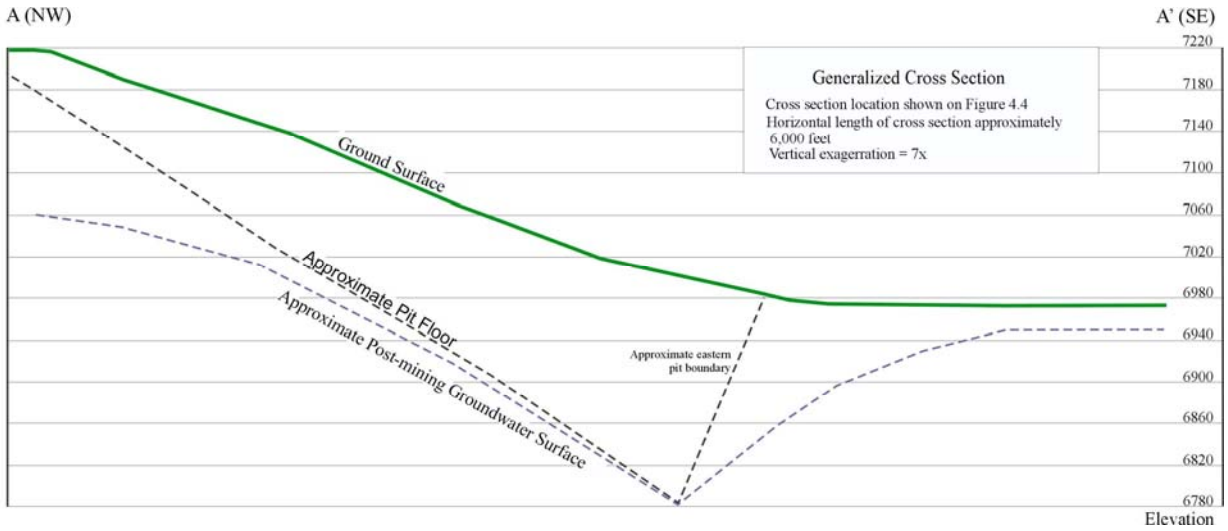


Figure 4.5 Cross Section Showing Approximate Maximum Groundwater Surface Drawdown



No past, present, or foreseeable future action beyond the Proposed Action are present within the project area that would create cumulative impacts on groundwater resources in the assessment area beyond the indirect and direct impacts discussed above.

Cumulative impacts if the No Action Alternative were implemented would represent continued localized, minor and short term impacts associated with potentiometric drawdown from on-going operations.

4.9.1.6 Irreversible and Irretrievable Commitment of Resources

Changes to the physical characteristics of the aquifers removed during mining activities and replaced with undifferentiated fill material would represent an irreversible change. The discharge of groundwater encountered during mining represents an irretrievable commitment of resources.

4.9.1.7 Potential Mitigation and Monitoring Measures

Based on the analysis of impacts, no mitigation or monitoring measures are proposed beyond those included in the Proposed Action.

4.9.1.8 Residual Impacts

The post-mining backfill would take many years to reach pre-mining water levels and water quality. Residual impacts on groundwater quality and water levels would decrease faster over time with distance from the mine pit in undisturbed materials.

4.9.2 Surface Water Quality and Quantity

4.9.2.1 Regulatory Framework

Activities that affect surface water quantity and/or quality are regulated through the permit process that is overseen by the WDEQ/LQD and WDEQ/WQD. Surface water resource protections would be incorporated into the WDEQ/LQD permit, which acts as a platform to ensure WDEQ/WQD National

Pollutant Discharge Elimination System (NPDES) compliance and water rights compliance. The permit process also ensures compliance with both the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin initiated by the USFWS on January 22, 1988, which establishes average annual depletion levels from the Upper Colorado River and the Colorado River Salinity Control Act of 1974. The Green River RMP and ROD (BLM 1997) describe goals and objectives for the management of surface water in the project area.

4.9.2.2 Analysis Assumptions and Assessment Areas

The direct and indirect IAAs include the two 5th order watersheds that include the project area. The cumulative IAA includes the affected portion of the6th order watershed within the two 5th order watersheds.

Surface water runoff from the project area would be retained within the project area. Discharges from retention ponds may occur during large precipitation events or from enhanced pit dewatering activities; all discharges would comply with NPDES permit requirements. Retention of surface water during mining activities in the vicinity of the surface water divide would reduce the potential for transfer of surface water between 5th order drainage basins and would increase groundwater infiltration and recovery rates. Stream channel morphology and profiles would be recreated in disturbed areas in accordance with WDEQ/LQD permit reclamation requirements.

4.9.2.3 Direct and Indirect Impacts of the Proposed Action

Direct impacts on surface water resources from the Proposed Action include potential increases in runoff, turbidity, and sedimentation within the project area due to disturbances to vegetation and soil resources. Ephemeral drainages in proposed disturbance areas would be excavated and reconstructed upon backfilling and reclamation of the mine pit. Stream channel reconstruction and revegetation would minimize impacts on surface water, similar to pre-mining conditions and in some cases where pre-mining stream channel function is poor, may improve the erosion and sedimentation characteristics.

Direct and indirect impacts of mining activities on water quality downstream of the project area are unlikely since most runoff water would pass through the required sedimentation ponds, be treated, and then discharged into the undisturbed downstream channel.

The Proposed Action would create ponds to retain surface runoff from disturbed areas. Based on anticipated surface disturbances, it is anticipated approximately 3.2 acres of retention ponds would be created. Pursuant to USFWS (2002) the following calculations for the Proposed Action were performed in order to determine the potential depletion to the Colorado River system due to evaporative losses from the ponds:

Annual pan evaporation in the project area is estimated at 45 inches. Assuming an average annual pan coefficient of 0.70, average annual evaporation is approximately 31.5 inches (45 x 0.70). Assuming average annual precipitation is 8.84 inches and that 70 percent (6.2 inches) is lost to evapotranspiration prior to the proposed disturbance, the average net annual evaporative loss is 25.3 inches (31.5 – 6.2 inches). Assuming that the year-round surface area of the retention ponds is eight acres and is multiplied by 25.3 inches (2.1 feet) of evaporation per year, the average annual depletion for the Proposed Action is estimated to be 16.9acre-feet.

4.9.2.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no surface disturbance or development would take place. Surface water infiltration, evaporation and runoff would continue as it currently functions. These impacts would be

minor and short term to long term due to existing mining. Surface water depletion from the Colorado River system would continue to be moderate and short term on the existing mine and downstream.

4.9.2.5 Cumulative Impacts

When storm and snowmelt events occur at the project area and on other disturbances in the cumulative IAA, surface water retention systems would decrease the overall contribution to stream flow during and shortly after the event occurs. Discharge of treated water from the retention systems would delay the surface water contribution in downstream stream reaches from storm and snowmelt events. A corresponding decrease in the peak flows in downstream stream channel reaches would occur. Infiltration and evaporation of retained water would reduce the contribution of surface water from the disturbed areas to downstream channels. The intensity of impacts are difficult to quantify based on the spatial variability in storm events and the lack of documented retention systems discharge practices from other facilities utilizing retention basins. Under the No Action Alternative, surface water flows in the cumulative IAA would be would be affected by existing disturbances and retention systems with no additive impacts from the project area.

The project area represents 1.6 percent (4,359 acres) of the Bitter Creek-Patrick Draw and Black Butte Creek watersheds (271,169 acres). The specific runoff for the Bitter Creek watershed is between 0.1 to 0.2 inches per year (Busby 1966). Based on the specific runoff and the area of the cumulative IAA the specific runoff is calculated to be 2,260 to 4,519 acre-feet per year. Approximately 1.6 percent of the annual specific runoff is 36 to 72 acre-feet per year and represents the potential runoff affected by the Proposed Action. Under the No Action Alternative the 37 to 73 acre-feet of runoff would not be impeded from entering stream channels.

Surface disturbances in the cumulative IAA (271,169 acres) would include 14,611 acres of existing disturbances (5.39 percent of the IAA), 2,250 acres associated with the Proposed Action (0.83 percent) and 4,624 acres of foreseeable future disturbances (1.71 percent), totaling 21,485 acres or 7.92 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 47.05 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 7.09 percent of the cumulative IAA would have surface disturbances.

The average annual depletion to the Colorado River System for the existing operations at Black Butte Mine was established by the USFWS as 160 acre-feet in December 2003 (Kelly 2003). As areas of the existing mine are reclaimed, the depletions would decrease and additional depletions from the Proposed Action would have to be evaluated to determine the cumulative water loss to the Upper Colorado River as established by the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin.

The capture and treatment of disturbed area runoff in sedimentation/retention basins prior to discharge for the mining and oil and gas projects in the cumulative IAA would reduce the potential for TSS and related enhanced sedimentation impacts downstream from these disturbances. Road disturbances without retention ponds would continue to affect TSS concentrations in surface waterbodies. Under the No Action Alternative, surface water quality would be affected primarily by roads and other uncontrolled features in the cumulative IAA with minor to negligible differences compared to the Proposed Action implementation.

4.9.2.6 Irreversible and Irretrievable Commitment of Resources

Any reduction of streamflow would represent an irretrievable, but not irreversible commitment of resources.

4.9.2.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures are proposed based on the analysis of impacts on surface water resources beyond those proposed in the development plan and **Appendix J**.

4.9.2.8 Residual Impacts

No residual impacts are anticipated following reclamation and the associated revegetation reestablishment.

4.10 VEGETATION

4.10.1 Vegetation Range Sites

4.10.1.1 Regulatory Framework

Guidance for the management of vegetation on BLM-administered lands in Wyoming is provided by Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the State of Wyoming, August 12, 1997. Additionally, the WDEQ/LQD permitting process requires baselines studies, range site monitoring, and reclamation in association with the implementation of mining projects. Results of studies, monitoring, and reclamation activities must meet pre-determined standards specific to the area for plant diversity and abundance, and indicate a lack of noxious weed infestation.

4.10.1.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for vegetation are the project area. Because no wetland or riparian vegetation is associated with the ephemeral drainages within the project area (BBCC 2004a; 2004b), impacts on these vegetation types would not occur.

A site-specific post-mining reclamation plan would be developed by BBCC in coordination with the WDEQ/LQD, BLM RSFO, and WGFD. The plan would include detailed specifications for reclamation activities such as grading, contouring, re-application of topsoil, reseeding, etc. The seed mix used for reseeding would likely include a diverse mix of native grasses, forbs, and shrubs (as defined by existing range sites) that would comprise a sagebrush steppe community type.

4.10.1.3 Direct and Indirect Impacts of the Proposed Action

The Proposed Action would result in the direct progressive impact and short-term removal of approximately 2,250 acres of vegetation within the project area, for the following developments: approximately 1,570 acres for Pit 14, approximately 101 acres for new haul-road development outside the pit, and approximately 579 acres for necessary facilities and temporary use areas (e.g., power lines, topsoil stockpiles, and retention ponds). **Table 4.10** identifies the approximate total number of range site acres that would be directly impacted by the Proposed Action.

Direct impacts from surface disturbance would leave 2,250 acres of vegetation communities unavailable for use as wildlife habitat and livestock forage during the life-of-operations (i.e., 20 years). Interim reclamation (conducted during operation associated with the Proposed Action on all disturbances) would occur gradually over the short term, and vegetation production could become established within approximately three to five years following reclamation of disturbed sites. Some disturbed areas could become available for use by wildlife during the life-of-operations. Following the life-of-operations, direct

impacts associated with the Proposed Action would cease, and remaining areas of disturbance would be reclaimed.

Table 4.10 Acres of Mine Development on Range Sites Found Within the Project Area

Range Site	Approximate Percentage of Project Area	Approximate Acres of Direct Impact	Approximate Percentage of Project Area Range Sites That Would Be Impacted
Shallow Loamy Big Sagebrush Shrubland	80	1,882	55
Saline Upland Subshrub	10	126	27
Rocky/Shale Shrubland	10	242	54
TOTAL	100	2,250 Acres	N/A

In addition to direct disturbance of approximately 2,250 acres of vegetation, direct or indirect impacts could occur anywhere within the remaining 2,109 acres of project area. Direct impacts could include removal or modification of vegetation. Indirect impacts could include modification to existing range sites (e.g., changes in plant make-up, distribution, and density) through invasive weed establishment or changes in land use (e.g., grazing and wildlife use). Despite the return of some re-established vegetation production within the short term, reclamation of disturbed range sites would continue through the long term in order to fully re-establish successful vegetation cover upon disturbed sites associated with the Proposed Action. This is due to the consideration of the re-establishment of sagebrush steppe community types, which due to local climatic conditions, are difficult to re-establish. This community type is a large component of the existing range sites and would be the target vegetation for reestablishment within the reclaimed range sites.

Prior to release of the reclamation bond (a minimum of 10 years following closure of the pit), establishment of a diverse, productive, and permanent vegetative community would be required. To achieve this, reclamation would be designed to facilitate the return of current, and/or anticipated post-mine land uses. Reclamation could produce range sites of equal or greater productivity than those found within the project area prior to mining development. Species diversity would initially be lower on reclaimed lands, with the shrub component of each range site requiring the longest amount of time to re-establish.

With careful seedbed preparation and timely seeding, as required by WDEQ/LQD, reclaimed lands could eventually support vegetation cover and production rates similar to pre-mine conditions. Species diversity would be emphasized with a diverse seed mix, and special planting practices for shrubs, particularly sagebrush, would encourage re-growth of this important ecosystem component.

4.10.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development within the project area would take place beyond current BLM authorizations. Therefore, impacts on vegetation within the project area would continue to follow existing trends, which generally includes negligible impacts in the project area. Vegetation impacts would continue to result in moderate, trending to minor and long term impacts within the Black Butte Mine area (outside of the assessment area).

4.10.1.5 Cumulative Impacts

Surface disturbances in the cumulative IAA (4,359 acres) would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.26 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance, or 51.69 percent of the cumulative IAA. This would represent a

75,000 percent increase in surface disturbance in the cumulative IAA. Because the cumulative IAA for vegetation is limited to the project area, cumulative impacts would be the same as the direct and indirect impacts described above.

Under the No Action Alternative, no project-related disturbance or development within the project area would take place beyond current BLM authorizations. Impacts on vegetation within the project area would continue to follow existing trends, which generally includes negligible impacts in the project area.

4.10.1.6 Irreversible and Irretrievable Commitment of Resources

Because reclamation activities would be implemented to re-establish current vegetation condition (meeting or exceeding pre-mining conditions) and land uses, no irreversible commitment of vegetation resources would be anticipated. However, because vegetation production could be diminished in both the short and long term (i.e., following reclamation and during re-establishment of range sites), there would be an irretrievable loss of vegetation production and diversity during these time frames.

4.10.1.7 Potential Mitigation and Monitoring Measures

Because adequate interim and final reclamation planning, development and monitoring requirements, as required by the WDEQ/LQD, are in-place for the life of the operation process, additional mitigation and monitoring measures have not been identified for the Proposed Action. BBCC would develop a reclamation plan as required by the WDEQ/LQD that would identify adequate re-vegetation, including appropriate seed mixes, application and planting methods, monitoring schedules and success standards based on the evaluation of the current vegetation cover. Interim (during mining operations) and final reclamation (upon cessation of operations) monitoring of all disturbances would be conducted through the 40-year life of the project to monitor and measure revegetation success objectives to meet post-mine land use goals.

4.10.1.8 Residual Impacts

Interim and post-mine site reclamation activities and vegetation monitoring would provide for suitable and beneficial vegetation communities to provide adequate habitat for wildlife, livestock grazing forage, and other post-mine land uses. Though range sites would be restored to conditions equal to or better than pre-mining conditions (following post-mining recovery), reclaimed vegetation may never completely match the surrounding native plant communities.

4.10.2 Invasive Species

4.10.2.1 Regulatory Framework

Executive Order 13112 on Invasive Species directs federal agencies to prevent the introduction of invasive and noxious species and provide for their control, and minimize economic, ecological, and human health impacts that invasive species can cause. The Green River RMP and ROD (BLM 1997) provides management direction for noxious weed infestation. Additionally, the WDEQ/LQD permitting process requires baselines studies, range site monitoring, and reclamation in association with the implementation of mining projects. Results of studies, monitoring, and reclamation activities must meet pre-determined standards specific to the area for plant diversity and abundance, and indicate a lack of noxious weed infestation.

4.10.2.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for noxious weeds are the project area.

Per the Green River RMP and ROD (BLM 1997), noxious weed infestations would be controlled by livestock management or environmentally acceptable mechanical, chemical, or biological means. Additionally, grazing systems and wildlife management would be designed to maintain or improve plant diversity and restore disturbed or altered habitat with the purpose of attaining desired native plant communities.

A site-specific post-mining reclamation plan would be developed by BBCC in coordination with the WDEQ/LQD, BLM/RSFO, and WGFD for the Proposed Action. The plan would include detailed specifications for reclamation activities such as grading, contouring, re-application of topsoil, reseeding, and weed control. The seed mix used for reseeding would likely include a certified weed-free diverse mix of native grasses, forbs, and shrubs (as defined by existing range sites) that would comprise a sagebrush-steppe community type. The re-establishment of a self-perpetuating native plant community would limit opportunities for the establishment of invasive species and noxious weeds.

4.10.2.3 Direct and Indirect Impacts of the Proposed Action

Surface disturbance would increase the potential for the spread of invasive and noxious weeds that are currently found within the project area, (e.g., Canada thistle, perennial pepperweed, and black henbane). Disturbance would also have the potential to introduce new invasive and noxious weed species from outside the project area. Such introductions could result in infestation and consequent alteration of species distribution within a given range site. Alteration could include destruction of otherwise unaffected acres of existing range sites, and could complicate reclamation. However, because invasive species and noxious weeds are not abundant within the project area and mining and reclamation plans would include control measures to prevent the spread of invasive and noxious weed species, impacts from annual grass introduction or the establishment of other invasive and noxious weeds would be minimized.

4.10.2.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Impacts caused by the threat of noxious weeds would continue to follow existing trends, which would generally include the implementation of precautionary measures when there is potential to establish and spread invasive and noxious weeds (e.g., annual grasses and halogeton) from a contaminated area to a non-contaminated area.

4.10.2.5 Cumulative Impacts

Surface disturbances in the cumulative IAA (4,359 acres) would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.26 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance, or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Because the cumulative IAA for invasive and noxious weeds includes the project area, and no other reasonably foreseeable actions exist within the project area, any cumulative impacts from invasive and noxious weeds associated with the Proposed Action would be the same as the direct and indirect impacts described above.

4.10.2.6 Irreversible and Irretrievable Commitment of Resources

Because reclamation activities would be implemented to re-establish current vegetation condition (meeting or exceeding pre-mining conditions) and land uses, no irreversible commitment of vegetation resources from the establishment of invasive or noxious weed species would be anticipated. Reclamation activities would be implemented to re-establish current land uses would be anticipated. If there were a

spread of invasive and/or noxious weed species following implementation of the Proposed Action, the option for noxious weed abatement would not be lost.

Because reclamation would not necessarily occur immediately following project-related disturbance, and invasive species and noxious weeds could have the opportunity to temporarily establish during that time, there could be an irretrievable loss of vegetation resources at any point during the short term (i.e., 20 year life-of-operations). Although the area would already be experiencing an irretrievable loss of vegetation resources from mine development, the potential for an additional irretrievable loss of vegetation would exist if the temporary establishment of invasive species or noxious weeds spread outside the area of direct impact.

4.10.2.7 Potential Mitigation and Monitoring Measures

Because reclamation and vegetation monitoring requirements exist through the WDEQ/LED permitting process, require post-mine vegetation to meet pre-mine standards (e.g., no noxious weed infestations) prior to bond release, and are inherent to the Proposed Action, mitigation and monitoring measures have not been identified for the Proposed Action.

4.10.2.8 Residual Impacts

No residual impacts would occur. Weed management and site stabilization techniques (e.g., re-vegetation, soil stabilization, etc.) previously conducted at the existing Black Butte Mine, and assumed to be incorporated into WDEQ/LQD requirements for the Proposed Action would require immediate site stabilization and control and containment of noxious and invasive weed establishment on all disturbed areas.

4.11 WILDLIFE AND FISHERIES

4.11.1 Big Game

4.11.1.1 Regulatory Framework

Big game species are managed by the WGFD, and BLM manages and protects big game habitat on BLM-administered lands. In addition, the Green River RMP and ROD (BLM 1997) establishes goals and objectives for species habitat within the project area. The WDEQ/LQD mine permitting process requires that mine and reclamation plans be developed that identify protective measures to minimize impacts on wildlife resources, including big game species.

4.11.1.2 Analysis Assumptions and Assessment Areas

The direct, indirect and cumulative IAAs for big game include the following: the project area for direct impacts, the project area plus the Black Butte Mine for indirect impacts, and the entire individual herd unit areas for cumulative impacts.

The Green River RMP and ROD (BLM 1997) indicates that high value big game habitats (i.e., crucial winter range and calving areas) would be maintained or improved by reducing habitat loss and alteration, applying appropriate spatial and temporal buffers, and applying appropriate rehabilitation standards. In an effort to avoid impacts on big game species, disturbed areas would be reclaimed with perennial grass, forb, and shrub species conducive to big game and sagebrush-obligate species use. Big game monitoring could also be utilized during implementation of the Proposed Action to further define potential areas of concern and identify any future mitigation needs.

4.11.1.3 Direct and Indirect Impacts of the Proposed Action

Approximately 4,359 acres of pronghorn winter/yearlong habitat are found within the direct IAA. Approximately 5,332 acres of pronghorn winter yearlong and crucial winter/yearlong habitat (including approximately 4,359 within the project area and 973 acres within the Black Butte Mine permit area) are found within the indirect IAA.

Approximately 3,256 acres of mule deer winter/yearlong and 1,103 acres of mule deer crucial winter/yearlong habitat are found within the direct IAA. Approximately 41,309 acres of mule deer winter yearlong and 1,103 acres of mule deer crucial winter/yearlong habitat are found within the indirect IAA.

Approximately 4,359 acres of elk undetermined habitat are found within the direct IAA. Approximately 42,412 acres of elk undetermined habitat are found within the indirect IAA.

Direct impacts on big game species would include loss of habitat and forage resources, and displacement to nearby suitable habitat. Increased stress and competition for remaining resources could cause reduced reproduction rates and a decline in physical condition. Direct impacts on big game species could also include the loss of life from animal/vehicle collisions, harassment (intentional or unintentional), an increased likelihood of poaching, and hunting. Increased susceptibility to hunting could also result as individuals are displaced from secure habitats into less secure habitats, and as densities of animals on available habitats increase. However, BBCC would restrict access to the project area for hunting and recreational use. Accordingly, non-disturbed land within the project area could serve as a refuge from hunting pressure in adjoining areas if the animals acclimate to nearby mining activities. Mule deer have been especially successful at utilizing developed areas with ongoing noise or disturbance.

Direct impacts from surface disturbance would leave 2,250 acres unavailable for use by wildlife during the life-of-operations (i.e., 20 years), and would include loss or modification of range sites. However, because reclamation would occur gradually over the short term, and vegetation production could become established within approximately three to five years following reclamation, some disturbed areas could become available for use by wildlife during the life-of-operations.

Following the life-of-operations, direct impacts associated with the Proposed Action would cease, and remaining areas of disturbance would be reclaimed.

Indirect impacts could include loss or modification of existing habitat (e.g., changes in species composition, distribution, and density, and loss of escape cover), forage losses from invasive weed establishment, changes in land use (e.g., grazing and wildlife use), or an increase in surface disturbing activities such as mining and reclamation.

Although the use of reclaimed areas by wildlife could impede reclamation success, it is anticipated that, in the long term, reclaimed lands would meet or exceed pre-mining levels of species production, diversity, and use. An emphasis on vegetation compositions that favor sagebrush would benefit sagebrush-obligate native species in the long term.

4.11.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Impacts on big game species would continue following existing trends associated with current hunting regulations and herd management goals. Continuing impacts resulting from displacement, habitat loss and forage availability would be minor to moderate and short term to long term within the Black Butte Mine area.

4.11.1.5 Cumulative Impacts

The cumulative IAAs for pronghorn, mule deer, and elk include the Bitter Creek, South Rock Springs, and Petition Herd Units, respectively. **Table 4.11** presents IAA and disturbance acreages associated with big game species.

Approximately 35,083 acres (2.19 percent of the IAA) of existing, 2,250 acres (0.14 percent) associated with the Proposed Action, and 17,552 acres (1.09 percent) of foreseeable future action surface disturbances would occur within the 1,603,167 acre pronghorn cumulative IAA. The total surface disturbance in the pronghorn cumulative IAA would be 54,885 acres or 3.42 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 56.44 percent increase in surface disturbance in the cumulative IAA. Impacts on pronghorn within the project area would contribute minimally to cumulative impacts on pronghorn throughout the Bitter Creek Herd Unit.

Approximately 14,108 acres (1.24 percent of the IAA) of existing, 2,250 acres (0.2 percent) associated with the Proposed Action, and 19,077 acres (1.68 percent) of foreseeable future action surface disturbances would occur within the 1,134,282 acre mule deer cumulative IAA. The total surface disturbance in the mule deer cumulative IAA would be 35,435 acres or 3.12 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 151.17 percent increase in surface disturbance in the cumulative IAA. Impacts on mule deer within the project area would contribute minimally to cumulative impacts on mule deer throughout the South Rock Springs Herd Unit.

Approximately 18,574 acres (1.28 percent of the IAA) of existing, 2,250 acres (0.15 percent) associated with the Proposed Action, and 7,754 acres (0.53 percent) of foreseeable future action surface disturbances would occur within the 1,453,728 acre elk cumulative IAA. The total surface disturbance in the elk cumulative IAA would be 28,578 acres or 1.97 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 53.86 percent increase in surface disturbance in the cumulative IAA. Impacts on elk within the project area would contribute minimally to cumulative impacts on elk throughout the Petition Herd Unit.

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Impacts within the cumulative IAA on big game species would continue following existing trends associated with current hunting regulations and herd management goals. Continuing impacts resulting from displacement, habitat loss and forage availability would be minor to moderate and short term to long term within the cumulative IAA.

4.11.1.6 Irreversible and Irretrievable Commitment of Resources

Because of proposed reclamation activities within the project area, and anticipated re-establishment of current land uses, there would be no irreversible commitment of big game resources. There would exist, however, an irretrievable commitment of resources during the life-of-project (40 years) and until habitat restoration is completed. Because sagebrush ecosystems are typically slow to re-establish, there would exist an irretrievable commitment of sagebrush habitat until areas are completely reclaimed.

4.11.1.7 Potential Mitigation and Monitoring Measures

Mitigation and monitoring beyond those inherent in the Proposed Action have not been identified.

4.11.1.8 Residual Impacts

Although the project area would be reclaimed to near original conditions, there would be some residual wildlife impacts. Alteration of pre-mine topography and the long period to re-establish post-mine vegetation communities may result in a decrease of habitat diversity and alteration of wildlife use.

Likewise, the reclaimed post-mine landscape may result in an increase of habitat diversity and abundance of suitable wildlife forage.

4.11.2 Raptors

4.11.2.1 Regulatory Framework

Raptor nests are afforded legal protection under the following laws: the federal Migratory Bird Treaty Act of 1918, Eagle Protection Act of 1962 (as amended), ESA of 1973 (as amended), and U.S. Fish and Wildlife Coordination Act. In addition, the Wyoming BLM has identified spatial and temporal buffers (as described in the raptor subsection of Chapter 3) for raptor nest protection.

Many raptors are migratory, some are considered Migratory Birds of High Federal Interest, and some are special status species. Migratory birds are protected by the Migratory Bird Treaty Act of 1918, and special status species are protected by either the ESA of 1973 (as amended) under the jurisdiction of the USWFS, or by the BLM through direction contained in the BLM Manual 6840.

The WDEQ/LQD permitting process would require raptor protection and a mitigation plan as part of the mine plan.

4.11.2.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for raptor species include: the direct IAA includes active nest sites within the project area plus a one-mile buffer; the indirect IAA includes nest sites within the project area and the existing Black Butte Mine, plus a one-mile buffer; and the cumulative IAA comprises the project area, the existing Black Butte Mine, and a two-mile buffer (**Figure 3.15**).

In an effort to avoid impacts on raptor species, BBCC would provide ongoing monitoring of nests, active territories, and prey base. During the life-of-operations, raptors would be protected by BLM-developed spatial buffers designed to protect nesting raptors nesting periods. For the ferruginous hawk, the buffer is one mile; for all other raptors, the buffer is 0.5 mile (Dunder 2005a).

When disturbance would occur outside of the nesting period, a No Surface Occupancy stipulation would be specified to include avoidance of areas within 1,313 feet for the ferruginous hawk nests and 815 feet for all other raptor nests (Dunder 2005a). Raptors are also protected by laws listed in Chapters 2 and 3 of this EIS.

4.11.2.3 Direct and Indirect Impacts of the Proposed Action

Fourteen active raptor nests are found within the direct IAA, and include: four golden eagle nests, three prairie falcon nests, three red-tailed hawk nests, two great horned owl nests, and two American kestrel nests. All active raptor nests are located outside of the project area, and 11 are located west of the project area and separated from it by a ridgeline and cliff. A spatial buffer of 0.5 mile for one of the American kestrel nests intercepts one of the proposed topsoil stockpiles, and the edge of the Pit 14 buffer; no other spatial buffers intercept a component of the Proposed Action. Because these 11 nests are geographically separated from the project area, there would likely be no direct impacts on them.

Three nests are located east of the project area within the indirect IAA, including two golden eagle nests and one prairie falcon nest. The spatial buffers of 0.5 mile for one golden eagle nest and the prairie falcon nest intercept the project area, but do not intercept a component of the Proposed Action (e.g., a stockpile, road, the pit, etc.). Because there are no geographical features separating these nests from the project area, it would be possible for them to incur line-of-sight impacts. Direct impacts on breeding raptors could include temporary or permanent displacement or nest abandonment from construction or operations noise

and activity; increased predation of eggs or young; loss of brood (i.e., egg or young); destruction or alteration of nesting or roosting habitat; and/or destruction or alteration of foraging habitat or resources.

Indirect impacts on raptors could include a decrease in available prey, such as small mammals that rely upon sagebrush habitats, and subsequent displacement, nest abandonment, or otherwise failed breeding attempts.

4.11.2.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Minor and moderate impacts on raptors would continue following existing trends associated with climatic changes, prey abundance, and current monitoring and management.

4.11.2.5 Cumulative Impacts

Approximately 9,812 acres (9.10 percent of the IAA) of existing, 2,250 acres (2.09 percent) associated with the Proposed Action, and 4,411acres (4.09 percent) of foreseeable future action surface disturbances would occur within the 107,860 acre raptor cumulative IAA. The total surface disturbance in the raptor cumulative IAA would be 16,473 acres or 15.27 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 67.89 percent increase in surface disturbance in the cumulative IAA. Because the 2,250 acres of disturbance that would occur under the Proposed Action would be subject to the raptor protection and mitigation measures already in place for the existing Black Butte Mine (BBCC 2004c), the Proposed Action would likely contribute minimally to cumulative impacts on raptors throughout the assessment area.

4.11.2.6 Irreversible and Irretrievable Commitment of Resources

Because of proposed reclamation activities within the project area, and anticipated re-establishment of current land uses, there would be no irreversible commitment of raptor resources. There would exist, however, an irretrievable commitment of resources during the life-of-operations and until habitat restoration could be completed. Because sagebrush ecosystems are typically slow to re-establish, there would exist an irretrievable commitment of sagebrush resources.

4.11.2.7 Potential Mitigation and Monitoring Measures

A raptor protection and mitigation plan has been developed for existing operations at the Black Butte Mine. If the project were approved, this plan would be expanded to include the new project area. As such, it is considered part of the Proposed Action. Mitigation measures beyond those inherent to the Proposed Action were not identified.

4.11.2.8 Residual Impacts

Although the project area would be reclaimed to near original conditions, there would be some residual raptor impacts. Alteration of pre-mine topography and the long period to re-establish post-mine vegetation communities may result in a decrease of habitat diversity and alteration of raptor use (e.g., nesting, roosting, and foraging). Likewise, the reclaimed post-mine landscape could benefit raptor use due to an increase of habitat diversity and an abundance of suitable small mammal habitat.

4.11.3 Special Status Wildlife and Fisheries Species

4.11.3.1 Regulatory Framework

Special status species are protected by either the ESA of 1973 (as amended) under the jurisdiction of the USWFS, or by the BLM through direction contained in BLM Manual 6840 and the goals, objectives, and techniques presented in the Green River RMP and ROD (BLM 1997). The Federal Migratory Bird treaty Act of 1918, Eagle Protection Act of 1962 (as amended), ESA of 1973 (as amended) for federally listed raptor species, and U.S. Fish and Wildlife Coordination Act also protect special status raptors and migratory birds. In addition, the WDEQ/LQD permitting process has requirements for protection of wildlife and fisheries, as well as their habitat.

Standards for water quality and quantity for the Colorado River are also required through the mine permitting process. The USFWS provides management guidance for endangered fish species that are found within the Upper Colorado River Basin, through a Recovery Implementation Program and an existing intra-service Biological Opinion. This management guidance for fish species subsequently provides management guidance for the basin.

4.11.3.2 Analysis Assumptions and Assessment Areas

The following BLM sensitive species have been carried forward for analysis: migratory birds (sage sparrow, Brewer's sparrow, loggerhead shrike, and sage thrasher), ferruginous hawk, greater sage-grouse, mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, swift fox, and fisheries. No ESA-related species have been carried forward for analysis. For additional discussion of impacts specific to raptors (including ferruginous hawk and burrowing owl), please see the raptor subsection of this chapter. Assessment areas and analysis assumptions for the BLM sensitive species analyzed in this section include:

Migratory Birds

The direct, indirect, and cumulative IAAs for the sage sparrow, Brewer's sparrow, loggerhead shrike, and sage thrasher include the project area.

As directed by the Green River RMP and ROD (BLM 1997), BLM sensitive species would be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss.

Ferruginous Hawk

The direct IAA for the ferruginous hawk includes nest sites within the project area plus a one-mile buffer, and the indirect IAA includes nest sites within the project area and existing Black Butte Mine, plus a one-mile buffer. The cumulative IAA for the ferruginous hawk comprises the project area and existing Black Butte Mine, plus a two-mile buffer. These IAA is the same as the raptor IAA.

The Green River RMP and ROD (BLM 1997) specifies that BLM sensitive species habitat will be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss. Additionally, a raptor protection and mitigation plan has been developed for existing operations and would include the project area as part of the mine permit for the Proposed Action.

In an effort to limit impacts on raptor species, BBCC would provide ongoing monitoring of nests, active territories, and prey base. During the life-of-operations, raptors would be protected by BLM-developed spatial buffers designed to protect nesting raptors during nest-building and incubation periods. For ferruginous hawks, the buffer is one mile; for all other raptors, the buffer is 0.5 mile (Dunder 2005a).

When disturbance would have potential to occur outside of the nest-building and incubation period, a No Surface Occupancy stipulation would be specified within 1,313 feet for the ferruginous hawk nest, 1,958 feet for golden eagle nests, and 815 feet for all other raptor nests (Dunder 2005a).

Greater Sage-Grouse

The direct IAA for the greater sage-grouse includes potentially suitable habitat within the project area, and the indirect IAA includes potentially suitable habitat within an 11-mile buffer surrounding the project area. The cumulative IAA for the greater sage-grouse comprises potentially suitable habitat within the following borders: Interstate 80 on the north, the Wyoming/Colorado state line on the south, the Baggs Road on the east, and Flaming Gorge Reservoir and the Green River on the west (**Figure 3.16**).

As directed by the Green River RMP and ROD (BLM 1997), BLM sensitive species habitat would be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss. Additionally, as directed by the Green River RMP, greater sage-grouse breeding and nesting areas would be generally protected, and aboveground facilities would be prohibited on or within ¼ mile of breeding grounds. Between approximately March 15 and July 15, from 6:00 pm to 9:00 am, disruptive activities would not be permitted in proximity to occupied breeding grounds. Seasonal restrictions between approximately March 1 and June 30 would prohibit disruptive activities within approximately two miles of greater sage-grouse nesting habitat.

In an effort to reduce impacts on the greater sage-grouse and its habitat, the following techniques could be implemented: re-establishment of shrubs on reclaimed lands, and grading of reclaimed lands to include swales and depressions. Monitoring of greater sage-grouse strutting grounds in the area before, during, and after mining would provide information on impacts of the project and success of reclamation. These and other measures would be further developed in the mine plan and WDEQ/LQD permit.

Mountain Plover, Burrowing Owl, Pygmy Rabbit, White-Tailed Prairie Dog, and Swift Fox

The direct, indirect, and cumulative IAAs for the mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, and swift fox include the project area.

As directed by the Green River RMP and ROD (BLM 1997), BLM sensitive species habitat would be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss.

Active burrowing owl nest sites would have a raptor protection buffer of 0.5 mile (Dunder 2005a). When disturbance could have potential to occur outside of the nest-building and incubation period, a No Surface Occupancy stipulation would be specified within 815 feet of burrowing owl nest sites (Dunder 2005a).

Fisheries

The direct IAA for fisheries includes the project area. The indirect IAA area includes the project area and existing Black Butte Mine. The cumulative IAA comprises the project area, existing Black Butte Mine, and the combined Black Butte Creek and Bitter Creek – Patrick Draw 5th order watersheds.

As directed by the Recovery Implementation Program, recovery activities would be implemented for projects resulting in water depletions to the Colorado River.

4.11.3.3 Direct and Indirect Impacts of the Proposed Action

The Proposed Action would result in the progressive, short-term removal of approximately 2,250 acres of sagebrush-steppe habitat within the project area, for the following developments: approximately 1,570

acres for Pit 14, approximately 101 acres for new haul-road development outside the pit, and approximately 579 acres for necessary facilities and temporary use areas (e.g., power lines, topsoil stockpiles, mine pit buffer, and retention ponds). These disturbances would be direct. In addition to direct impacts on approximately 2,250 acres of vegetation, direct or indirect impacts could occur within the remaining 2,109 acres of project area. In the long term, habitat within the project area would be restored.

Impacts on BLM sensitive species could include direct loss of habitat, mortality, temporary or permanent displacement, and restriction of movement (caused by fences, the pit, haul roads, reduced water flows, etc.). However, to the extent that suitable, unoccupied habitat is available adjacent to the project area, populations would remain relatively unaffected. If suitable, occupied habitat is available nearby, individuals would likely still be able to utilize the cover and forage resources therein, but could suffer from the effects of competition if the areas became overused by displaced individuals.

Sagebrush-steppe habitat provides 2,250 acres of foraging, nesting, and roosting habitat for migratory bird species, ferruginous hawks, and burrowing owls known to occur in the project areas. It is expected that the direct habitat loss available to these species would indirectly displace them into surrounding sagebrush habitats near the Proposed Action. Direct impacts on breeding birds could include temporary or permanent displacement or nest abandonment from construction or operations noise and activity; increased predation of eggs or young; loss of brood (i.e., egg or young); destruction or alteration of nesting or roosting habitat; and/or destruction or alteration of small mammal and other foraging habitat.

Indirect impacts on raptors could include a decrease in available prey, such as small mammals that rely upon sagebrush habitats, and subsequent displacement, nest abandonment, or otherwise failed breeding attempts. Due to the extent that suitable sagebrush-steppe habitat is available surrounding the project area and IAAs, direct and indirect impacts on these species would be negligible.

Direct mortality of small animals (i.e., white-tailed prairie dog and pygmy rabbit) would likely be greater than mortality of mid-sized and larger animals, because small animals often have limited mobility. However, these losses would likely be counteracted by the rapid reproductive rate of the smaller species, and the lighter demand on forage and cover resources. Smaller species would likely return to pre-mining levels more readily following reclamation than larger species.

Because spatial and temporal buffers have been developed to protect breeding grounds and nesting areas, the greater sage-grouse would likely not be impacted by the proposed project. There are six active leks within the area of indirect impact. Although a portion of the proposed pit and pit buffer would intercept a seasonal buffer for one of these leks, birds could utilize suitable, unoccupied nesting habitat in the surrounding areas.

Alterations in topography and distribution of species within range sites, particularly the sagebrush type, would decrease carrying capacity and wildlife species diversity until successfully reclaimed. Because the re-establishment of sagebrush occurs slowly, sagebrush-obligate BLM sensitive species (specifically the sage thrasher, greater sage-grouse and pygmy rabbit) could be unable to fully use this area until habitat is fully restored.

The USFWS's Biological Opinion for the Black Butte Mine Modification Project determined that annual water depletions would require payment (as described in the "Reasonable and Prudent Measures" section of the biological opinion) in order to offset effects of the project. Payment and modification of the biological opinion, as necessary, would be determined at the time of lease approval.

4.11.3.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current authorizations. Negligible to moderate and long term impacts on BLM sensitive wildlife species

and fisheries would continue following existing trends. Since minimal development currently exists within the project area, few impacts would result.

4.11.3.5 Cumulative Impacts

Surface disturbances in the special status animal species (sage sparrow, Brewer's sparrow, loggerhead shrike, sage thrasher, mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, and swift fox) cumulative IAA would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.26 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA. Impacts within the project area on these species would contribute noticeably to other impacts on these species and their habitat within the cumulative IAA.

Cumulative impacts if the No Action Alternative were implemented would represent continued negligible to minor impacts due to loss of habitat and displacement due to on-going and other proposed activities in the cumulative IAA. Impacts would likely impact, but are minor for Colorado River endemics in cumulative IAA. The USFWS has determined that any water withdrawl from the Colorado River system may constitute a may affect status and may jeopardize threatened and endangered endemics in this system.

Approximately 9,812 acres (9.10 percent of the IAA) of existing, 2,250 acres (2.09 percent) associated with the Proposed Action, and 4,411acres (4.09 percent) of foreseeable future action surface disturbances would occur within the 107,860 acre raptor (ferruginous hawk) cumulative IAA. The total surface disturbance in the raptor cumulative IAA would be 16,473 acres or 15.27 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 67.89 percent increase in surface disturbance in the cumulative IAA. Because the 2,250 acres of disturbance that would occur under the Proposed Action would be subject to the raptor protection and mitigation measures already in place for the existing Black Butte Mine (BBCC 2004c), the Proposed Action would likely contribute minimally to cumulative impacts on raptors throughout the assessment area.

Approximately 13,830 acres (1.94 percent of the IAA) of existing, 2,250 acres (0.32 percent) associated with the Proposed Action, and 4,205 acres (0.59 percent) of foreseeable future action surface disturbances would occur within the 711,526 acre greater sage grouse cumulative IAA. The total surface disturbance in the greater sage grouse cumulative IAA would be 20,285 acres or 2.85 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 46.67 percent increase in surface disturbance in the cumulative IAA. Impacts on the greater sage-grouse habitat within the project area would contribute minimally to the cumulative impacts on greater sage-grouse habitat throughout the assessment area.

Surface disturbances in the fisheries cumulative IAA would include 14,611 acres of existing disturbances (5.39 percent of the IAA), 2,250 acres associated with the Proposed Action (0.83 percent) and 4,624 acres of foreseeable future disturbances (1.71 percent), totaling 21,485 acres or 7.92 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 47.05 percent increase in surface disturbance in the fisheries cumulative IAA.

Approximately 160 acre-feet of water are depleted annually from surface water sources (by mining) within the fisheries cumulative IAA (comprising approximately 271,169 acres of land). Approximately, an additional 17 acre-feet would be depleted annually from the assessment area if the Proposed Action were implemented. This would increase the total depletion by approximately 11 percent to approximately 177 acre-feet annually. Regardless of size, any water depletions are considered to be detrimental to the four endangered Colorado River fishes and, as such, are likely to contribute to adverse effects upon them.

4.11.3.6 Irreversible and Irretrievable Commitment of Resources

Because of proposed reclamation activities, and anticipated re-establishment of current land uses, there would be no irreversible commitment of special status species resources after the project area is reclaimed. There would exist, however, an irretrievable commitment of resources during the life-of-operations and until habitat restoration could be completed, particularly for sagebrush-obligate species (such as the sage thrasher, greater sage-grouse and pygmy rabbit). Because sagebrush ecosystems are typically slow to re-establish, there would exist an irretrievable commitment of sagebrush resources.

4.11.3.7 Potential Mitigation and Monitoring Measures

Current and proposed wildlife monitoring and vegetation success monitoring for re-establishment of a sagebrush steppe community have, and would be developed under the Proposed Action to address the impact of mining and post-mine land use needs. Monitoring for migratory birds and migratory birds of high federal interest, raptors, and greater sage-grouse is currently on-going through the WDEQ/LQD permitting process for the existing Black Butte Mine and within the project area. BBCC would develop a reclamation plan as required by the WDEQ/LQD that would identify native vegetation to establish a sagebrush-steppe habitat, including appropriate seed mixes, application and planting methods, monitoring schedules and success standards based on the evaluation of the current vegetation cover. Interim (during mining operations) and final reclamation (upon cessation of operations) monitoring of all disturbances would be conducted through the 40-year life of the project to monitor and measure re-vegetation success objective to meet post-mine land use goals. Mitigation and monitoring measures beyond those inherent to the Proposed Action were not identified.

4.11.3.8 Residual Impacts

Although the project area would be reclaimed to near original conditions, there would be some residual impacts on special status species. Alteration of pre-mine topography and the long period to re-establish post-mine vegetation communities may result in a decrease of habitat diversity and alteration and elimination of wildlife use dependent upon key components of the sagebrush-steppe. Likewise, the reclaimed post-mine landscape may result in an increase of habitat diversity and abundance of suitable wildlife forage that may benefit raptor species (ferruginous hawk and burrowing owls).

4.12 WILD HORSES

4.12.1 Regulatory Framework

Wild horses and their habitat are managed by the BLM through objectives presented in the Green River RMP (BLM 1997), and are protected by the Wild Free-Roaming Horse and Burro Act of 1971.

4.12.2 Analysis Assumptions and Assessment Areas

The direct, indirect and cumulative IAAs for wild horses include the following: the project area for the direct IAA, the project area plus the Black Butte Mine for indirect IAA, and the Salt Wells Creek HMA for the cumulative IAA.

As directed by the Green River RMP (BLM 1997), wild horses would be managed at an appropriate management level with a site-specific activity plan that outlines RMP conformance objectives for vegetation management. Other resource uses within the HMA would be maintained and protected as long as they are not in conflict with the maintenance of viable wild horse herds at appropriate herd management levels (BLM 1997).

4.12.3 Direct and Indirect Impacts of the Proposed Action

Approximately 2,250 acres directly impacted by the Proposed Action would be disturbed in the short term, and forage production in this area would be lost for approximately 20 years during the life-of-operations. This loss of forage would displace individual wild horses to nearby suitable habitat. Because necessary resources for wild horses would be available adjacent to the project area, impacts on wild horse populations from displacement would be negligible. Additionally, because no range improvements or important water sources for wild horses exist within the project area, the Proposed Action would not impact them.

4.12.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Minor and short term impacts on wild horses would continue following existing trends, which would generally include the protection and maintenance of viable herds and appropriate herd management levels.

4.12.5 Cumulative Impacts

Surface disturbances in the wild horses cumulative IAA would include 21,014 acres of existing disturbances (1.79 percent of the IAA), 2,250 acres associated with the Proposed Action (0.19 percent) and 23,202 acres of foreseeable future disturbances (1.98 percent), totaling 46,466 acres, or 3.97 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 121.12 percent increase in surface disturbance in the wild horses cumulative IAA. Impacts on wild horses within the project area would contribute minimally to cumulative impacts on wild horses throughout the Salt Wells Creek HMA.

Within the cumulative IAA, minor and short term impacts from the No Action alternative would continue following existing trends. This would generally include the protection and maintenance of viable herds and appropriate herd management levels.

4.12.6 Irreversible and Irretrievable Commitment of Resources

Because reclamation activities would be implemented, and re-establishment of current land uses would be anticipated, there would be no irreversible commitment of resources for wild horses. There would exist, however, an irretrievable commitment of forage resources during the life-of-operations and until habitat restoration is complete.

4.12.7 Potential Mitigation and Monitoring Measures

Mitigation and monitoring measures have not been identified.

4.12.8 Residual Impacts

No residual impacts would occur.

4.13 LAND USE

4.13.1 Land Status and Prior Rights

4.13.1.1 Regulatory Framework

The Green River RMP and ROD (BLM 1997) allows for coal leasing and development, other mineral leasing and locating, ROW and grazing permitting, recreational use, and provides land use guidance for those land uses within planning area.

4.13.1.2 Analysis Assumptions and Assessment Areas

The land status and prior rights direct, indirect, and cumulative IAAs are the project area. During construction and operation of the mine, the project area would be closed to recreation and grazing.

4.13.1.3 Direct and Indirect Impacts of the Proposed Action

In the short term, surface coal mining would restrict livestock grazing and reduce wildlife habitat, restrict public access and associated recreational use, and disrupt oil and gas development in the project area. There are no developed recreation areas or wilderness areas in the immediate vicinity of the existing Black Butte Mine or the project area.

In the long term, the surface and vegetation in the project area would be reclaimed and the land would be returned to a condition similar to its original status. The land would again be open to grazing, hunting, and other recreational opportunities. The land would also be available for oil or gas development. The land would be returned to BLM management for multiple use after the mine has received bond release. Private land would remain private.

4.13.1.4 Direct and Indirect Impacts of the No Action Alternative

If the No Action Alternative is selected, land status and prior rights to the project area would remain unchanged. The coal tract would not be developed. Impacts would continue to be moderate to substantial and short term to long term on the adjacent Black Butte Mine area.

4.13.1.5 Cumulative Impacts

There are no known past, present, or reasonably foreseeable projects that would change the land tenure in the project area. The land status and prior rights held by any party would remain unchanged. However, land use within the project area would be restricted. The mine would lease the federal surface and mineral estates from the BLM until the coal has been mined and the area has been reclaimed and released from bond.

Surface disturbances in the cumulative IAA would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.26 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA.

4.13.1.6 Irreversible and Irretrievable Commitment of Resources

The loss of the coal in the project area would be irreversible. Measures would be implemented to return the area to a natural state when coal mining is complete, making the loss of opportunities for other land uses irretrievable, but not irreversible. The land status and prior rights to the land would remain unchanged during the life of the project.

4.13.1.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures are proposed beyond those inherent in the Proposed Action.

4.13.1.8 Residual Impacts

No residual impacts are anticipated.

4.13.2 Livestock and Grazing Management

4.13.2.1 Regulatory Framework

The Taylor Grazing Act of 1934, FLPMA of 1976, Public Rangelands Improvement Act of 1978, CFR, Subchapter D - Range Management (4000), 43 CFR 4000, and the Green River RMP and ROD (BLM 1997) contain the federal regulatory framework for grazing on lands administered by the BLM. The permit application package submitted to OSM and WDEQ/LQD would require reclamation, including revegetation of the coal mine.

4.13.2.2 Analysis Assumptions and Assessment Areas

The direct IAA for livestock grazing is the project area. The indirect IAA includes the project area and the existing Black Butte Mine permit area. The cumulative IAA includes the portion of the Rock Springs Allotment south of Interstate 80 and east of the Flaming Gorge Natural Recreation Area. It is assumed that the entire project area would be restricted from grazing when the mine starts operating in the area.

4.13.2.3 Direct and Indirect Impacts of the Proposed Action

Development of the project area would directly remove up to 4,359 acres of land from grazing use in the short term. Allocations of allotment use would have to be restructured by the BLM to accommodate the loss of forage and access available to grazing permittees. Approximately 221 AUMs would be lost as a direct result of leasing and subsequent mine expansion. Surface disturbance would alter approximately 2,250 acres of the project area's long-term forage productivity and diversity. The effects of mining in the project area would be most notable to those permittees who use forage production within the project area on an annual basis.

The project area provides approximately less than one percent (0.43 percent) of the total AUMs available in the indirect impact area portion of the Rock Springs Grazing Allotment South of Interstate 80. As portions of the adjoining Black Butte Mine are reclaimed and made available to grazing, the indirect impact of the loss of grazing in the project area would be reduced. There would be no additional loss of grazing area within the Black Butte Mine as a result of developing the project area.

4.13.2.4 Direct and Indirect Impacts of the No Action Alternative

The No Action Alternative would maintain the current situation for grazing. Forage production and diversity would remain the same and permittee access to the project area would continue. Impacts would continue to be moderate to substantial and short term on the adjacent Black Butte Mine area.

4.13.2.5 Cumulative Impacts

Surface disturbances in the livestock and grazing management cumulative IAA would include 17,964 acres of existing disturbances (1.78 percent of the IAA), 2,250 acres associated with the Proposed Action (0.22 percent) and 10,002 acres of foreseeable future disturbances (0.99 percent), totaling 30,216 acres or 2.99 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 68.20 percent increase in surface disturbance in the livestock and grazing management cumulative IAA.

Under the No Action Alternative 2.7 percent of allotment use and associated forage would not be available in the cumulative IAA. However, in both the No Action Alternative and the Proposed Action, reclamation and revegetation of surface disturbed sites will make many of these acres available for grazing in the short and long term. Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA.

4.13.2.6 Irreversible and Irretrievable Commitment of Resources

No irreversible commitment of resources anticipated in the project area. However, there would be an irretrievable commitment of resources during the short to long term. The project area would be closed to grazing until reclamation revegetation is established to a level where grazing would not interfere with reclamation success.

4.13.2.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures have been identified beyond those inherent to the Proposed Action.

4.13.2.8 Residual Impacts

No residual impacts would be present.

4.13.3 Recreation

4.13.3.1 Regulatory Framework

BLM-administered public lands in the IAAs are managed for dispersed recreation. Goals and objectives for recreation are discussed in the Green River RMP and ROD (BLM 1997). WGFD sets hunting seasons and other regulations for hunting. Other recreational activities are guided by the Wyoming Statewide Comprehensive Outdoor Recreation Plan (Wyoming Division of State Parks and Historic Sites 2003).

4.13.3.2 Analysis Assumptions and Assessment Areas

The direct IAA for recreation is the project area, while the indirect IAA is the project area and Black Butte Mine. The cumulative IAA includes the project area, Black Butte Mine, and Southern Sweetwater County south of Interstate 80.

4.13.3.3 Direct and Indirect Impacts of the Proposed Action

Due to safety concerns, the project area (4,359 acres) would be closed to the public, precluding recreational use. The restrictions would prohibit hunting, OHV use, camping, mountain biking, and hiking.

Indirect short-term effects from the Proposed Action to hunting could include displacement of big game, such as pronghorn, from the project area due to noise and habitat loss. Recreationists, including birders and nature photographers would find the visual quality of the outdoor experience diminished in the short term in areas with a view of the project area.

Upon project completion, the project area would be reopened to recreationists. Access for hunting, OHV use, camping, hiking, and mountain biking would be permitted in accordance with the applicable land use designations. Visual resource dependent recreation opportunities would be restored. BBCC would complete a site-specific, detailed reclamation plan in consultation with the WDEQ/LQD. One of the direct results of the reclamation would be restoration of native plant communities that support wildlife forage, nesting, cover, and the associated reestablishment of wildlife use for hunting opportunities.

4.13.3.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, there would be no direct loss of recreation areas within the project area. Hunters would not experience a disruption of large game behavior from additional mining activities, and access routes would remain unchanged. There would be no change in the visual quality of the outdoor experience. There would be no direct or indirect effects related to mining. Ongoing impacts in the adjacent Black Butte Mine area would be continue to be moderate and short term due to existing mining and other operations.

4.13.3.5 Cumulative Impacts

Surface disturbances in the recreation cumulative IAA would include 18,329 acres of existing disturbances (1.17 percent of the IAA), 2,250 acres associated with the Proposed Action (0.14 percent) and 23,379 acres of foreseeable future disturbances (1.49 percent), totaling 43,958 acres or 2.79 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 139.83 percent increase in surface disturbance in the recreation cumulative IAA.

Surface disturbing impacts would continue to displace big game species of interest to hunters. Some of these disturbances would increase motorized access to areas on roads developed for the project and others would restrict motorized and non-motorized access utilized by recreationists. The Proposed Action would not contribute to impacts on developed recreational facilities in the area. Dispersed recreation such as hunting and OHV use would still occur, but would be more concentrated on non-restricted areas.

Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA.

4.13.3.6 Irreversible and Irretrievable Commitment of Resources

There is no identified irreversible commitment of recreation resources. However, the project area would be closed to recreation during operation of the mine, which would lead to an irretrievable loss of recreation opportunities. The project area would be reopened for recreation following reclamation activities.

4.13.3.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures have been identified beyond those in the Proposed Action.

4.13.3.8 Residual Impacts

No residual impacts would occur.

4.13.4 Transportation and ROWs

4.13.4.1 Regulatory Framework

The Green River RMP and ROD have a goal to make public lands available throughout the planning area for ROWs permits and leases for utility and transportation systems (BLM 1997).

4.13.4.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for transportation and ROWs are the project area.

4.13.4.3 Direct and Indirect Impacts of the Proposed Action

Approximately three miles of undesignated two-track road would be disturbed and inaccessible to the public in the project area. The undesignated two-track road bordering the eastern boundary of the project area could experience temporary visibility impacts during high wind and dry conditions.

4.13.4.4 Direct and Indirect Impacts of the No Action Alternative

If the No Action Alternative were selected then the existing two-track roads would remain unchanged. No new roads or ROWs would be constructed because the project area would remain undeveloped. Impacts would continue to be minor and short term from mining operations within the adjacent Black Butte Mine area.

4.13.4.5 Cumulative Impacts

Surface disturbances in the cumulative IAA would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.26 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA. Minor erosion associated with two-track roads and OHV use would continue. The existing two-track roads in the project area would remain accessible with no change.

4.13.4.6 Irreversible and Irretrievable Commitment of Resources

An irretrievable and potentially irreversible commitment of resources, due to the loss of the two-track roads in the project area, would occur. An irreversible commitment of resources would occur if new two-track roads are not reconstructed.

4.13.4.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures have been identified beyond those inherent to the Proposed Action.

4.13.4.8 Residual Impacts

No residual impacts would occur.

4.14 VISUAL RESOURCES

4.14.1.1 Regulatory Framework

The Green River RMP and ROD have a goal to preserve the visual characteristics of or mitigate impacts on those characteristics throughout the planning area (BLM 1997). WDEQ/LQD permit requirements mandate that the topographic expression of a surface coal mine be reclaimed to a condition similar to pre-mining conditions.

4.14.1.2 Analysis Assumptions and Assessment Areas

The direct IAA for visual resource issues would be the project area. The indirect IAA is the project area and the Black Butte Mine permit area. The cumulative IAA for visual resources encompasses the checkerboard lands south of Interstate 80, and within the RSFO.

4.14.1.3 Direct and Indirect Impacts of the Proposed Action

The project area's Class IV VRM classification allows for disturbance such as mining to occur. Alterations to line, form, character, and texture would occur in the direct and indirect impact areas in the short term. The mining of Pit 14 would not be visible from any major travel routes. Portions of the project area and ancillary facilities in the Black Butte Mine would be highly visible from the Black Butte Mine Road and the two-track road that borders the eastern boundary of the project area during the short term.

In the long term as the land is reclaimed, the surface disturbance from mining would be recontoured with re-creations of existing landforms occurring where practical. Revegetation of land surfaces would buffer visual impact; however, until vegetation has matured, the lack of sagebrush would differentiate reclaimed areas from undisturbed areas. When the shrub component of revegetation matures (20 plus years) it would be difficult to distinguish reclaimed areas from undisturbed areas.

4.14.1.4 Direct and Indirect Impacts of the No Action Alternative

No impacts on line, form, character, or texture would occur in the project area under the No Action Alternative. Impacts to visual resource would continue to be moderate and short term on the adjacent Black Butte Mine area during mining. Impacts would be minor and permanent following reclamation.

4.14.1.5 Cumulative Impacts

Surface disturbances in the visual resource cumulative IAA would include 17,570 acres of existing disturbances (2.52 percent of the IAA), 2,250 acres associated with the Proposed Action (0.32 percent) and 10,002 acres of foreseeable future disturbances (1.43 percent), totaling 29,882 acres or 4.27 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 69.73 percent increase in surface disturbance in the visual resource cumulative IAA. Cumulative impacts to Class IV VRM areas would be minor.

Under the No Action Alternative 3.9 percent of the cumulative IAA would contain visible surface disturbances. Cumulative impacts following reclamation would be moderate and permanent in the cumulative IAA.

4.14.1.6 Irreversible and Irretrievable Commitment of Resources

Most visual impacts are irretrievable. Topographic modification of the project area would be an irreversible commitment of resources.

4.14.1.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures have been identified beyond those inherent to the Proposed Action.

4.14.1.8 Residual Impacts

A permanent moderation in line and form would occur following reclamation.

4.15 CULTURAL RESOURCES

4.15.1.1 Regulatory Framework

Cultural sites that are listed or eligible for listing in the NRHP would be managed under the guidelines of the National Historic Preservation Act (especially sections 106 and 110) and the Archeological Resources Protection Act. The Green River RMP and ROD (BLM 1997) sets goals and objectives for cultural resources in the planning area.

According to the Green River RMP:

In general, cultural sites on federal coal lands are avoidance areas for surface disturbing activities. As avoidance areas, cultural sites are open to consideration for coal leasing and development with appropriate measures to protect these resources (BLM 1997).

The following is a list of other rules and regulations that govern cultural resources:

- Wyoming Environmental Quality Act
- LQD Rules and Regulations; Coal Chapters II and IV
- The Antiquities Act of 1906
- The Historic Sites Act of 1935
- The Historic Preservation Act of 1966, as amended
- NEPA of 1969
- Executive Order 11593
- Procedures for the Protection of Historic and Cultural Properties of 1974
- Archeological Conservation Act of 1974
- SMCRA of 1977
- Archeological Resources Protection Act of 1979

4.15.1.2 Analysis Assumptions and Assessment Areas

The direct IAA for cultural resources includes portions of the project area that would be subject to ground disturbance. The indirect IAA includes the entire project area and the Black Butte Mine. The cumulative

IAA includes the portion of the east flank of the Rock Springs Uplift overlapping the Black Butte, Leucite Hills, and Bridger Coal mines.

4.15.1.3 Direct and Indirect Impacts of the Proposed Action

Direct impacts would primarily result from construction-related activities and would be considered substantial if lost information impeded efforts to reconstruct the prehistory or history of a region. A data recovery program has identified sites, including NRHP eligible, in the project area and recordation of attributes associated with those sites has occurred. Six sites have been excavated and removed. Based on this, the likelihood of cultural resources existing that have not been identified is low. A negligible impact on the future ability to reconstruct the prehistory and history within the project area would occur. Sites located within the pit area (the actual pit disturbance limit) would be destroyed during the implementation of activities related to open pit coal mining. Impacts on NRHP sites from other types of disturbances would be minor to moderate due to the implementation of avoidance measures when possible. No Native American Sensitive Sites were identified within the project area and based on this no impact would occur.

Indirect impacts include permanent the loss over a larger area of NRHP eligible sites in surface disturbances. These impacts may result in the future inability to revisit and analyze sites in the context of their aerial relationships. Indirect impacts on prehistoric and historic sites could result from unauthorized surface collecting of artifacts unrelated to the Proposed Action.

4.15.1.4 Direct and Indirect Impacts of the No Action Alternative

The No Action Alternative would not affect or increase the potential for impacts on cultural resources in the project area. Impacts would continue to be moderate and long term to permanent within the adjacent Black Butte Mine area.

4.15.1.5 Cumulative Impacts

Surface disturbances in the cumulative IAA would include 21,931 acres of existing disturbances (7.91 percent of the IAA), 2,250 acres associated with the Proposed Action (0.81 percent) and 4,411 acres of foreseeable future disturbances (1.59 percent), totaling 28,592 acres or 10.32 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 30.37 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 9.5 percent of the cumulative IAA would have surface disturbances. Impacts would be moderate and permanent in the cumulative IAA for known sites.

These surface disturbances would result in the loss of unidentified sites or artifacts that could otherwise add to the cultural information base. The likelihood of this is greatest on those private lands where cultural surveys are not performed prior to development. In these areas the loss or damage to unidentified cultural or historical sites or resources could be substantial. Such losses are not expected to increase in the cumulative IAA, due to the addition of the project area, since a Class III inventory and evaluative testing program has been completed.

4.15.1.6 Irreversible and Irretrievable Commitment of Resources

The project area and the actual pit disturbance area have already been field evaluated and six sites have been excavated and removed. The removal of the physical presence of these sites is an irreversible impact. However, data from these sites has been recovered. Additional sites that are located in areas that would experience surface disturbances would experience an irreversible commitment of resources.

4.15.1.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures have been identified beyond those inherent to the Proposed Action.

4.15.1.8 Residual Impacts

No residual impacts are expected.

4.16 SOCIAL AND ECONOMIC VALUES

4.16.1.1 Regulatory Framework

The Green River RMP and ROD (BLM 1997) provides goals and objectives for social and economic resources in the project area. The decisions contained in the Green River ROD guides the development of resources and resource uses that indirectly impact social and economic conditions in the planning area.

4.16.1.2 Analysis Assumptions and Assessment Areas

The IAAs for direct, indirect, and cumulative impacts are the same and are Sweetwater County. Most of the workforce for the project would be from existing mine-related workforces in Sweetwater County and at the existing Black Butte Mine in particular.

4.16.1.3 Direct and Indirect Impacts of the Proposed Action

During the operational phases of the project, economic impacts would include continued employment in the mining industry and secondary jobs in retail and service sectors. Property taxes and net proceeds of the mining taxes, as well as sales taxes would be paid to Sweetwater County. Continued mine employment would affect quality-of-life for workers and their families by providing income both directly to mine employees and indirectly to employees and owners of businesses providing personal and business support services. The State of Wyoming and the federal government would receive revenue resulting from continued mining.

BBCC employs approximately 170 people in Sweetwater County and would continue employment of approximately the same number of people. Most of the work force for the project would be from existing mine-related work forces in Sweetwater County. The Proposed Action could provide for stable employment levels for approximately 20 more years. Since it is expected that few new employees from outside the area would be needed, in migration due to the Proposed Action is anticipated to be negligible. No net change in Sweetwater County's socioeconomic resource base of employment, salary, and others is expected.

In 2004, the average annual wage for coal miners in Wyoming (not including benefits) was approximately $64,000. As a result, the continued employment of the 170 BBCC employees would generate 10.9 million in total annual wages. Assuming a 3.0 multiplier (secondary employment to primary employment), it is estimated that approximately 510 jobs (full-time equivalents) would potentially remain in the area of secondary employment associated with the mine. These jobs would be in the areas of wholesale and retail trade, local government, services, and other business and would have an estimated average annual wage of between $16,000 and $30,000 (BLM 2004).

The total estimated revenue at current market prices for in-place minable coal reserves ($13.50 per ton for 8,800 btu per pound coal to $34.35 per ton for 11,100 btu per pound coal) at the Black Butte Mine, Leucite Hills Mine, and Bridger Coal Mine, is between $1.7 and $4.5 billion. If the Proposed Action was

approved, the in-place minable reserves would increase this revenue an additional $467 million to $1.2 billion, or 26 percent increase over the life of the mine.

Approximately 34.6 million tons of in-place minable coal would be removed from the project area. Approximately 25 percent of revenues from the sale of coal would go to pay royalty, severance and ad valorem taxes. The resultant royalty and tax payments from revenues of coal sales would be between $116 and $300 million.

The majority of the remaining mine revenues would go to direct expenses associated with labor, equipment, maintenance, fuel, coal transportation, permitting, reclamation, sales and use taxes, lease bonus payment to the federal government, and property taxes. The remainder from this would be recognized as profit. Indirectly the operational and tax payments would benefit to local and national businesses supporting the coal mine and governmental programs. These economic impacts would be present in the short term and to a lesser extent into the long term during reclamation activities.

The initial construction and operation of the mine is planned to be completed with Black Butte Mine's existing workforce. Therefore, no additive effects on housing and support services would occur from the Proposed Action.

Jim Bridger Power Plant would have a continuation of locally produced and inexpensive supply of coal of known quality available for purchase. This coal supply would stabilize electricity production costs.

4.16.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, future contributions to state and local tax districts from ad valorem property and production taxes, abandoned mine land distributions, severance tax, sales tax, rents, and royalties, etc. would not occur that would otherwise be realized under the Proposed Action Alternative. This would amount to unrealized revenue emanating from the estimated $10.9 million a year in personal income and the $467 million and $1.2 billion in total coal sales revenue. Employment beyond 2008 for the majority of the 171 individuals working at the Black Butte Mine would end. This would eliminate an income source for mine employees and support service employees.

A reduction in the demand for community support services and housing would occur. This would result in the re-evaluation of fire, medical, and educational service requirements in the county.

Jim Bridger Power Plant would have to acquire replacement contracts to supply coal, potentially increasing electricity production costs due to increased transportation and coal costs.

4.16.1.5 Cumulative Impacts

Implementation of the Proposed Action, reasonably foreseeable future projects, and continuation of existing projects would provide an increase in the tax base to the county, state, and federal governments. This increase would be realized through severance and ad valorem taxes, and royalty payments from existing and proposed mining, oil and gas, and oil shale projects. Employment opportunities would also be expected to increase. Based on this, the population of Sweetwater County is expected to increase over the next several years. The increase in population and the anticipated continuation of this trend, due primarily to increased non-coal mineral exploration development and production, would, in combination with a stable employment rate at the mine, continue to increase property values, the need for more schools, medical facilities, and other community services.

Implementation of the No Action Alternative would result in substantial and long term impacts in the cumulative IAA. The cessation of mining at the end of the Black Butte Mine's permitted reserves would create a negative and moderate impact that would decrease the rate of growth in population and personal

income levels. This may also slow growth impacts associated with known and reasonably foreseeable action in the cumulative IAA.

4.16.1.6 Irreversible and Irretrievable Commitment of Resources

No irreversible and irretrievable commitment of socioeconomic resources has been identified as a result of the Project.

4.16.1.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures have been identified for this resource.

4.16.1.8 Residual Impacts

No residual impacts on socioeconomics would occur.

CHAPTER 5.0 - CONSULTATION AND COORDINATION

5.1 INTRODUCTION

An Interdisciplinary Team of BLM resource specialists and Maxim Technologies staff prepared this EIS. The OSM, WDEQ/LQD, and Wyoming State Planning Office were formal cooperating agencies.

5.2 PUBLIC PARTICIPATION SUMMARY

An early and open process was used for determining the scope of issues to be addressed during the EIS planning process. Consultation and coordination efforts were ongoing throughout the process of preparing this EIS. *Federal Register* notices, news releases, a public meeting, and individual meetings with interested publics were also implemented. An NOI for the preparation of this EIS was published in the *Federal Register* on January 4, 2005. The NOI initiated the public scoping process by inviting participation in identifying planning issues and criteria. Information about the planning process was provided during an open house on January 26, 2005 at the BLM RSFO in Rock Springs, Wyoming. Questions were answered during a public meeting, which immediately followed the open house. Issues, concerns, and comments were taken in writing by e-mail, mail, facsimile, and hand delivery. Eleven letters were received during the public scoping period (January 4 – February 4, 2005). The scoping notice mailing distribution list is included below:

Government Offices

- BLM, Wyoming State Office
- U.S. Department of the Army, Corps of Engineers
- USFWS
- Office of the Governor, State of Wyoming
- WDEQ
- WGFD (Cheyenne, Green River)
- Wyoming State Clearinghouse
- Federal Land Planning Office

Elected and Other Officials

- Mayors of Rock Springs, Green River, Superior
- State Representatives: Stephen Watt, Bill Thompson, Pete Jorgensen, Mick Powers, Marty Martin
- State Senators: Rae Lynn Job, Tex Boggs, Stan Cooper
- Sweetwater County Commissioners
- Sweetwater County Libraries, Green River, Rock Springs
- Sweetwater County Planner
- U.S. Congresswoman Barbara Cubin, Bonnie Cannon, Representative
- U.S. Senator Craig Thomas, Pati Smith, Representative
- U.S. Senator Mike Enzi, Lyn Shanaghy, Representative

Oil and Gas Lessees (certified)

- Barlow & Haun Inc.
- Anadarko E&P Company

- Questar Exploration & Production Company
- NPC Incorporated
- ABO Petroleum Corporation Andex Resources LLC
- MYCO Industries
- Sharbro Oil & Gas Company Westport Oil & Gas Company Yates Drilling Company
- Yates Petroleum Corporation

Public Land Users and User Groups

- Affected grazing permittees in the Rock Springs Allotment
- Biodiversity Conservation Alliance
- Environmental Defense Fund
- Independent Petroleum Association of Mountain States
- National Wildlife Federation
- Native American Tribes: Eastern Shoshone, Northern Ute, Northern Arapaho, Shoshone-Bannock
- People for the West
- Petroleum Association of Wyoming
- Rocky Mountain Elk Foundation
- Sierra Club, Northern Plains Representative
- Southwest Wyoming Industrial Association
- Wilderness Society
- Wyoming Association of Professional Archaeologists
- Sierra Club
- Wyoming Outdoor Council
- Wyoming Public Lands Council
- Wyoming Wildlife Federation

Newspapers

- Casper Star-Tribune
- Green River Star
- Kemmerer Gazette
- Pinedale Roundup
- Rock Springs Daily Rocket-Miner
- Sublette Examiner
- Uinta County Herald
- Wyoming State Journal

Radio Stations

- Cowboy News Network - Cheyenne
- KMER/KOAX/KDWY - Kemmerer
- KOTB/KEVA – Evanston
- KPIN – Pinedale

- KQSW/KRKKIKSIT - Rock Springs
- KUGR/KYCS/KFRZ - Green River
- Public Radio – Laramie

Television Stations

- KCWY-TV - Casper
- KGWC-TV - Casper
- KGWN - Cheyenne
- KTWO-TV - Casper
- KWFY-TV - Casper

5.3 COOPERATING AGENCIES AND OTHER ENTITIES

Below is a list of personnel contacted or consulted during preparation of this EIS and includes scoping respondents. Consultation would be an on-going effort throughout the EIS process.

Persons, Groups, and Governmental Agencies Consulted in EIS Preparation

- Wyoming Diversity Database
- United States EPA, Region 8
- Wyoming Department of Environmental Quality, Land Quality Division
- Wyoming Department of Environmental Quality, Air Quality Division
- BLM Wyoming State Office
- BLM Denver Regional Office
- United States Fish and Wildlife Service

In keeping with the provisions of NEPA and FLPMA, BLM established opportunities for interactions with tribal officials. The FLPMA, Title II, Section 202, provides guidance for coordinating planning efforts with American Indian tribes, other federal departments, and agencies of state and local governments. Local governments, tribal governments, and federal and state agencies with resource management interests or responsibilities were informed of the project planning efforts and encouraged to participate. Native American Tribe representatives that were sent letters requesting consultation included:

Chairman Burton Hutchinson, Sr.
Northern Arapaho Business Council
P.O. Box 396
Fort Washakie, WY 82514

Chairman Frederick Auck
Shoshone-Bannock Tribal Chairman
P.O. Box 306
Fort Hall, ID 83203

Chairman Vernon Hill
Shoshone Tribal Council
P.O. Box 1008
Fort Washakie, WY 82514

Judge Richard Ferris
Eastern Shoshone Tribe
P.O. Box 608
Fort Washakie, WY 82514

Ms. Betsy Chapoose
Ute Tribe Cultural Resources
P.O. Box 190
Fort Duchesne, UT 84026

Mr. Willie Preacher
Shoshone-Bannock Tribes, Cultural Resource Coordinator
P.O. Box 306
Fort Hall, ID 83203

Chairman Floyd Wopsock
Northern Ute Tribe
P.O. Box 190
Fort Duchesne, UT 84026

Mr. Richard Burnett
Shoshone Tribe
P.O. Box 1008
Fort Washakie, WY 82514

Mr. Robert Goggles
Northern Arapaho Tribe
P.O. Box 54 Star Route
Arapaho, WY 82510

Mr. Clifford Duncan
Ute Tribe Cultural Resources
P.O. Box 1892
Roosevelt, UT 84066

5.4 PREPARERS AND REVIEWERS

The list of preparers and reviewers for this EIS, including BLM Interdisciplinary Team members, cooperating State of Wyoming and OSM personnel and offices, and the third-party contractor, Maxim Technologies, is presented in **Table 5.1**.

Table 5.1 List of Preparers and Reviewers

Name	Position	Area of Responsibility
RSFO		
Joanna Nara-Kloepper	Mining Engineer	Project Lead, Solid Minerals, Coal Screening Criteria
Teri Deakins	Environmental Protection Specialist	Project Manager (NEPA), Introduction in Chapters 1, 3, and 4
Bonni Bruce	Archeologist	Cultural, Historic Transportation, Native American Concerns
Jeff Clawson	Mining Engineer	Solid Minerals
Dennis Doncaster	Hydrologist	Surface Water, Ground Water
Jim Glennon	Botanist	Special Status Plant Species, Vegetation
Susan Davis	Petroleum Engineer	Fluid Minerals
Jay D'Ewart	Range Conservationist/Wild Horse Specialist	Livestock Grazing, Wild Horses
Jo Foster	Outdoor Recreation Planner	Recreation, Visual Resources
Patricia Hamilton	Realty Specialist	Transportation, Rights-of-way
Jim Dunder	Wildlife Biologist	Wildlife, Special Status Animal Species
Chris Durham	Natural Resource Specialist	Reclamation, Sage-grouse Working Group
John Henderson	Fisheries Biologist	Colorado River Endemics
Steve Wiig	Geologist	Geology, Solid Minerals
Richard Adams	GIS Specialist	GIS Support
John MacDonald	AFM – Lands and Minerals	Soils
Angelina Pryich	Editor	Document Editing
Monica Whitby	Intern, Chicago Botanical Gardens	Wildlife
Brett Governanti	Intern, Chicago Botanical Gardens	Wildlife
Steve Boyer	Civil Engineer	IAA Calculations
Renee Dana	Resource Advisor	Land Use Planning
Russ Tanner	Archeologist	Cultural, Historic Transportation, Native American Concerns
Mike Holbert	RSFO Manager	

Name	Position	Area of Responsibility
BLM Wyoming State Office		
Mavis Love	Land Law Examiner	Legals
Bob Janssen	Regional Coal Coordinator	Coal Leasing
Phil Perlewitz	Supervisory Mining Engineer	Solid Minerals
Dwain McGarry	Geologist	Fluid Minerals, Reservoir Management Group
Roy Allen, PhD	Economist	Social, Economics
Susan Caplan	Physical Scientist	Air Quality, Coordinator Interagency Air Quality Team (IAQT)
Janet Kurman	Environmental Protection Specialist	NEPA
BLM National Science and Technology Center		
Craig Nicholls	BLM- National Air Quality Modeler	IAQT Member, Air Quality
EPA		
Joseph Delwiche	EPA- Air and Radiation Program	IAQT Member, Air Quality
Sara Laumann	Associate Regional Counsel, EPA Region VIII	
WDEQ/AQD		
Darla Potter	Air Quality Specialist	IAQT Member, Air Quality
Cooperating Agencies		
Floyd McMullen	OSM – NEPA Coordinator	NEPA Adequacy
Marit Sawyer	WDEQ/LQD – Senior Environmental Analysis	NEPA Adequacy
Ben Brandes	Wyoming State Planning Office	NEPA Adequacy
BBCC		
Dave McCarthy	Mine Engineer	Project Development, Proposed Action
Chad Johnson	Mine Engineer	Project Development, Proposed Action
Maxim Technologies		
David Steed	Project Manager	Project Management and NEPA Lead
Mike Egan	Assistant Project Manager	Geology, Leasing and Minerals Management
Craig Clement	Physical Resource Coordinator	Water Resources and Soils
Susan Hatch	Biological Resource Coordinator	Wildlife and Special Status Species, Wild Horses, Vegetation, Greater Sage Grouse
Valerie Waldorf	Social Resource Coordinator and GIS Specialist	Land Use, Social Economics
Dale Herring	Technical Editor	NEPA Format and Procedure
Mary Garner	GIS Specialist	GIS
Wynn John	Physical Engineer	Air Quality
Pete Guernsey	NEPA Specialist	Air Quality/NEPA Review
Cameo Flood	NEPA Specialist	NEPA Review/Quality Assurance and Control
Jana Pastor (Subcontractor)	Cultural Resource Specialist	Cultural Resources
Ronn Smith (Subcontractor)	Air Resource Specialist	Air Quality

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GLOSSARY

Definitions from (BLM 2004a) and (BLM 1997) unless otherwise noted.

Animal Unit Month (AUM): The amount of forage to sustain one mature cow or the equivalent, based on an average daily forage consumption of 26 pounds of dry matter per day. The equivalent animal units for other ungulate species, based on a weight conversion (3 percent body weight per day), are: 10.5 for antelope; 7.6, deer; 2.1, elk; 1.2, moose; 0.9, wild horses; and 5.2, sheep.

Application: A formal request for rights to use, or obtain eventual title to, public lands or resources.

Appropriate Management Level (AML): The optimum number of wild horses that provides a thriving natural ecological balance on the public range.

Archaeological and Historical Site: A site that contains either objects of antiquity or cultural values relating to history and/or prehistory that warrant special protection.

Beneficial Impact: An apparent direct or indirect advantageous effect (BLM 2003).

Big Game Habitat: Habitat areas used by big game animals at some time during their yearly life cycle.

Camping: Includes auto and trailer camping, along with other camping at developed sites, and backcountry camping.

Cooperating Agency: Assists the lead Federal agency in developing an EA or EIS. The Council on Environmental Quality regulations implementing NEPA define a cooperating agency as any agency that has jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.6). Any tribe or Federal, State, or local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency.

Cultural Resource Inventory: A three-tiered process for discovering, recording, and evaluating cultural resources.

Class I Inventory: A review of existing literature and oral informant data together with an analysis of a specific geographic region (e.g., an area of potential effect, drainage basin, resource area, etc.).

Class II Inventory: A sampling survey usually aimed at developing and testing a predictive model of cultural resource-distribution.

Class III Inventory: An on-the-ground survey to discover, record, and evaluate cultural resources within a specific geographic area (e.g., usually an area of potential effect for a proposed undertakings).

Cultural Resources: Remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in past human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred, even though evidence of the event no longer remains, and (3) the environment immediately surrounding the actual resource.

Endangered Species: Any animal or plant species in danger of extinction throughout all or a significant portion of its range. Also, see Threatened Species.

Environmental Impact Statement (EIS): A written analysis of the impacts on the natural, social, and economic environment of a proposed project or resource management plan. Federal Land: All classes of land owned by the Federal Government.

Grazing Lease: An authorization that permits the grazing of livestock on public lands outside the grazing districts during a specified period of time (Section 15 of the Taylor Grazing Act).

Herd Management Area: The area of wild horse or burro habitat covered by a herd management area plan.

Hunting: Includes big- and small-game hunting, waterfowl hunting, and trapping.

Land Use Plan: A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA; an assimilation of land-use-plan-level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed.

Leasable Minerals: Minerals subject to lease by the Federal Government; include oil and gas, coal, phosphate, sodium, potash, and oil shale, as well as geothermal resources.

License: An authority granted by the United States to do a particular act or series of acts upon public lands without the licensee possessing any estate or interest in the land itself.

Life of Mine: Time period it takes to exhaust the recoverable coal reserves within a mine or permit area.

Lithic Scatter Site: A class of cultural resource that consists of an array of chipped stone artifacts without other kinds of artifacts or features.

Minable Coal: Coal that can be economically mined using present day mining technology (BLM 2003).

Mineral Rights: The rights of one who owns the mineral estate (subsurface) (BLM 2003).

Mineral: Organic and inorganic substances occurring naturally, with characteristics and economic uses that bring them within the purview of mineral laws; a substance that may be obtained under applicable laws from public lands by purchase, lease, or preemptive entry.

Mining Permit: A permit to conduct surface coal mining and reclamation operations issued by the state regulatory authority pursuant to a state program or by the Secretary pursuant to a federal program (see 30 CFR 701.5) (BLM 2003).

Mitigation: Avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree of magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and/or compensating for the impact by replacing or providing substitute resources or environments.

Multiple Use: A combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, and wildlife and fish, along with natural scenic, scientific, and historical values.

National Environmental Policy Act (NEPA) of 1969: The federal law established in 1969, which went into effect on January 1, 1970, that 1) established a national policy for the environment, 2) requires federal agencies to become aware of the environmental ramifications of their proposed actions, 3) requires full disclosure to the public of proposed federal actions and a mechanism for public input into the federal decision-making process, and 4) requires federal agencies to prepare an environmental impact statement for every major action that would significantly affect the quality of the human environment.

Native (Indigenous) Species: Plants or animals that originated in the area in which they are found (i.e., they naturally occur in that area); with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

NEPA Process: All measures necessary for compliance with the National Environmental Policy Act of 1969 (see 40 CFR 1508.21) (BLM 2003).

No Action Alternative: An alternative where the proposed activity would not occur.

Overburden: Material of any nature, consolidated or unconsolidated, that overlies a coal or other useful mineral deposit, excluding topsoil (BLM 2003).

Permit: A revocable authorization to use public land for a specified purpose for up to three years.

Permittee: An entity authorized to grazing on BLM lands in accordance with Section 3 of the Taylor Grazing Act.

Permitted Use: the forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease; expressed in Animal Unit Months (BLM 2004c).

Public Lands: Any land and interest in land owned by the United States that are administered by the Secretary of the Interior through the Bureau of Land Management, without regard to how the United States acquired ownership, except for (1) lands located on the Outer Continental Shelf, and (2) lands held for the benefit of Indians, Aleuts, and Eskimos. Includes public domain and acquired lands. (See definitions.)

Reclamation: The reconstruction of disturbed ecosystems by returning the land to a condition approximate or equal to that which existed prior to disturbance, or to a stable and productive condition compatible with the land use plan. The immediate goal of reclamation is to stabilize disturbed areas and protect both disturbed and adjacent undisturbed areas from unnecessary degradation.

Recoverable Coal: The amount of coal that can actually be recovered for sale from the demonstrated coal reserve base (BLM 2003).

Right of Way: A permit or an easement that authorizes the use of lands for certain specified purposes, such as the construction of access roads or a gas pipeline.

Riparian Habitat: A highly valued wetland vegetation community found along or around streams, lakes, ponds, and other open water (both perennial and intermittent). This unique habitat is crucial to the continued existence of many fish and wildlife species known to occur in the area. Riparian vegetation helps maintain high water tables, stabilize pond and streambanks, create quality fish and wildlife habitat, prevent or reduce flooding, and maintain or improve water quality.

Riparian: An area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not have vegetation dependent on free water in the soil.

Soil Survey: The systematic examination, description, classification, and mapping of soils in an area, usually a county. Soil surveys are classified according to the level of detail of field examination. Order I is the most detailed and Order V is the least detailed (BLM 2003).

State Office: The first-level administrative unit of the Bureau of Land Management field organization. It comprises a geographic area consisting of one or more States.

Strutting Ground (sometimes referred to as a lek): A traditional breeding area for grouse species where territorial males display and establish dominance (BLM 2003).

Threatened Species: Any animal or plant species likely to become endangered within the foreseeable future throughout all or a part of its range.

Total Dissolved Solids (TDS): The total quantity in milligrams per liter of dissolved materials in water (BLM 2003).

Unsuitability Criteria: The 20 criteria described in 43 CFR 3461, the application of which results in an assessment of federal coal lands as suitable or unsuitable for surface coal mining (BLM 2003).

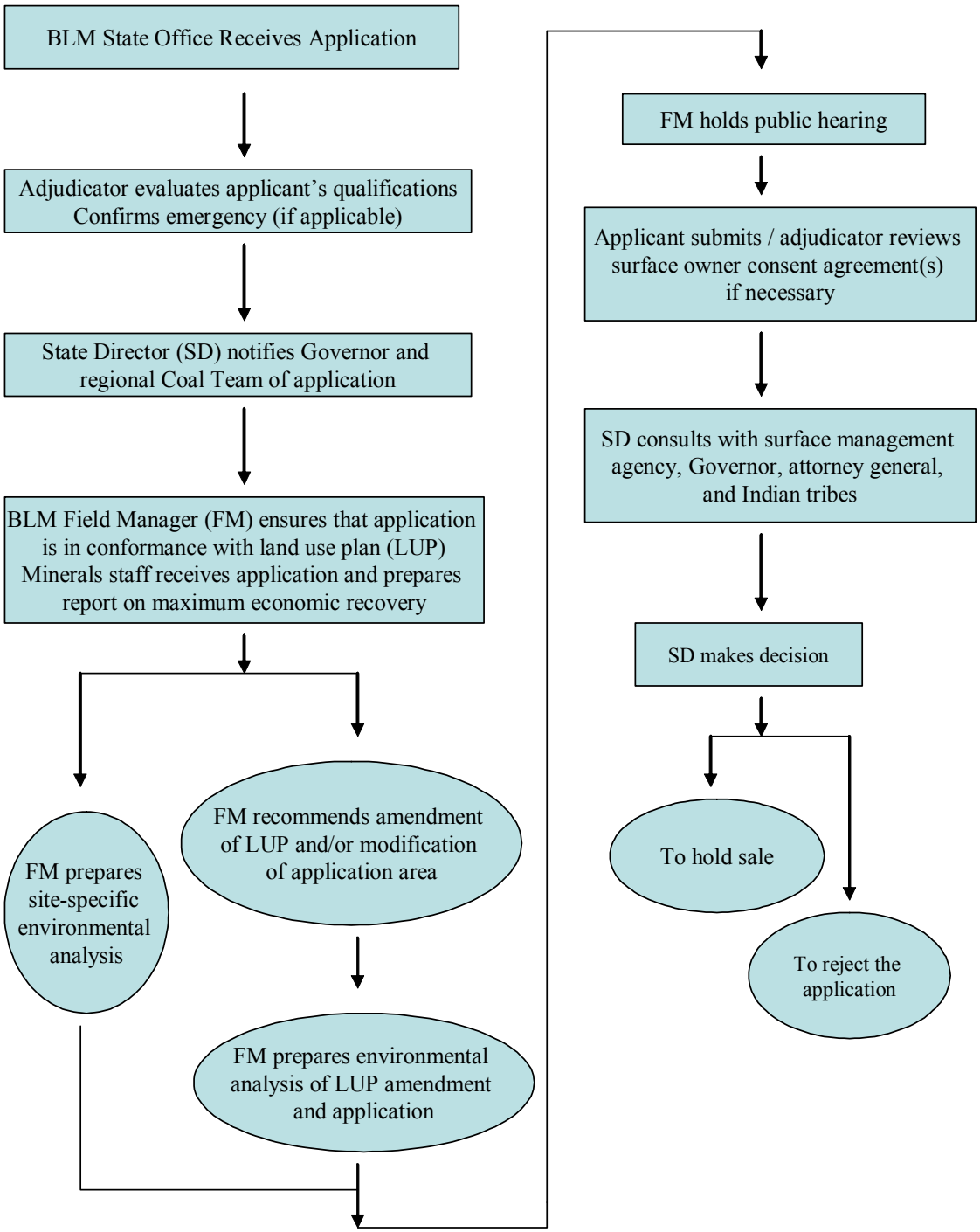
Visual Resource Management (VRM): The systematic means to identify visual values, establish objectives which provide the standards for managing those values, and evaluate the visual impacts of proposed projects to ensure that objectives are met.

Wetland: Lands where at least periodic inundation or saturation with water (either from the surface or subsurface) is the dominant factor determining the nature of soil development and the types of plant and animal communities living there. These include the entire zones associated with streams, lakes, ponds, springs, canals, seeps, wet meadows, and some aspen stands. Wetlands support all fish. They also support more species of wildlife (in higher densities) than any other habitat type in the planning area. They comprise less than one percent of the public land acreage.

Wild Horses: All unbranded and unclaimed horses using public lands as all or part of their habitat.

Wilderness: An area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation, that is protected and managed so as to preserve its natural conditions and that (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

APPENDIX A
COAL LBA FLOW CHART


BLM State Office Receives Application
Adjudicator evaluates applicant's qualifications
Confirms emergency (if applicable)
State Director (SD) notifies Governor and regional Coal Team of application
BLM Field Manager (FM) ensures that application is in conformance with land use plan (LUP)
Minerals staff receives application and prepares report on maximum economic recovery
FM prepares site-specific environmental analysis
FM recommends amendment of LUP and/or modification of application area
FM prepares environmental analysis of LUP amendment and application
FM holds public hearing
Applicant submits / adjudicator reviews surface owner consent agreement(s) if necessary
SD consults with surface management agency, Governor, attorney general, and Indian tribes
SD makes decision
To hold sale
To reject the application

APPENDIX B
PERMITTING REQUIREMENTS

Agency	Responsibility
Federal	
BLM	Coal lease Resource Recovery & Protection Plan Scoria sales contract Exploration drilling permit
OSM	Preparation of mining plan approval document SMCRA oversight
Office of the Secretary of the Interior	Approval of mining plan
Mine Safety and Health Administration	Safety permit and legal ID Ground control plan Major impoundments Explosives use and storage permit
Bureau of Alcohol, Tobacco, and Firearms	Explosives manufacturer's license Explosives use and storage permit
Federal Communication Commission	Radio permit Ambulance Mobile relay system radio license
Army Corps of Engineers	Authorization of impacts to wetlands and other U.S. waters
Department of Transportation	Hazardous waste shipment notification
Unites States Fish and Wildlife Service	Consultation on potential impacts to federally-listed species
Federal Aviation Administration	Radio tower permits
State of Wyoming	
State Land Commission	Coal lease
WDEQ/Land Quality Division	Permit and license to mine Bonding and Reclamation
WDEQ/Air Quality Division	Air quality permit to construct Air quality permit to operate
WDEQ/Water Quality Division	National Pollutant Discharge Elimination System water discharge permit Permit to construct sedimentation pond (if needed)
WDEQ/Solid Waste Management Program	Solid waste disposal permit-permanent and construction
State Engineer's Office	Appropriation of surface water permits Appropriation of groundwater permits
State Historical Preservation Office	Authorization and mitigation of impacts to cultural resources
Industrial Siting Council	Industrial Siting Certificate of Non-Jurisdiction

APPENDIX C
UNSUITABILITY CRITERIA, RECOMMENDATIONS, AND FINDINGS ASSOCIATED WITH THE LBA TRACT

Unsuitability Criterion	General Recommendations for Green River RMP (BLM 1997)	Findings for the LBA tract
Federal Land Systems and Federal Lands in Communities	The federal coal lands and the federal surface/state coal lands, within the incorporated limits of the towns of Rock Springs and Superior, were determined to be unsuitable for coal mining and related surface operations and impacts.	The lands included in the LBA tract are not unsuitable under Criterion 1, because no lands defined as such lie within it.
Rights-of-Way and Easements	Only those federal coal lands and federal surface/state coal lands along the Interstate 80 and Union Pacific Railroad rights-of-way, were determined to be unsuitable for coal mining and related surface operations and impacts.	The lands included in the LBA tract are not unsuitable under Criterion 2, because no lands defined as such lie within it.
Buffer Zones for Rights-of-Way, Communities, & Buildings	It was determined that buffer areas for rights-of-way are unnecessary. It was determined that a 100-foot buffer zone around cemeteries and a 300-foot buffer zone around occupied dwellings, public buildings, schools, churches, community or institutional buildings, or public parks would be unsuitable for coal mining and related surface operations and impacts.	The lands included in the LBA tract are not unsuitable under Criterion 2, because no lands defined as such lie within it.
Wilderness Study Areas	Those parts of the Sand Dunes and Red Creek Badlands WSAs that are within the coal development potential area were determined to be unsuitable for coal mining and related surface operations and impacts, as long as they are under review by Congress for possible wilderness designation. Both federal coal lands and federal surface/state coal lands are involved.	The lands included in the LBA tract are not unsuitable under Criterion 4, because no lands defined as such lie within it.
Scenic Areas	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 5 for the LBA tract. Lands within the tract are defined as Visual Resource Management Class IV.
Lands Used For Scientific Study	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 6 for the LBA tract. No exclosures or transects exist in the LBA tract.

Unsuitability Criterion	General Recommendations for Green River RMP (BLM 1997)	Findings for the LBA tract
Places Included in the National Register of Historic Places	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 7 for the LBA tract. No places included in the National Register of Historic Places exist within the LBA tract.
National Natural Landmarks	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 8 for the LBA tract. No National Natural Landmarks exist within the LBA tract.
Federally Listed Endangered Species Habitat	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 9 for the LBA tract.
State Listed Endangered Species Habitat	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 10 for the LBA tract.
Bald and Golden Eagle Nest Sites	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 11 for the LBA tract. No nesting sites lie within the LBA tract.
Bald and Golden Eagle Roosts	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 12 for the LBA tract. No roosting sites lie within the LBA tract.
Falcon Cliff Nesting Sites	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 13 for the LBA tract. No nesting sites lie within the LBA tract.
Migratory Bird Habitat	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 14 for the LBA tract.
Habitat for State High-Interest Wildlife and Plants	No areas were determined to be unsuitable under this criterion. The greater Cooper Ridge and Elk Butte areas were determined to be acceptable for further consideration for federal coal leasing and development, pending further analysis.	There are no unsuitable findings under Criterion 15 for the LBA tract. However, appropriate mitigation must be applied.

Unsuitability Criterion	General Recommendations for Green River RMP (BLM 1997)	Findings for the LBA tract
Concerning the Greater Cooper Ridge and Elk Butte Areas	The greater Cooper Ridge and Elk Butte areas (about 25,765 acres and 438 million tons of coal) were determined to be acceptable for further consideration for federal coal leasing and development, pending further analysis. This analysis is for the purpose of defining the extent of any deer and antelope crucial winter range in the area, and for determining if certain methods of coal mining can occur in the area without having a significant long-term impact on the deer and antelope herds. About 395 acres of state coal lands would also be affected.	The LBA tract is considered acceptable for mining with appropriate mitigation.
Concerning Grouse Lek Areas	Grouse nesting areas (sage or sharptail grouse) were determined to be acceptable for further consideration for federal coal leasing and development with certain requirements. Exploration activities and ancillary facilities will be allowed with the following requirement: If an occupied grouse nest may be adversely affected by coal mining and related surface disturbing activities, surface uses and activities will be delayed in the area of influence for the nest until nesting is completed.	The LBA tract is considered acceptable for mining with appropriate mitigation.
Riverine, Coastal, and Special Floodplains	The floodplains of Bitter Creek and Salt Wells Creek were determined to be unsuitable for coal mining and related surface operations and impacts. Other riparian and wetland habitat areas were determined to be acceptable for coal development, if they were managed as avoidance areas for surface disturbing activities.	There are no unsuitable findings under Criterion 16 for the LBA tract. No such lands exist within the tract.
Municipal Watersheds	The federal coal lands within the municipal watershed for the town of Superior were determined to be unsuitable for coal mining and related surface operations and impacts.	There are no unsuitable findings under Criterion 17 for the LBA tract. No municipal watersheds exist within the LBA tract.
National Resource Waters	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 18 for the LBA tract. No national resource waters exist within the tract.

Unsuitability Criterion	General Recommendations for Green River RMP (BLM 1997)	Findings for the LBA tract
Alluvial Valley Floors	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 19 for the LBA tract.
Unsuitability Criterion Proposed by a State or by an Native American Tribe	No areas were determined to be unsuitable under this criterion.	There are no unsuitable findings under Criterion 20 for the LBA tract. No tribal lands exist within the tract.

APPENDIX D
FORM 3400-12 (COAL LEASE) AND BLM SPECIAL STIPULATIONS

Form 3400-12
(January 2004)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0073
Expires: January 31, 2007

Serial Number

COAL LEASE

PART 1. LEASE RIGHTS GRANTED

This lease, entered into by and between the UNITED STATES OF AMERICA, hereinafter called lessor, through the Bureau of Land Management (BLM), and *(Name and Address)*

hereinafter called lessee, is effective *(date)* / / , for a period of 20 years and for so long thereafter as coal is produced in commercial quantities from the leased lands, subject to readjustment of lease terms at the end of the 20th lease year and each 10-year period thereafter.

Sec. 1. This lease is issued pursuant and subject to the terms and provisions of the:

☐ Mineral Lands Leasing Act of 1920, Act of February 25, 1920, as amended, 41 Stat. 437, 30 U.S.C. 181-287, hereinafter referred to as the Act;
☐ Mineral Leasing Act for Acquired Lands, Act of August 7, 1947, 61 Stat. 913, 30 U.S.C. 351-359;

and to the regulations and formal orders of the Secretary of the Interior which are now or hereafter in force, when not inconsistent with the express and specific provisions herein.

Sec. 2. Lessor, in consideration of any bonuses, rents, and royalties to be paid, and the conditions and covenants to be observed as herein set forth, hereby grants and leases to lessee the exclusive right and privilege to drill for, mine, extract, remove, or otherwise process and dispose of the coal deposits in, upon, or under the following described lands:

containing acres, more or less, together with the right to construct such works, buildings, plants, structures, equipment and appliances and the right to use such on-lease rights-of-way which may be necessary and convenient in the exercise of the rights and privileges granted, subject to the conditions herein provided.

PART II. TERMS AND CONDITIONS

Sec. 1. (a) RENTAL RATE - Lessee must pay lessor rental annually and in advance for each acre or fraction thereof during the continuance of the lease at the rate of $ for each lease year.

(b) RENTAL CREDITS - Rental will not be credited against either production or advance royalties for any year.

Sec. 2. (a) PRODUCTION ROYALTIES - The royalty will be percent of the value of the coal as set forth in the regulations. Royalties are due to lessor the final day of the month succeeding the calendar month in which the royalty obligation accrues.

(b) ADVANCE ROYALTIES - Upon request by the lessee, the BLM may accept, for a total of not more than 10 years, the payment of advance royalties in lieu of continued operation, consistent with the regulations. The advance royalty will be based on a percent of the value of a minimum number of tons determined in the manner established by the advance royalty regulations in effect at the time the lessee requests approval to pay advance royalties in lieu of continued operation.

Sec. 3. BONDS - Lessee must maintain in the proper office a lease bond in the amount of $. The BLM may require an increase in this amount when additional coverage is determined appropriate.

Sec. 4. DILIGENCE - This lease is subject to the conditions of diligent development and continued operation, except that these conditions are excused when operations under the lease are interrupted by strikes, the elements, or casualties not attributable to the lessee. The lessor, in the public interest, may suspend the condition of continued operation upon payment of advance royalties in accordance with the regulations in existence at the time of the suspension. Lessee's failure to produce coal in commercial quantities at the end of 10 years will terminate the lease. Lessee must submit an operation and reclamation plan pursuant to Section 7 of the Act not later than 3 years after lease issuance.

The lessor reserves the power to assent to or order the suspension of the terms and conditions of this lease in accordance with, inter alia, Section 39 of the Mineral Leasing Act, 30 U.S.C. 209.

Sec. 5. LOGICAL MINING UNIT (LMU) - Either upon approval by the lessor of the lessee's application or at the direction of the lessor, this lease will become an LMU or part of an LMU, subject to the provisions set forth in the regulations.

The stipulations established in an LMU approval in effect at the time of LMU approval will supersede the relevant inconsistent terms of this lease so long as the lease remains committed to the LMU. If the LMU of which this lease is a part is dissolved, the lease will then be subject to the lease terms which would have been applied if the lease had not been included in an LMU.

(Continued on page 2)

Sec. 6. DOCUMENTS, EVIDENCE AND INSPECTION - At such times and in such form as lessor may prescribe, lessee must furnish detailed statements showing the amounts and quality of all products removed and sold from the lease, the proceeds therefrom, and the amount used for production purposes or unavoidably lost.

Lessee must keep open at all reasonable times for the inspection by BLM the leased premises and all surface and underground improvements, works, machinery, ore stockpiles, equipment, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or under the leased lands.

Lessee must allow lessor access to and copying of documents reasonably necessary to verify lessee compliance with terms and conditions of the lease.

While this lease remains in effect, information obtained under this section will be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 7. DAMAGES TO PROPERTY AND CONDUCT OF OPERATIONS - Lessee must comply at its own expense with all reasonable orders of the Secretary, respecting diligent operations, prevention of waste, and protection of other resources.

Lessee must not conduct exploration operations, other than casual use, without an approved exploration plan. All exploration plans prior to the commencement of mining operations within an approved mining permit area must be submitted to the BLM.

Lessee must carry on all operations in accordance with approved methods and practices as provided in the operating regulations, having due regard for the prevention of injury to life, health, or property, and prevention of waste, damage or degradation to any land, air, water, cultural, biological, visual, and other resources, including mineral deposits and formations of mineral deposits not leased hereunder, and to other land uses or users. Lessee must take measures deemed necessary by lessor to accomplish the intent of this lease term. Such measures may include, but are not limited to, modification to proposed siting or design of facilities, timing of operations, and specification of interim and final reclamation procedures. Lessor reserves to itself the right to lease, sell, or otherwise dispose of the surface or other mineral deposits in the lands and the right to continue existing uses and to authorize future uses upon or in the leased lands, including issuing leases for mineral deposits not covered hereunder and approving easements or rights-of-way. Lessor must condition such uses to prevent unnecessary or unreasonable interference with rights of lessee as may be consistent with concepts of multiple use and multiple mineral development.

Sec. 8. PROTECTION OF DIVERSE INTERESTS, AND EQUAL OPPORTUNITY - Lessee must: pay when due all taxes legally assessed and levied under the laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; restrict the workday to not more than 8 hours in any one day for underground workers, except in emergencies; and take measures necessary to protect the health and safety of the public. No person under the age of 16 years should be employed in any mine below the surface. To the extent that laws of the State in which the lands are situated are more restrictive than the provisions in this paragraph, then the State laws apply.

Lessee will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and the rules, regulations, and relevant orders of the Secretary of Labor. Neither lessee nor lessee's subcontractors should maintain segregated facilities.

Sec. 9. (a) TRANSFERS

- ☐ This lease may be transferred in whole or in part to any person, association or corporation qualified to hold such lease interest.
- ☐ This lease may be transferred in whole or in part to another public body or to a person who will mine the coal on behalf of, and for the use of, the public body or to a person who for the limited purpose of creating a security interest in favor of a lender agrees to be obligated to mine the coal on behalf of the public body.
- ☐ This lease may only be transferred in whole or in part to another small business qualified under 13 CFR 121.

Transfers of record title, working or royalty interest must be approved in accordance with the regulations.

(b) RELINQUISHMENT - The lessee may relinquish in writing at any time all rights under this lease or any portion thereof as provided in the regulations. Upon lessor's acceptance of the relinquishment, lessee will be relieved of all future obligations under the lease or the relinquished portion thereof, whichever is applicable.

Sec. 10. DELIVERY OF PREMISES, REMOVAL OF MACHINERY, EQUIPMENT, ETC. - At such time as all portions of this lease are returned to lessor, lessee must deliver up to lessor the land leased, underground timbering, and such other supports and structures necessary for the preservation of the mine workings on the leased premises or deposits and place all workings in condition for suspension or abandonment. Within 180 days thereof, lessee must remove from the premises all other structures, machinery, equipment, tools, and materials that it elects to or as required by the BLM. Any such structures, machinery, equipment, tools, and materials remaining on the leased lands beyond 180 days, or approved extension thereof, will become the property of the lessor, but lessee may either remove any or all such property or continue to be liable for the cost of removal and disposal in the amount actually incurred by the lessor. If the surface is owned by third parties, lessor will waive the requirement for removal, provided the third parties do not object to such waiver. Lessee must, prior to the termination of bond liability or at any other time when required and in accordance with all applicable laws and regulations, reclaim all lands the surface of which has been disturbed, dispose of all debris or solid waste, repair the offsite and onsite damage caused by lessee's activity or activities incidental thereto, and reclaim access roads or trails.

Sec.11. PROCEEDINGS IN CASE OF DEFAULT - If lessee fails to comply with applicable laws, existing regulations, or the terms, conditions and stipulations of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease will be subject to cancellation by the lessor only by judicial proceedings. This provision will not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver will not prevent later cancellation for the same default occurring at any other time.

Sec. 12. HEIRS AND SUCCESSORS-IN-INTEREST - Each obligation of this lease will extend to and be binding upon, and every benefit hereof will inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

Sec.13. INDEMNIFICATION - Lessee must indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under this lease.

Sec. 14. SPECIAL STATUTES - This lease is subject to the Clean Water Act (33 U.S.C. 1252 et seq.), the Clean Air Act (42 U.S.C. 4274 et seq.), and to all other applicable laws pertaining to exploration activities, mining operations and reclamation, including the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 et seq.).

Sec. 15. SPECIAL STIPULATIONS

(Continued on page 3)

Sec. 15. SPECIAL STIPULATIONS (Cont'd.) -

The Privacy Act of 1974 and the regulation in 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this application.

AUTHORITY: 30 U.S.C. 181-287 and 30 U.S.C. 351-359.

PRINCIPAL PURPOSE: BLM will use the information you provide to process your application and determine if you are eligible to hold a lease on BLM Land.

ROUTINE USES: BLM will only disclose the information according to the regulations at 43 CFR 2.56(d).

EFFECT OF NOT PROVIDING INFORMATION: Disclosing the information is necessary to receive a benefit. Not disclosing the information may result in BLM's rejecting your request for a lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:

This information is being collected to authorize and evaluate proposed exploration and mining operations on public lands.

Response to the provisions of this lease form is mandatory for the types of activities specified.

BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT

Public reporting burden for this form is estimated to average one hour per response including the time for reading the instructions and provisions, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to: U.S. Department of the Interior, Bureau of Land Management (1004-0073), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, Mail Stop 401 LS, Washington, D.C. 20240.

THE UNITED STATES OF AMERICA

_____	By _____
(Company or Lessee Name)	
_____	_____
(Signature of Lessee)	(BLM)
_____	_____
(Title)	(Title)
_____	_____
(Date)	(Date)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Form 3400-12, page 3)

SPECIAL LEASE STIPULATIONS

In addition to observing the general obligations and standards of performance set out in the current regulations, the lessee shall comply with and be bound by the following special stipulations.

These stipulations are also imposed upon the lessee's agents and employees. The failure or refusal of any of these persons to comply with these stipulations shall be deemed a failure of the lessee to comply with the terms of the lease. The lessee shall require their agents, contractors and subcontractors involved in activities concerning this lease to include these stipulations in the contracts between and among them. These stipulations may be revised or amended, in writing, by the mutual consent of the lessor and the lessee at any time to adjust to changed conditions or to correct an oversight.

These stipulations are also imposed upon the lessee's agents and employees. The failure or refusal of any of these persons to comply with these stipulations shall be deemed a failure of the lessee to comply with the terms of the lease. The lessee shall require his agents, contractors and subcontractors involved in activities concerning this lease to include these stipulations in the contracts between and among them. These stipulations may be revised or amended, in writing, by the mutual consent of the lessor and the lessee at any time to adjust to changed conditions or to correct an oversight.

(a) CULTURAL RESOURCES - (1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall conduct a cultural resource intensive field inventory in a manner specified by the Authorized Officer of the BLM or of the surface managing agency, if different, on portions of the mine plan area and adjacent areas, or exploration plan area, that may be adversely affected by lease-related activities and which were not previously inventoried at such a level of intensity. The inventory shall be conducted by a qualified professional cultural resource specialist (i.e., archeologist, historian, historical architect, as appropriate), approved by the Authorized Officer of the surface managing agency (BLM, if the surface is privately owned), and a report of the inventory and recommendations for protecting any cultural resources identified shall be submitted to the Assistant Director of the Western Support Center of the Office of Surface Mining, the Authorized Office of the BLM, if activities are associated with coal exploration outside an approved Mining permit area (hereinafter called Authorized Officer), and the Authorized Officer of the surface managing agency, if different. The lessee shall undertake measures, in accordance with instructions from the Assistant Director, or Authorized Officer, to protect cultural resources on the leased lands. The lessee shall not commence the surface disturbing activities until permission to proceed is given by the Assistant Director or Authorized Officer.

(2) The lessee shall protect all cultural properties that have been determined eligible to the National Register of Historic Places within the lease area from lease-related activities until the cultural resource mitigation measures can be implemented as part of an approved Mining and reclamation or exploration plan unless modified by mutual agreement in consultation with the State Historic Preservation Officer.

(3) The cost of conducting the inventory, preparing reports, and carrying out mitigation measures shall be borne by the lessee.

(4) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Assistant Director or Authorized Officer, or the Authorized Officer of the surface managing agency, if the Assistant Director is not available. The lessee shall not disturb such resources except as may be subsequently authorized by the Assistant Director or Authorized Officer.

Within two (2) working days of notification, the Assistant Director or Authorized Officer will evaluate or have evaluated any cultural resources discovered and will determine if any action may be required to protect or preserve such discoveries. The cost of data recovery for cultural resources discovered during lease operations shall be borne by the lessee unless otherwise specified by the Authorized Officer of the BLM or of the surface managing agency, if different.

(5) All cultural resources shall remain under the jurisdiction of the United States until ownership is determined under applicable law.

(b) PALEONTOLOGICAL RESOURCES - If paleontological resources, either large and conspicuous, and/or of significant scientific value are discovered during Mining operations, the find will be reported to the Authorized Officer immediately. Mining operations will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 feet of such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils or significant scientific interest discovered during the operations.

(c) THREATENED and ENDANGERED SPECIES – The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq., or that have other special status. The Authorized Officer may recommend modifications to exploration and development proposals to further conservation and management objectives or to avoid activity that will contribute to a need to list such species or their habitat or to comply with any biological opinion issued by the Fish and Wildlife Service for the proposed action. The Authorized Officer will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act. The Authorized Officer may require modifications to, or disapprove a proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species, or result in the destruction or adverse modification of designated or proposed critical habitat.

The lessee shall comply with instructions from the Authorized Officer of the surface managing agency (BLM, if the surface is private) for ground disturbing activities associated with coal exploration on federal coal leases prior to approval of a Mining and reclamation permit or outside an approved Mining and reclamation permit area. The lessee shall comply with instructions from the Authorized Officer of the Office of Surface Mining Reclamation and Enforcement, or his designated representative, for all ground-disturbing activities taking place within an approved Mining and reclamation permit area or associated with such a permit.

(d) MULTIPLE MINERAL DEVELOPMENT - Operations will not be approved which, in the opinion of the Authorized Officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

(e) OIL AND GAS/COAL RESOURCES - The BLM realizes that coal Mining operations conducted on Federal coal leases issued within producing oil and gas fields may interfere with the economic recovery of oil and gas; just as Federal oil and gas leases issued in a Federal coal lease area may inhibit coal recovery. BLM retains the authority to alter and/or modify the resource recovery and protection plans for coal operations and/or oil and gas operations on those lands covered by Federal mineral leases so as to obtain maximum resource recovery.

(f) RESOURCE RECOVERY AND PROTECTION - Notwithstanding the approval of a resource recovery and protection plan (R2P2) by the BLM, lessor reserves the right to seek damages against the operator/lessee in the event (i) the operator/lessee fails to achieve maximum economic recovery (MER) (as defined at 43 CFR 3480.0-5(21)) of the recoverable coal reserves or (ii) the operator/lessee is determined to have caused a wasting of recoverable coal reserves. Damages shall be measured on the basis of the royalty that would have been payable on the wasted or unrecoverable coal.

The parties recognize that under an approved R2P2, conditions may require a modification by the operator/lessee of that plan. In the event a coal bed or portion thereof is not to be mined or is rendered unminable by the operation, the operator/lessee shall submit appropriate justification to obtain approval by the Authorized Officer to lease such reserves unmined. Upon approval by the Authorized Officer, such coal beds or portions thereof shall not be subject to damages as described above. Further, nothing in this section shall prevent the operator/lessee from exercising its right to relinquish all or portion of the lease as authorized by statute and regulation.

In the event the Authorized Officer determines that the R2P2, as approved, will not attain MER as the result of changed conditions, the Authorized Officer will give proper notice to the operator/lessee as required under applicable regulations. The Authorized Office will order a modification if necessary, identifying additional reserves to be mined in order to attain MER. Upon a final administrative or judicial ruling upholding such an ordered modification, any reserves left unmined (wasted) under that plan will be subject to damages as described in the first paragraph under this section.

Subject to the right to appeal hereinafter set forth, payment of the value of the royalty on such unmined recoverable coal reserves shall become due and payable upon determination by the Authorized Officer that the coal reserves have been rendered unminable or at such time that the operator/lessee had demonstrated an unwillingness to extract the coal.

The BLM may enforce this provision either by issuing a written decision requiring payment of the MMS demand for such royalties, or by issuing a notice of non-compliance. A decision or notice of non-compliance issued by the lessor that payment is due under this stipulation is appealable as allowed by law.

(g) PUBLIC LAND SURVEY PROTECTION - The lessee will protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the lease areas. If any monuments, corners or accessories are destroyed, obliterated, or damaged by this operation, the lessee will hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories at the same locations, using the surveying procedures in accordance with the “Manual of Surveying Instructions for the Survey of the Public Lands of the United States.” The survey will be recorded in the appropriate county records, with a copy sent to the Authorized Officer.

APPENDIX E
ASSESSMENT AREA EMISSIONS INVENTORY

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
Anadarko E&P Company, LP	Arch Battery 3	Storage Tank Battery	wv-M+9	3/1/2000	0.1	0.3			32.9
	Blair Dehydration Unit	Dehydration	wv-EV0	2/1/2000	0.1	0.3			6.9
	Brady (South 6D)	Production Site	wv-XY9	8/27/1999	0.1	0.3			0.1
	Brady 19D	Production Site	wv-XY9	8/27/1999	0.1	0.3			0.1
	Brady 31 Dakota	Production Site	wv-XY9	8/27/1999	0.1	0.3			0.1
	Brady 46F	Production Site	CT-2713	2/11/2002	0.2	0.7			7.9
	Brady 9 Dakota	Production Site	wv-XY9	8/27/1999	0.1	0.3			0.1
	Brady Deep 45 Frontier Well	Production Site	wv-DN2	5/21/2002	0.1	0.3			1.9
	Brady Deep Unit 47 Frontier	Production Site	wv-KB2	5/13/2002	0.1	0.3			1.8
	Brady Deep Unit 48F	Production Site	wv-Q72	4/11/2002	0.2	0.7			13.9
	Churchill Federal 12	Production Site	wv-2354	9/26/2005	0.1	0.5			7.6
	Delaney Rim 2	Production Site	wv-KH0	3/16/2000	0.8	1.0			1.8
	Delaney Rim 9 and Battery	Storage Tank Battery	wv-MG0	4/3/2000	2.6	3.0			7.1
	Desert Springs 14	Production Site	wv-D68	11/4/1997	1.6	2.6			0.5
	Desert Springs 16	Production Site	wv-D68	11/4/1997	0.5	0.8			0.1
	Desert Springs 6	Production Site	wv-D68	11/4/1997	0.5	0.8			0.1
	Desert Springs 7	Production Site	wv-D68	11/4/1997	0.6	1.6			0.2
	Echo Springs 242 F-2	Production Site	wv-797	7/31/1998	0.1	0.2			5.8
	Higgins 15L	Production Site	wv-XG9	3/2/2000	0.1	0.3			22.7
	Higgins 7	Production Site	wv-XG9	3/2/2000	0.1	0.3			1.6
	Higgins 8	Production Site	wv-XG9	3/2/2000	0.1	0.3			5.8
	Higgins Dehydration Facility	Dehydration	CT-4008	7/25/2005	2.2	0.9		74.4	8.1
	Higgins Unit 15-43A Well and Production Battery	Unknown	wv-3707	9/29/2005	0.7	1.2			2.5
	Higgins Unit 17	Production Site	wv-2666	9/29/2005	0.5	2.2		0.8	0.9
	Higgins Unit 18	Production Site	wv-3672	9/28/2005	0.3	1.1			
	Higgins Unit 19	Production Site	wv-2364	9/28/2005	0.4	1.8		0.8	0.4
	Jackknife Springs 10	Production Site	wv-EG0	1/20/2000	0.2	0.3			4.0
	Jackknife Springs 11	Production Site	wv-D52	12/21/2001	0.2	0.8			31.7
	Jackknife Springs 2	Production Site	wv-DW0	1/27/2000	1.5	1.6			9.9
Anadarko E&P	Jackknife Springs 5	Production Site	wv-XF9	2/29/2000	0.1	0.3			7.2

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
Company, LP	Jackknife Springs 6	Production Site	wv-XF9	2/29/2000	0.1	0.3			12.0
	Jackknife Springs 7	Production Site	wv-EJ0	1/19/2000	0.2	0.3			4.6
	Jackknife Springs 8	Production Site	wv-BM0	12/22/1999	0.2	0.3			47.9
	Jackknife Springs 9	Production Site	CT-1820	4/8/2000	0.2	0.2			5.5
	Monell Battery 4	Storage Tank Battery	wv-L+9	3/1/2000	0.1	0.3			4.0
	Monell Production Battery A	Production Site	MD-1144	4/12/2005	2.7	4.1			1.8
	North Brady Tank Battery	Storage Tank Battery	wv-XX9	3/14/2000	0.2	0.6		0.1	29.6
	Overland Trail Battery (UPRR 41-27)	Production Site	wv-XR9	2/3/2000	0.1	0.3			3.7
	Playa 2-5	Production Site	wv-U27	7/6/1998	1.0	7.0			
	Pronghorn 3-3	Production Site	wv-3888	10/14/2005	6.3	3.1			3.1
	Rock Island 4-H	Production Site	wv-3270	8/4/2005	3.1	2.4			1.5
	Sidewinder Unit #2-H	Production Site	wv-YG0	7/5/2000	1.3	1.3			0.2
	South Brady Shallow #3 Well Site	Production Site	wv-SP2	6/7/2002	0.2	0.6			5.4
	South Brady Shallow 1	Production Site	wv-YA9	2/11/2000	0.1	0.3			17.7
	South Brady Shallow 4	Production Site	wv-G82	12/27/2001	0.2	0.6			20.9
	SW Table Rock Federal 1	Production Site	wv-XC9	8/16/1999	0.1	0.3			1.8
	Table Rock Gas Plant	Sour Gas Plant	MD-1214	8/25/2005	47.9	43.6		80.6	12.0
	UPR 1-3	Production Site	wv-0899	6/13/2003	0.1	0.3			17.2
	UPRR 1 3-5	Production Site	wv-XC9	8/16/1999	0.1	0.3			1.8
	UPRR 21-15	Production Site	wv-XC9	8/16/1999	0.1	0.3			1.8
	UPRR 4-11	Production Site	wv-BV9	4/5/1999	0.0	0.0			0.0
	Valiant 1-19	Production Site	wv-3N2	8/5/2002	0.1	0.3			1.5
	Wells Bluff 13-1	Production Site	MD-869	4/15/2003	0.3	0.9			4.2
	Wells Bluff 13-2	Production Site	wv-0588	3/3/2003	0.1	0.3			10.7
	Wells Bluff 13-4	Production Site	wv-1392	12/9/2003	0.1	0.3			18.9
	Wooly Bully 4-23	Production Site	wv-XC9	8/16/1999	0.1	0.3			7.3
Anadarko Gathering Company	Big Robbie Compressor Station	Compressor Station	CT-3326	6/10/2003	6.0	17.7			7.3
Anadarko Petroleum Company	11 Phosphoria Compressor Station	Compressor Station	wv-FQ1	1/5/2001	3.4	5.2			3.0
	Greasewood Wash CBM Pilot	Unknown	wv-3762	8/25/2005	8.7	4.2			4.2

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
Anderson Oil Company	Anderson 12-1	Production Site	wv-W06	6/13/1996	0.7	0.7			0.2
Basin Exploration Incorporated	Chicken Springs Federal 33-30	Production Site	wv-MK0	7/5/2000	1.0	1.8			17.6
BCCK Engineering, Inc.	Pretty Water Gas Plant	Sour Gas Plant	CT-2969A	7/28/2003	18.6	13.8			8.1
Black Butte Coal Company	Leucite Hills mine	Surface Coal mine	wv-D28	10/23/1997			87.1		
BP America Production Company	Antelope Creek 35-2	Production Site	wv-1399	12/10/2003	0.1	0.3			15.9
	Bitter Creek 13-1	Production Site	wv-0416	12/19/2002	0.1	0.3			12.4
	Bitter Creek 15-01 Well Site	Production Site	wv-Z82	3/18/2002		0.3			17.5
	Bitter Creek 15-02	Production Site	wv-0174	9/19/2002	0.1	0.7			30.2
	Bitter Creek 15-3	Production Site	wv-0346	11/27/2002	0.1	0.3			49.9
	Bitter Creek 21-01	Production Site	wv-MV2	3/14/2002		0.3			16.1
	Bitter Creek 21-02	Production Site	wv-SE2	4/2/2002		0.3			16.0
	Bitter Creek 21-4	Production Site	wv-0573	3/5/2003	0.1	0.3			23.4
	Bitter Creek 23-02	Production Site	wv-WL2	4/2/2002		0.3			43.8
	Bitter Creek II-1 Msvrd	Production Site	wv-B36	1/7/1998					13.4
	Champlin 267 Amoco A	Production Site	wv-B36	1/7/1998					47.6
	Champlin 271 C2	Production Site	wv-0795	5/14/2003	0.1	0.3			17.3
	Champlin 320 Amoco C1A-H	Production Site	wv-Z80	12/2/1999	0.1	0.1			24.3
	Kinney Springs 3-1	Production Site	wv-1085	9/11/2003	0.1	0.3			25.1
	Kinney Springs 9-1	Production Site	wv-1166	9/23/2003	0.1	0.3			15.5
	Laney Wash 11-1	Production Site	wv-1008	8/5/2003	0.1	0.3			13.7
	Laney Wash 21-2	Production Site	wv-3527	8/25/2005	0.1	0.3			16.5
	North Barrel Springs 01-01	Production Site	wv-3008	4/5/2005	0.1	0.3			21.3
	North Barrel Springs 11-2	Production Site	wv-2441	3/15/2005	0.1	0.3			15.7
	North Barrel Springs 15-1	Production Site	wv-2442	3/15/2005	0.1	0.3			16.5
	North Barrel Springs 23-01	Production Site	wv-2512	3/16/2005	0.1	0.3			14.7
	North Barrel Springs 25-01	Production Site	wv-2510	3/17/2005	0.1	0.3			22.0

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	NW Iron Pipe 25-1	Production Site	wv-1376	12/5/2003	0.1	0.3			36.6
	NW Iron Pipe 29-2	Production Site	wv-0913	6/17/2003	0.1	0.3			42.9
	NW Iron Pipe 29-3	Production Site	wv-1424	12/18/2003	0.1	0.3			17.0
	NW Iron Pipe 31-2	Production Site	wv-1344	11/25/2003	0.1	0.3			13.3
	Red Lake 13-2	Production Site	wv-2091	10/25/2004	0.1	0.4			32.1
	Red Lake Fed 04-02	Production Site	wv-3039	4/5/2005	0.1	0.3			18.4
	Red Wash 11-1	Production Site	CT-3243	2/18/2003	0.1	0.3			11.9
	Red Wash 11-2	Production Site	wv-3531	9/22/2005	0.1	0.3			11.1
	Red Wash 1-2	Production Site	wv-4J2	7/3/2002	0.0	0.3			49.3
	Red Wash 1-3	Production Site	wv-0260	10/24/2002	0.1	0.3			49.7
	Red Wash 15-1	Production Site	CT-3884	4/22/2005	0.1	0.5			12.2
	Red Wash 23-1	Production Site	wv-1293	10/30/2003	0.1	0.3			29.7
	Red Wash 25-01	Production Site	wv-3340	5/16/2005	0.1	0.3			13.3
	Red Wash 3-1	Production Site	CT-3292	4/22/2003	0.1	0.4			11.7
	Red Wash 35-01	Production Site	wv-2894	4/4/2005	0.1	0.3			20.9
Celsius Energy Company	Vermillion Creek Deep 3	Production Site	wv-AX8	4/27/1998	1.2	1.0			0.5
Chevron USA, Inc.	Government Union 4	Production Site	wv-PM0	4/26/2000	14.8	7.0		0.3	14.4
	Morrison 1	Production Site	wv-WY0	10/5/2000	0.3	0.4			4.4
	Table Rock Compressor Station	Compressor Station	MD-1191	7/25/2005	7.5	14.7			10.6
	Table Rock Field-Battery #3	Production Site	MD-746	3/19/2002	0.6	2.3			34.9
	Table Rock Unit #122	Production Site	wv-P52	10/14/2002	0.3	1.4			2.0
	TRU 006	Production Site	wv-WY0	10/5/2000	0.2	0.3			4.8
	TRU 007	Production Site	wv-WY0	10/5/2000	0.2	0.3			6.7
	TRU 008	Production Site	wv-WY0	10/5/2000	0.2	0.3			5.0
	TRU 009	Production Site	wv-WY0	10/5/2000	0.2	0.4			9.5
	TRU 013	Production Site	wv-WY0	10/5/2000	0.2	0.3			5.3
	TRU 015	Production Site	wv-WZ0	6/15/2000	0.5	0.6			5.3
	TRU 016	Production Site	wv-WY0	10/5/2000	0.3	0.4			6.4
	TRU 017	Production Site	wv-WY0	10/5/2000	0.3	0.4			10.9
	TRU 021	Production Site	wv-WZ0	6/15/2000	0.5	0.6			4.0

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	TRU 023	Production Site	wv-WZ0	6/15/2000	0.6	0.8			4.0
	TRU 026	Production Site	wv-WZ0	6/15/2000	0.3	0.4			4.0
	TRU 030	Production Site	wv-WZ0	6/15/2000	0.3	0.4			4.0
	TRU 032	Production Site	wv-WZ0	6/15/2000	0.2	0.3			6.2
	TRU 033	Production Site	wv-WZ0	6/15/2000	0.3	0.4			4.0
	TRU 036	Production Site	wv-WZ0	6/15/2000	0.2	0.2			4.0
	TRU 037	Production Site	wv-WZ0	6/15/2000	0.5	0.6			4.0
	TRU 038	Production Site	wv-WZ0	6/15/2000	0.3	0.4			4.0
	TRU 039X	Production Site	wv-WY0	10/5/2000	0.4	0.6			4.6
	TRU 040	Production Site	wv-WZ0	6/15/2000	0.5	0.6			7.8
	TRU 041	Production Site	wv-WZ0	6/15/2000	0.4	0.5			8.0
	TRU 042	Production Site	wv-WY0	10/5/2000	0.2	0.3			4.4
	TRU 071	Production Site	wv-WY0	10/5/2000	0.4	0.6			5.0
	TRU 092	Production Site	wv-WY0	10/5/2000	0.3	0.4			5.3
	TRU 097L	Production Site	wv-WY0	10/5/2000	0.4	0.6			5.5
	TRU 098	Production Site	wv-WY0	10/5/2000	0.3	0.4			12.5
	TRU 101A	Production Site	wv-WY0	10/5/2000	0.2	0.3			4.6
	TRU 102	Production Site	wv-WZ0	6/15/2000	0.5	0.6			4.0
	TRU 104	Production Site	wv-WZ0	6/15/2000	0.2	0.2			4.1
	TRU 106	Production Site	wv-WY0	10/5/2000	0.2	0.3			6.6
	TRU 108	Production Site	wv-WY0	10/5/2000	0.2	0.3			6.8
	TRU 109	Production Site	wv-WY0	10/5/2000	0.3	0.4			11.7
	TRU 111	Production Site	wv-WZ0	6/15/2000	0.5	0.6			4.0
	TRU 112	Production Site	wv-WZ0	6/15/2000	0.2	0.2			6.8
	TRU 116	Production Site	wv-WY0	10/5/2000	0.4	0.6			6.6
Chicken Creek, LLC	Rhode Island Red Federal 4-27	Production Site	wv-3232	7/18/2005	1.6	0.8			1.6
Coastal Field Services	Coastal Federal 1-28	Production Site	wv-849	11/4/1998					6.0
	Government 12-A-18	Production Site	wv-849	11/4/1998					5.1
	Sampson Federal 1-18	Production Site	wv-859	11/4/1998					6.6
	Table Rock 21	Production Site	wv-E69	10/15/1998					15.0

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
Coastal Oil and Gas Corporation	Federal 1-28	Production Site	wv-M56	1/12/1998		0.3			7.4
	State 1-16	Production Site	wv-M56	1/12/1998		0.2			4.7
	Winona Federal 1-18	Production Site	wv-M56	1/12/1998		0.3			7.4
Coleman Construction, Inc.	Bitter Creek Pit	Crushing and Screening	CT-3967	6/14/2005	0.6	3.7	1.4		0.1
Colorado Interstate Gas	Desert Springs Compressor Station	Compressor Station	31-041	1/23/2002	43.0	308.7			42.4
	No. 1 UPRC No. 3-5	Dehydration	wv-D87	3/20/1997	0.1	0.1			7.3
	Table Rock 111	Dehydration	wv-D87	3/20/1997	0.0	0.2			0.8
	Table Rock 2-24 V	Production Site	wv-M36	4/4/1996	0.1	0.2			1.3
	Table Rock 41	Dehydration	wv-D87	3/20/1997	0.1	0.3			14.0
	Table Rock Compressor Station	Compressor Station	MD-740A	1/2/2003	17.7	130.3			17.0
Colt Resources Corporation	Government Polly 1	Production Site	CT-	12/30/1999	1.2	5.5			5.3
ConocoPhillips Company	Rock Springs Terminal	Storage Tank Battery	wv-CN1	10/4/2002	22.9	9.2			97.9
CREDO Petroleum Company	Marianne Compressor Station	Compressor Station	MD-971	2/3/2004	7.0	3.9			1.8
Crown Oil and Gas Company Incorporated	Patrick Draw Central Tank Battery	Storage Tank Battery	wv-WW0	8/17/2000	0.1	0.1			5.2
	State #2	Production Site	wv-WW0	8/17/2000	2.7	3.1			0.4
	State #3	Production Site	wv-WW0	8/17/2000	1.3	7.2			1.3
	State #8	Production Site	wv-WW0	8/17/2000	2.7	3.1			0.4
	State 1-36	Production Site	wv-WW0	8/17/2000	2.7	3.1			0.4
	State 5-36	Production Site	wv-WW0	8/17/2000	1.3	7.2			1.3
Devon Energy Production Company, L.P.	Federal 12X-14B	Production Site	wv-877	1/27/1998	7.7	5.1			2.8
	Leucite Hills 1-26	Production Site	wv-M76	1/12/1998		0.3			9.1
DNR Oil & Gas Incorporated	North Pioneer 1-8	Production Site	wv-QU9	8/26/1999	0.1	0.1			1.2
Duke Energy Field Services,	Bittercreek 21-3	Production Site	wv-0506	1/29/2003					13.0
	Black Butte 1-18-100	Dehydration	wv-0845	1/14/2004		0.2			11.8

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
LP	Champlin 104 Amoco A-1	Dehydration	wv-1618	3/17/2004					4.6
	Champlin 104 Amoco B-1	Dehydration	wv-1617	3/17/2004					4.5
	Deadman 21-8	Dehydration	wv-YE2	6/27/2002		0.1			1.7
	Valliant 1-19	Production Site	wv-2K2	9/12/2002		0.1			1.4
	Yates Bicycle Federal Compressor #18	Compressor Station	CT-3477	12/23/2003	1.9	6.3			23.4
	Yates Bicycle Federal Compressor #6	Compressor Station	CT-3507	1/20/2004	1.9	6.3			23.4
	Yates Huffy State Compressor #16	Compressor Station	CT-3508	1/20/2004	1.9	6.3			23.4
El Paso Field Services	Shiprock 4-4	Dehydration	wv-Q12	6/6/2001		0.1			7.2
Encana Oil and Gas (USA), Inc.	Amoco UPRR 01-11	Production Site	wv-S67	1/6/1998	0.1	0.7			23.4
	Desert Spring Unit 1	Production Site	wv-2078	8/2/2004	0.9	1.0			0.4
	Desert Springs 10-13L	Production Site	wv-2079	8/2/2004	1.1	1.3			30.1
	Desert Springs 10-14L	Production Site	wv-3655	10/7/2005	1.1	1.3			2.4
Enterprise NGL Pipelines, LLC	Rock Springs Station	Compressor Station	MD-1006	6/3/2004	99.2	77.6			4.7
EOG Resources	Powder Mountain 1-13F	Production Site	wv-SJ0	5/9/2000	0.3	1.1			0.2
Forest Oil Corporation	Shiprock Federal #4-1	Production Site	wv-FZ1	1/4/2001	0.1	0.3			0.1
Global Compression Services	Vermillion Creek Compressor	Compressor Station	CT-1165	7/5/1995	24.1	19.3			9.7
Grynberg Petroleum	Federal 1-21	Production Site	wv-HB9	8/20/1999	0.3	1.1			3.2
Halliburton Services	Rock Springs Sand Handling Facility	Miscellaneous	MD-301	11/26/1996			0.0		
Headwaters Resources, Inc.	Jim Bridger Power Plant	Power Plant	wv-3454	6/21/2005			1.4		
Howell Petroleum Corporation	Champlin 162 A1	Production Site	wv-928	11/6/1998	0.1	0.7			13.4
Independent Production Company	1-29 Champlin Battery	Storage Tank Battery	wv-K26	4/5/1996	0.1	0.5			3.8
	2-29 Champlin	Production Site	wv-K16	4/5/1996	0.5	3.8			1.0
	4-29 Champlin	Production Site	wv-K26	4/5/1996					0.8

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	8-29 Champlin	Production Site	wv-K26	4/5/1996	0.2	1.6			0.4
	Anderson 12-1	Production Site	wv-NN9	8/31/1999	0.1	0.1			0.1
Infinity Oil & Gas of Wyoming	Black Bear 1	Production Site	wv-3120	10/12/2005	2.9	3.9			1.7
	Pipeline 12-2-18-100	Production Site	wv-2845	10/13/2005	2.8	3.5			1.7
	Pipeline 13-1-18-100	Production Site	wv-2847	10/13/2005	2.8	3.7			1.7
	Pipeline 13-12-18-100	Production Site	wv-2840	10/13/2005	0.4	3.4			1.7
	Pipeline 13-2-18-100	Production Site	wv-2848	10/13/2005	2.8	3.5			1.7
	Pipeline 13-4R-18-100	Production Site	wv-2849	10/13/2005		0.2			
	Pipeline 1-4-18-100	Production Site	wv-2844	10/12/2005	0.3	2.1			1.1
John Bunning Transfer Company	Rock Springs Transloading Facility	Transloading Facility	wv-047	11/1/1996			0.1		
Kaiser-Francis Oil Company	Higgins Federal 1	Production Site	wv-RG9	3/8/2000	0.1	0.3			0.8
	Jewell Federal 1	Production Site	wv-RG9	3/8/2000	0.1	0.2			0.8
	Joyce Creek	Production Site	wv-RN9	3/7/2000	0.2	0.2			4.4
	Landsdale Federal 1	Production Site	wv-RG9	3/8/2000					0.7
	Mt. Kenai	Production Site	wv-RL9	3/13/2000	0.2	0.3			3.3
	Pronghorn 1 Tank Battery	Storage Tank Battery	wv-498	11/20/1997	2.1	8.6			8.4
	Sheep Camp Federal	Production Site	wv-RH9	3/7/2000	0.1	0.2			0.9
	U.P.P.R. Federal 1	Production Site	wv-RG9	3/8/2000					0.7
Kestrel Energy Incorporated	Dines 2	Production Site	wv-GJ9	1/18/2000	1.0	1.3			7.2
	Greens Canyon #27-3	Production Site	wv-WT0	6/7/2000	0.6	0.6			0.1
Laramide Production LLC	Crooked Canyon 11-16-21-103	Production Site	wv-FH9	8/20/1999	0.2	0.3			1.2
Luff Exploration Company	1-17 Champlin	Production Site	wv-P36	3/29/1996	0.1	0.4			7.2
	1-31 North Patrick Draw Battery	Storage Tank Battery	wv-K16	4/5/1996	0.2	0.8			4.0
	1-8 Federal	Production Site	wv-P66	5/9/1996	0.0	0.1			1.6
	1-9 Champlin	Production Site	wv-V17	8/25/1997	1.6	10.6			13.7
	2-17 Amoco Champlin	Production Site	wv-P66	5/9/1996	0.0	0.1			1.3
	2-17 Champlin	Production Site	wv-P36	3/29/1996	0.1	0.4			6.0
	21A Leucite	Production Site	wv-P66	5/9/1996	0.0	0.0			0.4

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	2-21 Champlin	Production Site	wv-K26	4/5/1996	0.5	3.8			1.0
	2-6 Government	Production Site	wv-P66	5/9/1996	0.1	0.3			4.9
	3-9 Amoco Champlin	Production Site	wv-P66	5/9/1996	0.1	0.4			7.5
	4-16 State	Production Site	wv-P36	3/29/1996	0.1	0.4			13.1
	6-31 North Patrick Draw Battery	Storage Tank Battery	wv-K16	4/5/1996	0.1	0.7			5.1
	B-32 Anadarko Federal	Production Site	wv-P76	3/29/1996	0.1	0.3			0.1
	Cedar Canyon Pipeline Facility	Compressor Station	wv-V07	8/26/1997	1.4	7.0			6.6
	Champlin 398 Amoco B	Production Site	wv-P66	5/9/1996	0.0	0.2			2.8
	Crooked Canyon Compressor Station	Compressor Station	wv-0194	10/14/2002	1.8	8.3			13.0
	G-4 Federal	Production Site	wv-P66	5/9/1996	0.0	0.1			2.5
Merit Energy Company	Wyoming Federal A1	Production Site	wv-Y98	4/7/1998	1.4	1.6			2.7
	Wyoming Federal A2	Production Site	wv-Y98	4/7/1998	0.7	5.1			3.0
Mountain Gas Resources	Antelope 35-2	Production Site	wv-1791	6/17/2004					6.9
	Barrel Springs 11-2	Production Site	wv-2287	2/22/2005					6.9
	Barrel Springs 15-1	Production Site	wv-2289	2/23/2005					5.4
	Bitter Creek 13-1	Dehydration	wv-0423	1/2/2003					6.8
	Bitter Creek 15-1	Dehydration	wv-AE2	5/2/2002		0.2			2.1
	Bitter Creek 15-2	Dehydration	wv-0242	11/25/2002		0.1			9.9
	Bitter Creek 15-3	Dehydration	wv-0342	11/25/2002					10.7
	Bitter Creek 21-1	Dehydration	wv-RB2	6/17/2002		0.1			10.2
	Bitter Creek 21-2	Dehydration	wv-RA2	6/12/2002		0.1			8.2
	Bitter Creek 21-4	Dehydration	CT-3289	4/22/2003					8.6
	Bitter Creek 23-2	Dehydration	wv-YD2	6/26/2002		0.1			9.0
	Bitter Creek State 16-1	Production Site	wv-1619	3/17/2004					12.4
	Black Butte 11-18-100 Compressor Station	Compressor Station	CT-2605A	3/14/2002	15.4	7.7			7.9
	Black Butte 1-18-100 Compressor Station	Compressor Station	wv-SZ2	3/21/2002	0.1	6.0			19.0
	Black Butte 13-18-100 Compressor Station	Compressor Station	CT-2606	11/27/2001	11.6	5.8			6.0
	Black Butte 23-19-100 Compressor Station	Unknown	CT-2397A	8/3/2001	15.6	7.8			22.9
	Champlin 271 Amoco C-2	Production Site	wv-1890	8/10/2004					4.9

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	Delaney Rim Dehydrator Station	Production Site	wv-M60	10/29/1999	0.1	0.1			12.9
	Iron Pipe 25-1	Dehydration	wv-1411	12/1/2003					8.7
	Iron Pipe 29-2	Dehydration	CT-3403	9/22/2003					0.8
	Iron Pipe 29-3	Dehydration	wv-1792	6/17/2004					7.9
	Iron Pipe 31-2	Dehydration	wv-1342	11/24/2003					4.5
	Kinney Springs 3-1	Production Site	CT-3433	11/12/2003		0.1			11.8
	Kinney Springs 9-1	Dehydration	wv-1176	9/25/2003					14.5
	Laney Rim 35-1	Dehydration	wv-0743	4/21/2003	0.1	0.3			6.1
	Laney Rim 35-3	Dehydration	CT-3324A	4/16/2004	0.1	0.5			8.7
	Laney Wash 11-1	Dehydration	wv-1022	8/11/2003					2.9
	Laney Wash 15-1	Dehydration	wv-1884	8/9/2004					8.8
	Orange Blossum	Dehydration	wv-0696	4/22/2002					3.7
	Pronghorn Federal 1	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.9
	Red Desert Gas Plant	Sweet Gas Plant	MD-1143	4/14/2005	159.5	94.4			104.2
	Verbrugee 2	Dehydration	wv-KW1	9/16/2002	0.1	0.3			9.0
	Wolf	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.6
New Mexico Resources, LLC	Bitter Creek Zeolite mine/Processing Plant	Miscellaneous	wv-2435	9/29/2004	23.8	38.0	9.8	7.9	3.0
Overland Trail Transmission Company	1-72	Dehydration	wv-KW1	9/16/2002	0.1	0.3			4.2
	Robert Federal 1	Production Site	wv-5M2	9/3/2002		0.2			0.5
Overland Trail Transmission, LLC	Anadarko Federal 1	Dehydration	wv-KW1	9/16/2002	0.1	0.3			7.4
	Diamondback 1-18	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.5
	Diamondback A1-2	Dehydration	wv-KW1	9/16/2002	0.1	0.3			4.4
	Hunt Federl 1	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.7
	Lucite Hills 2-19	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.8
	Mull 4-8	Dehydration	wv-KW1	9/16/2002	0.1	0.3			4.5
	North Baxter Compressor Station	Compressor Station	31-025	3/5/2002	54.1	299.6			45.3
	Pet Inc. 19-1	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.7
	Sput State 2	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.0
	TXO Deadman Federal	Dehydration	wv-KW1	9/16/2002	0.1	0.3			6.5

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Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	Yates Depot 1	Dehydration	wv-KW1	9/16/2002	0.1	0.3			6.9
	Yates Depot 2	Dehydration	wv-KW1	9/16/2002	0.1	0.3			6.6
	Yates Depot 3	Dehydration	wv-KW1	9/16/2002	0.1	0.3			5.0
	Yates Depot 4	Dehydration	wv-KW1	9/16/2002	0.1	0.3			3.7
P4 Production L.L.C.	Rock Springs - Rotary Coking	Miscellaneous	wv-3023	4/14/2005	9.0	319.0	106.9		2.0
Pamco Services International Incorporated	Compressor CT-1215 (Canyon Creek)	Compressor Station	CT-1215	5/7/1996	17.4	17.4			2.6
Petroleum Incorporated	Amoco UPRR 19-1	Production Site	wv-P18	4/30/1998	8.7	12.2			0.3
Questar Exploration & Production Company	Big Drop Well 8-1	Production Site	wv-EZ1	1/23/2001	0.0	0.3			0.4
	Big Drop Well 8-2	Production Site	wv-EZ1	1/23/2001	0.2	0.6			
	Big Drop Well 8-3	Production Site	wv-EZ1	1/23/2001	0.0	0.3			2.1
	Canyon Creek Shallow Central Dehydration Unit	Dehydration	wv-JE1	1/26/2001					3.9
	South Baxter Unit 22	Production Site	CT-3548	3/9/2004		0.6			12.8
	Vermillion Gas Plant	Production Site	wv-SS0	5/11/2000	0.3	0.8			0.3
Questar Gas Management Company	Big Drop Compressor Station	Compressor Station	wv-TH2	6/27/2002	7.7	3.9			8.8
	JL33 Dehy - Simon Station	Pipeline Station	wv-2187	12/28/2004	0.1	0.9			5.6
	Lateral 706 Compressor	Compressor Station	wv-X66	3/24/1997		57.0			18.0
	North Baxter Compressor Station	Compressor Station	wv-X66	3/24/1997		44.0			10.0
	Vermillion Creek Compressor Station	Compressor Station	MD-549A	5/8/2001	11.5	10.8			4.2
	Vermillion Creek Deep 3	Dehydration	wv-AW8	4/27/1998	0.0	0.1			1.4
	Vermillion Creek Deep Unit #1	Dehydration	wv-SR0	5/11/2000	0.1	0.3			
Questar InfoCom	Aspen Communications Facility	Generation	wv-K47	4/1/1997	0.8	0.2			0.0
	Kanda Communications Facility	Generation	wv-K47	4/1/1997	0.1	0.0			
	Pine Butte Communications Facility	Generation	wv-K47	4/1/1997	0.4	0.1			0.0
Questar Pipeline Company	Horseshoe Draw Compressor Station	Compressor Station	wv-X66	3/24/1997		47.0			56.0
	J.L. No. 19 Condensate Tank	Production Site	wv-X66	3/24/1997					3.2
	M.L. No. 58 Liquid Rec.	Production Site	wv-X66	3/24/1997					2.4
	Rock Springs Complex	Compressor Station	31-036	10/9/2003	369.7	434.1			76.7

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	(Clmn/Knda/Nghtngl)								
	Skull Creek Compressor Station	Compressor Station	wv-0972	8/25/2003	66.8	53.2			3.0
	South Baxter Compressor Station	Compressor Station	CT-3730	11/16/2004	4.8	13.8			28.3
	T.R.M.L. No. 22 Kanda	Production Site	wv-X66	3/24/1997					7.2
	Trail Unit No. 3, Meter 1338	Production Site	wv-J56	1/30/1996					1.7
Red Desert Gravel	Bitter Creek Pit	Crushing and Screening	CT-3976	6/20/2005			2.4		
Reliance Electric Service Center	Rock Springs Service Center	Miscellaneous	wv-667	1/10/1997	0.2	0.9	19.0		10.9
RMOC Holdings LLC	State Wells 1-36 & 44-36 Comp Station	Compressor Station	wv-S58	7/2/1998	1.0	1.0			2.0
Samson Resources Company	1-2 Federal	Production Site	wv-P56	3/29/1996	6.0	7.1			1.0
	1-7 Champlin	Production Site	wv-P56	3/29/1996	10.9	12.9			1.8
	1-7 Champlin Patented	Production Site	wv-0193	9/18/2002	2.4	3.8			8.4
	4-25 Amoco Champlin	Production Site	wv-V17	8/25/1997	2.3	5.1			5.1
	5-2A Sand Butte	Production Site	wv-V17	8/25/1997	7.8	1.9			0.5
	Baxter 04-15	Production Site	wv-EV9	6/21/1999	0.1	0.4			0.1
	Baxter 15-15	Production Site	wv-EV9	6/21/1999	0.1	0.4			0.1
	Baxter 21-15	Production Site	wv-SE1	4/9/2001	0.1	0.4			0.6
	Baxter 4-22	Production Site	wv-EV9	6/21/1999	0.1	0.4			0.1
	Baxter Compressor Station	Compressor Station	wv-VT9	7/27/1999	0.7	1.0			4.8
	Big Pond Federal 1 Well	Production Site	wv-CC8	5/27/1998	2.0	2.7			2.4
	Deadman Federal 1	Production Site	wv-2454	9/11/2005	0.1	0.5			
	Deadman Federal 21-8	Production Site	wv-2454	7/29/2005	6.5	3.1			0.4
	Desert Springs 12-33	Production Site	wv-L+0	11/13/2000	0.1	0.2			7.6
	Desert Springs 14-33	Production Site	wv-L+0	11/13/2000	0.1	0.3			1.0
	Desert Springs 24-29	Production Site	wv-L+0	11/13/2000	0.1	0.1			1.0
	Desert Springs 41-31	Production Site	wv-L+0	11/13/2000	0.1	0.2			0.1
	Desert Springs 41-5	Production Site	wv-L+0	11/13/2000					0.6
	Desert Springs 43-31	Production Site	wv-L+0	11/13/2000	0.1	0.2			0.6
	Desert Springs Central Tank Battery	Storage Tank Battery	wv-L+0	11/13/2000	0.1	0.2			8.0

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	Iron Duke 2-7	Production Site	wv-K+0	11/9/2000	0.1	0.4			0.4
	Leucite Hills 1-19	Production Site	wv-K+0	11/9/2000	0.1	0.4			5.8
	Leucite Hills 1-33	Production Site	wv-1662	3/1/2004	1.7	2.0			5.2
	Leucite Hills 2-19	Production Site	wv-BG1	11/7/2000	1.7	3.1			12.6
	Pine Canyon Federal 1-18	Production Site	wv-1702	5/6/2004	1.0	1.2			0.7
	Pine Canyon Federal A1-2	Production Site	wv-1704	5/6/2004		0.1			0.2
	Powder Mountain 1-13E	Production Site	wv-2407	7/28/2005	0.2	0.8			4.7
	Powder Mountain 23-36	Production Site	wv-XA1	6/11/2002		0.2			14.1
	Powder Mountain Federal 34-26X	Production Site	wv-D70	8/24/1999	0.1	0.4			0.9
	Salt Wells 15-10	Production Site	wv-3850	9/22/2005	3.0	1.8			15.4
	Salt Wells 22-11	Production Site	wv-RF9	6/3/1999	0.2	0.4			13.6
	Salt Wells Federal 11-11	Production Site	wv-1871	7/22/2004	0.3	0.3			2.6
	Union Federal2-11	Production Site	wv-3779	9/7/2005	3.8	1.9			1.9
	UPRC 13-3	Production Site	wv-SD1	4/5/2001	0.2	0.8			4.0
	UPRR 1-3 #1	Production Site	wv-K+0	11/9/2000	0.8	4.7			5.2
	UPRR 3-19 #2	Production Site	wv-K+0	11/9/2000	0.1	0.5			5.0
	UPRR 3-5 #1	Production Site	wv-L+0	11/13/2000	0.1	0.2			0.1
	West Pine Canyon 10-5 D	Production Site	wv-M27	3/31/1998	4.1	4.7			2.6
Samuel Fox Funeral Home	Samuel Fox Human Crematory	Incineration	CT-1249	9/24/1996			0.0		
SF Pipeline Limited Company	Clay Basin Booster Station	Miscellaneous	wv-BS2	10/31/2001	0.3	1.3	0.1	0.1	0.1
Simplot Phosphates LLC	Rock Springs Facility	Miscellaneous	MD-1130	3/14/2005	244.3	532.4		2586.4	23.1
TRC Alton Geoscience	Portable Remediation Unit	Soil Remediation Unit	CT-2037	9/6/2000	0.1	0.3			2.9
True Oil LLC	Beard Federal 24-4A	Production Site	wv-V26	10/31/1996	14.5	17.1			2.0
	Brown Federal 11-12	Production Site	wv-V26	10/31/1996	0.0	0.1			
Vase Funeral Homes	Rest Haven-Crematory- Sweetwater	Incineration	CT-1240	8/6/1996			0.1		
Warren E & P,	Pacific Rim Compressor Station #1	Compressor Station	wv-3286	5/17/2005	5.7	17.1			11.1

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Inc.	Pacific Rim Generator Station #1	Generation	CT-3472	12/12/2003	10.5	10.5			10.5
	Rifes Rim Compressor Station #1	Compressor Station	CT-4072	9/27/2005	10.2	10.5			5.1
Water Remediation Technology, LLC	Sweetwater Zeolite milesne (Test)	Crushing and Screening	wv-0233	10/10/2002	0.4	1.1	4.0	0.1	0.2
Western Gas Resources, Inc.	Anderson Federal 12-1	Dehydration	wv-EN8	11/3/1998					2.8
	Desert Springs 12-L	Production Site	wv-949	3/7/2005					0.0
	Desert Springs 16-L	Production Site	wv-859	3/7/2005					0.0
	Desert Springs 17-L	Production Site	wv-869	3/7/2005					0.0
	Desert Springs 18-L	Production Site	wv-859	3/7/2005					0.0
	Desert Springs 1-L	Production Site	wv-849	3/7/2005					0.0
	Desert Springs 20-L	Production Site	wv-859	3/7/2005					0.0
	Desert Springs 22-L	Production Site	wv-849	3/7/2005					0.0
	Desert Springs 23-L	Production Site	wv-949	3/7/2005					0.0
	Desert Springs 24-L	Production Site	wv-859	3/7/2005					0.0
	Desert Springs 25-A	Production Site	wv-849	3/7/2005					0.0
	Desert Springs 2-LI	Production Site	wv-859	3/7/2005					0.0
	Desert Springs 3-A	Production Site	wv-949	11/4/1998					6.8
	Desert Springs 5-AR	Production Site	wv-949	3/7/2005					0.0
	Kaiser Francis Higgins Federal	Production Site	wv-899	3/7/2005					0.0
	Kaiser Francis Jewel Federal	Dehydration	wv-EN8	3/7/2005					0.0
	Kaiser Francis UPRC 1	Dehydration	wv-EN8	3/7/2005					0.0
	Ken Luff TMF 1-7	Production Site	wv-859	3/7/2005					0.0
	Luff 1-2	Production Site	wv-849	3/7/2005					0.0
	Luff Sand Butte 5-2A	Production Site	wv-919	3/7/2005					0.0
	Madex 13-1	Dehydration	wv-EN8	11/3/1998					4.6
	Madex Federal 18-1	Dehydration	wv-EN8	11/3/1998					2.6
	Madex Federal 24-2	Dehydration	wv-EN8	11/3/1998					2.3
	Marathon Big Pond Federal	Dehydration	wv-EN8	11/3/1998					4.6
	Playa 2-5	Production Site	wv-859	3/7/2005					0.0

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	Playa 66-16SA	Production Site	wv-859	3/7/2005					0.0
	Prenalta Corp. Government O'Connell	Dehydration	wv-EN8	11/3/1998					4.1
	Rock Island 4	Production Site	wv-SN9	4/27/1999		0.1			0.5
	State 13-36	Production Site	wv-849	3/7/2005					0.0
	Steve Federal 14-1	Dehydration	wv-EN8	11/3/1998					4.3
	Table Rock 104	Dehydration	wv-0761	3/7/2005		0.0			0.0
	Table Rock 111	Dehydration	wv-0761	3/7/2005		0.0			0.0
	Templeton Energy Shiprock 4-1	Dehydration	wv-EN8	3/7/2005					0.0
	Texaco Federal A-1	Dehydration	wv-EN8	3/7/2005					0.0
	Texaco Federal A-2	Dehydration	wv-EN8	3/7/2005					0.0
	Texaco Government Union Oil 1	Dehydration	wv-EN8	11/3/1998					0.1
	Texaco Table Rock 104	Dehydration	wv-EN8	11/3/1998					0.3
	Texaco Table Rock 22	Dehydration	wv-EN8	11/3/1998					0.4
	Texaco Table Rock 26	Dehydration	wv-EN8	11/3/1998					0.4
	Texaco Table Rock 30	Dehydration	wv-EN8	3/7/2005					0.0
	Texaco Table Rock 36	Dehydration	wv-EN8	11/3/1998					0.3
	Texaco Table Rock 40	Production Site	wv-969	3/7/2005					0.0
	TRU 115H	Production Site	wv-KG0	3/7/2005	0.0	0.0			0.0
	True Oil Beard Federal 24-4	Dehydration	wv-EN8	11/3/1998					0.4
	True Oil Co. Brown Federal 11-12	Dehydration	wv-EN8	11/3/1998					1.1
	True Oil Co. Texaco Federal 11-2	Dehydration	wv-EN8	11/3/1998					1.1
	UPRC Arch 75	Production Site	wv-849	3/7/2005					0.0
	UPRC Delaney Rim 2	Dehydration	wv-EN8	11/3/1998					0.1
	UPRC Federal 1	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Higgins 1	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Higgins 15	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Higgins 3	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Higgins 5	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Higgins 7	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Higgins 8	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Playa 15-L	Production Site	wv-949	3/7/2005					0.0

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	UPRC Playa 1-8A	Production Site	wv-849	3/7/2005					0.0
	UPRC Playa G-13	Production Site	wv-859	3/7/2005					0.0
	UPRC Playa G-4	Production Site	wv-849	3/7/2005					0.0
	UPRC Playa G-8	Production Site	wv-869	3/7/2005					0.0
	UPRC Stage Stop 15	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Stage Stop 4	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Stage Stop 7	Dehydration	wv-EN8	3/7/2005					0.0
	UPRC Table Rock 21-15	Dehydration	wv-EN8	3/7/2005					0.0
Wexpro Company	Canyon Creek 11	Dehydration	CT-2556	10/26/2001		0.2			14.5
	Canyon Creek 15	Dehydration	CT-2556	10/26/2001		0.4			14.3
	Canyon Creek 19	Dehydration	CT-2556	10/26/2001		0.2			14.5
	Canyon Creek 22	Dehydration	CT-2556	10/26/2001		0.5			14.4
	Canyon Creek 23	Dehydration	CT-2556	10/26/2001		0.5			14.3
	Canyon Creek 26	Dehydration	wv-LK2	4/15/2003	0.2	0.3			8.3
	Canyon Creek 27	Dehydration	CT-2556	10/26/2001		0.4			14.4
	Canyon Creek 34-R	Production Site	wv-2684	9/7/2005	0.2	1.0			28.9
	Canyon Creek 35	Production Site	wv-1944	9/27/2004	0.1	0.4			11.7
	Canyon Creek 37	Production Site	wv-0460	1/16/2003		0.2			11.5
	Canyon Creek 4	Dehydration	wv-UK1	9/14/2001		0.5			14.4
	Canyon Creek 6	Dehydration	CT-2556	10/26/2001		0.1			14.4
	Canyon Creek Unit 38	Production Site	wv-3306	8/19/2005	0.2	0.8			13.4
	Canyon Creek/Vermillion Complex	Sweet Gas Plant	wv-2320A	10/12/2004	191.2	129.4			150.5
	Kinney 13-1	Production Site	CT-2710	2/5/2002	0.3	1.4			14.1
	Kinney 2	Production Site	wv-UL1	12/12/2001	0.2	0.8			6.6
	Kinney 5	Production Site	CT-2709	2/5/2002		0.3			14.4
	Leucite Hills Unit 4	Production Site	wv-3197	9/8/2005	0.1	0.6			10.0
	Newberger Well 5	Unknown	wv-LL2 (Revised)	8/12/2003	2.2	2.5			0.1
	South Baxter 23	Production Site	wv-2301	2/23/2005	0.1	0.7			2.1
	South Baxter Unit 22	Unknown	wv-2147	8/5/2004	5.3	2.7			1.3
	South Baxter Unit 24	Production Site	wv-2914	1/26/2005	2.1	2.0			8.0

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	South Baxter Unit 26	Production Site	wv-2986	8/17/2005	0.2	2.7			1.1
	Trail 12	Production Site	CT-2706	2/5/2002		0.2			23.2
	Trail 13	Production Site	CT-2707	2/5/2002		0.4			32.0
	Trail 16	Production Site	wv-9Z2	10/1/2002	0.1	0.5			20.1
	Trail 17	Production Site	wv-UL1	12/12/2001	0.0	0.4			11.3
	Trail 18	Production Site	CT-2708	2/5/2002	0.1	0.7			44.7
	Trail Unit Well 15	Production Site	CT-3258	3/11/2003	0.1	0.4			11.0
Williams Communications Incorporated	South Baxter Regeneration Site	Generation	wv-VX9	6/18/1999	0.3	1.8	0.1	0.2	0.1
	Table Rock OP-AMP Site	Generation	wv-TZ9	6/18/1999	0.3	1.8	0.1	0.2	0.1
Williams Field Services	Bitter Creek II 1	Dehydration	wv-T57	12/1/1998	0.1	0.0			4.6
	Champlin 267 A1	Dehydration	wv-T57	12/1/1998	0.5	0.0			12.5
	Champlin 269 B1	Dehydration	wv-T57	12/1/1998	0.5	0.0			21.2
	Champlin 271 C1	Dehydration	wv-T57	12/1/1998	0.5	0.0			11.9
	Champlin 320 C1 AH	Dehydration	wv-T57	12/1/1998	0.1	0.0			5.6
	Champlin 337 A2	Dehydration	wv-T57	12/1/1998	0.1	0.0			5.6
	Champlin 534 B1	Dehydration	wv-T57	12/1/1998	0.1	0.0			4.6
	Salt Wells to MFS	Dehydration	wv-T47	2/5/1999	0.1	0.0			2.6
	Wooly Bully 4-23	Dehydration	wv-T57	12/1/1998	0.1	0.0			5.6
Williams Field Services Company	Cow Catcher Federal 1	Dehydration	wv-1525	2/12/2004	0.1	0.3			6.8
	Gandy Dancer 1	Dehydration	wv-M72	10/22/2001	0.1	0.3			7.6
	Gandy Dancer Federal 2	Dehydration	wv-M72	10/22/2001	0.1	0.3			8.1
	Red Wah 1-4	Dehydration	wv-1525	2/12/2004	0.1	0.3			10.9
	Red Wash	Dehydration	wv-0167	10/23/2002	0.1	0.3			8.6
	Red Wash 1-1	Dehydration	wv-0490	1/23/2003	0.1	0.3			8.0
	Red Wash 11-1	Dehydration	wv-0490	1/23/2003	0.1	0.3			9.4
	Red Wash 11-2	Dehydration	wv-1169	10/9/2003	0.1	0.3			11.5
	Red Wash 1-2	Dehydration	wv-MK2	5/17/2002	0.1	0.3			8.6
	Red Wash 15-1	Dehydration	wv-1953	9/27/2004	0.1	0.3			7.1
	Red Wash 25-1	Production Site	wv-3342	9/23/2005	0.1	0.3			11.2
	Red Wash 3-1	Dehydration	wv-0490	1/23/2003	0.1	0.3			9.9

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	Steamer State 1	Dehydration	wv-MK2	5/17/2002	0.1	0.3			7.6
	Tipton 1	Dehydration	wv-2N1	4/1/2002	0.1	0.3			7.9
	Tipton Federal 2	Dehydration	wv-2N1	4/1/2002	0.1	0.3			8.6
	Tipton Federal 5	Dehydration	wv-1169	10/9/2003	0.1	0.3			9.5
	Trestal Federal 1	Dehydration	wv-M72	10/22/2001	0.1	0.3			8.6
	Trestle Federal 3	Dehydration	wv-5E2	8/29/2002	0.1	0.3			12.1
	Trestle Federal 4	Dehydration	wv-1525	2/12/2004	0.1	0.3			8.8
	Wells Bluff	Dehydration	wv-0167	10/23/2002	0.1	0.3			7.8
	Wells Bluff 13-2	Dehydration	wv-0490	1/23/2003	0.1	0.3			8.1
	Wells Bluff 13-4	Dehydration	wv-1169	10/9/2003	0.1	0.3			9.3
Wyoming Interstate Company	Baxter Compressor Station	Compressor Station	30-175	4/18/2000	127.6	45.2			51.9
Yates Drilling Company	South Bluewater Unit #1	Production Site	wv-3902	10/17/2005	1.0	1.1			13.8
Yates Petroleum Corporation	Bitter Creek State 1	Production Site	wv-1556	3/14/2004	0.1	0.4			8.3
	Cowcatcher Federal 1	Production Site	wv-1523	2/9/2004	0.1	0.4			6.7
	Depot 1	Production Site	wv-789a	3/31/2003					2.0
	Depot 2	Production Site	wv-789a	3/31/2003					2.0
	Depot 3	Production Site	wv-789a	3/31/2003					2.0
	Depot 4	Production Site	wv-1952A	8/3/2004	1.0	1.3			3.5
	Gandy Dancer Federal 2	Production Site	wv-GY2	5/13/2002	0.9	1.4			1.3
	Legend Federal 1	Production Site	wv-1324	11/17/2003	0.1	0.6			13.2
	Orange Blossom Special 1	Production Site	wv-0678	4/1/2003	1.7	2.1			10.0
	Roberts Federal 1	Production Site	wv-I35	4/18/1995	4.1	18.5			5.5
	South Blue Water Unit 1	Production Site	wv-3346	7/21/2005	0.1	0.3			13.4
	Spur State 2	Production Site	wv-789	9/8/1998	30.0	9.0			3.0
	Streamer State 1	Production Site	wv-YY2	7/11/2002	0.1	0.5			0.8
	Tipton Federal 1	Production Site	wv-1052	9/2/2003	2.5	3.9			4.3
	Tipton Federal 2	Production Site	wv-3627	7/29/2005	1.0	1.6			17.0
	Tipton Federal 3	Production Site	wv-1507	2/24/2004	1.2	1.7			5.6

Facility Information					Permitted Emissions				
Company Name	**Facility Name**	**Facility Class**	**Permit Number**	**Issue Date**	**CO**	**NOx**	**PM_{10}**	**SOx**	**VOC**
	Tipton Federal 4	Production Site	wv-1128	9/2/2003	3.6	2.9			17.0
	Tipton Federal 5	Production Site	wv-2240	8/31/2004	1.3	1.5			15.4
	Trestle Federal #1 Production Facility	Production Site	wv-3768	8/25/2005	1.1	1.5			1.9
	Trestle Federal #2 Production Facility	Production Site	wv-LV2	2/28/2002	1.6	1.6			0.8
	Trestle Federal #3 Production Facility	Production Site	wv-0338	11/21/2002	0.7	2.1			25.2
	Trestle Federal 4	Production Site	wv-1600	3/15/2004	0.1	0.4			6.2
	Wabash Cannonball Federal 1	Production Site	wv-HE9	8/31/1999	1.8	3.1			3.8
	Wabash Cannonball Federal 2	Production Site	wv-HE9a	3/24/2003	0.2	0.7			3.2
	Wabash Cannonball 1	Production Site	wv-067	7/19/1996	1.9	2.9			1.3

APPENDIX F
1999 NATIONAL EMISSIONS INVENTORY

Emissions				% of Total Emissions				Facility Name	Facility Mailing Address	County	Industry Type (SIC)
NOx	PM_{10}	$PM_{2.5}$	SO_2	NOx	PM_{10}	$PM_{2.5}$	SO_2				
37991.28	5651.116	4680.467	25784.7	73.26	53.78	54.88	66.71	Pacificorp Jim Bridger	P.O. Box 158, Point Of Rocks, Wy 82901	Sweetwater Co, WY	4911 - Electric Services
3607.7	1035.376	834.831	4761.4	6.96	9.85	9.79	12.32	General Chemical	P.O. Box 551, Green River, Wy 82935	Sweetwater Co, WY	1474 - Potash Soda & Borate minerals
3568.1	517.922	392.115	5413.8	6.88	4.93	4.6	14.01	Fmc Corp. Green River Plant, Sodium Prod	P.O. Box 870, Green River, Wy 82935	Sweetwater Co, WY	2812 - Alkalies And Chlorine
1921.4			274.7	3.71			0.71	Union Pac, Brady	30 miles Se Rock Spgs, Rock Springs, Wy 82901	Sweetwater Co, WY	1321 - Natural Gas Liquids
1375.6	193.596	161.422	89.7	2.65	1.84	1.89	0.23	Solvay Minerals, Inc.	P.O. Box 1167, Green River, Wy 82935	Sweetwater Co, WY	1474 - Potash Soda & Borate minerals
1095	167.81	127.216	265.3	2.11	1.6	1.49	0.69	Fmc Wyoming Corp, Soda Ash Plant	6 miles Ne Of Granger, Granger, Wy 82935	Sweetwater Co, WY	1474 - Potash Soda & Borate minerals
284.9	734.139	697.594	9.6	0.55	6.99	8.18	0.02	OCI Wyoming	P.O. Box 513, Green River, Wy 82935	Sweetwater Co, WY	1474 - Potash Soda & Borate minerals
272.5	1152.704	1095.167		0.53	10.97	12.84		FMC Wyoming Corporation	P.O. Box 872, Green River, Wy 82935	Sweetwater Co, WY	1474 - Potash Soda & Borate minerals
242.3	252.678	203.542	565.5	0.47	2.4	2.39	1.46	P4 Production Rock Springs Facility	Box 1356, Rock Springs, Wy 82901	Sweetwater Co, WY	3312 - Blast Furnaces And Steel mills
208	663.869	232.009	12	0.4	6.32	2.72	0.03	Bridger Coal Company Jim Bridger Mine	Jim Bridger mine, Rock Springs, Wy 82901	Sweetwater Co, WY	1221 - Bituminous Coal & Lignite - Surface
182.8				0.35				Questar, Rock Springs Complex	Sec 24, T18n, Range 106w, Rock Springs, Wy 82901	Sweetwater Co, WY	4922 - Natural Gas Transmission
132.9				0.26				Duke Energy Fld Svcs, Patrick Draw	7 miles E Of Rock Spgs, Rock Springs, Wy 82901	Sweetwater Co, WY	1321 - Natural Gas Liquids
129.5				0.25				Mountain Gas Resources, Granger Gas Plant	Sec 16,T18n,R111w, Granger, Wy 82934	Sweetwater Co, WY	1321 - Natural Gas Liquids
98.8				0.19				Northwest Pipeline, Green River	Sec 10, Twn 15 N, Range 109 W, Green River, Wy 82935	Sweetwater Co, WY	4922 - Natural Gas Transmission
89.2				0.17				Williams Nat Gas Comp Riner Station	Riner Compressor Sta, Rawlins, Wy 82301	Sweetwater Co, WY	4922 - Natural Gas Transmission
86.7				0.17				Questar Pipeline, South Baxter Compr Stat	Sec 16, Twn16n, Range 104w Rock Springs, Wy 82902	Sweetwater Co, WY	1311 - Crude Petroleum & Natural Gas

Emissions				% of Total Emissions				Facility Name	Facility Mailing Address	County	Industry Type (SIC)
NOx	PM_{10}	$PM_{2.5}$	SO_2	NOx	PM_{10}	$PM_{2.5}$	SO_2				
78.8				0.15				Colorado Interstate Gas, Desert Springs	Sec.9, T19n, R98w, Sweetwater Co, WY	Sweetwater Co, WY	4922 - Natural Gas Transmission
77.5			14.2	0.15			0.04	Colorado Inter Gas, Table Rock Gas Plant	Table Rock Gas Plant, Rock Springs, Wy 82901	Sweetwater Co, WY	1311 - Crude Petroleum & Natural Gas
68.4	28.239	17.853	1459.6	0.13	0.27	0.21	3.78	Sf Phosphates, Inc	5 miles Se Of Rock Spgs, Rock Springs, Wy 82902	Sweetwater Co, WY	2874 - Phosphatic Fertilizers
59.4	0.4	0.357	0.1	0.11	3.81E-03	4.19E-03	2.59E-04	Questar Pipeline, Blacks Fork Gas Plant	Unknown	Sweetwater Co, WY	4922 - Natural Gas Transmission
57				0.11				Williams Field Svcs, Frewen Lake Comp Stn	Unknown	Sweetwater Co, WY	4922 - Natural Gas Transmission
47.7				0.09				Mountain Gas Resources, Fontenelle	Sec 14,T24n,R111w, Green River, Wy 82935	Sweetwater Co, WY	1321 - Natural Gas Liquids
40.4				0.08				Colorado Interstate Gas, Table Rock Comp	S36, T18n, R98w, Unknown	Sweetwater Co, WY	4922 - Natural Gas Transmission
38.5				0.07				Cig Wamsutter Stn	Sec.27,T20n,R94w, Rock Springs, Wy 82901	Sweetwater Co, WY	4922 - Natural Gas Transmission
36.4				0.07				Questar Gas Mgnt, Canyon Creek	Unknown	Sweetwater Co, WY	1311 - Crude Petroleum & Natural Gas
22.9				0.04				Duke Ener, North Baxter Comp Stn	Se/4,Ne/4,S13,T20n,R104w , Unknown	Sweetwater Co, WY	1321 - Natural Gas Liquids
15				0.03				Mountain Gas Resources, Red Desert Plant	S7,T19n,R96w, Unknown	Sweetwater Co, WY	4922 - Natural Gas Transmission
14				0.03				Wyoming Interstate Gas Co, Baxter Comp St	Unknown	Sweetwater Co, WY	4922 - Natural Gas Transmission
9	10.818	9.948		0.02	0.1	0.12		Fmc Wyoming Corp, Caustic Soda Plant	P.O. Box 100, Granger, Wy 82934	Sweetwater Co, WY	2812 - Alkalies And Chlorine
5.1	99.254	76.38		0.01	0.94	0.9		Church & Dwight	20 miles East Of Green River, Green River, Wy 82935	Sweetwater Co, WY	2812 - Alkalies And Chlorine

APPENDIX G
SOIL SURVEY REPORT

D7 - SOIL RESOURCES

SALT WELLS AMENDMENT AREA
BLACK BUTTE COAL COMPANY

POINT OF ROCKS, WYOMING

Submitted to:

Intermountain Resources
P.O. Box 1589
Laramie, Wyoming

Submitted by:

James Nyenhuis
Certified Professional Soil Scientist, ARCPCS #2753
600 Ramah Dr.
Fort Collins, CO 80525

May 14, 2003

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SALT WELLS AMENDMENT AREA

D7 - SOIL RESOURCES

1.0 INTRODUCTION

The identification and proper management of the topsoil resources in the proposed Salt Wells Amendment Area is essential for the success of reclamation in the mine area and the achievement of the post-mining land use. The information presented in this Section is designed to aid in formulating a practical and successful reclamation plan.

Black Butte Coal Company (BBCC) has located a proposed Pit 14 Mining Area within the Salt Wells Amendment Area as well as a proposed haul road corridor which will connect to their current mining operations to the northeast.

The Salt Wells Amendment Area soils report supports the current BBCC Appendix D7, Soils, but is intended to be a separate document describing soils as identified and mapped on the proposed amendment area itself. Where appropriate, reference is made to soils information contained in the current Appendix D7 and will not be repeated here.

Based on the detailed soil survey, soil sampling in the proposed affected areas, soil suitability evaluation, and salvage recommendations for all soil map units, it is evident that sufficient suitable soil resources are available for salvage and reapplication in order to ensure successful reclamation of the Salt Wells Amendment Area.

Location and Size of the Proposed Area

The proposed Salt Wells Amendment Area is adjacent to the current BBCC permit boundary on the southwest side. The northeast corner of the Salt Wells project area is located approximately 4 miles southwest of the current BBCC office in Section 33, T.19N., R.100W.

The amendment area is approximately 5,518.4 acres in size and contains all or portions of Sections 26, 27, 33, 34, and 35, T.18N., R.101W.; and Sections 2, 3, 4, 8, 9, 10, 16 and 17, T.17N., R.101W. Please refer to the Introduction Section of the permit application package for the complete legal descriptions of the lands included within the proposed project area.

The proposed Pit 14 Mining Area and 600 foot surrounding buffer area is approximately 1,283.8 acres in size. The proposed haul road corridor is approximately 263.6 acres within the proposed permit area and a total of approximately 363.7 acres including some acres in the adjacent already permitted Section 23, T.18N., R.101W. The detailed Order 1-2 soil survey covered all of the proposed areas to be affected by mining activities.

Topography of the Proposed Area

Please refer to the soil maps attached to this soils report for an illustration of the topography of the proposed project area.

Vegetation and Hydrology of Proposed Area

Please refer to the vegetation and hydrology reports for a description of the vegetation types and hydrology within the proposed amendment area.

2.0 METHODOLOGY

Soils mapping, description, classification, and sampling was conducted in accordance with the procedures and standards of the National Cooperative Soil Survey (Soil Survey Staff, 1993 and 1999; and Schoeneberger et. al., 1998). The soil resources of the proposed area were investigated by Jim Nyenhuis, Certified Professional Soil Scientist/Soil Classifier (ARCPACS 2753), with 25 years experience conducting soil surveys for mining projects in Wyoming.

Initial mapping units were identified using several sources of information:

- the Order 3 soil survey of a somewhat large area of Sweetwater County completed by the private firm SaLUT in the early 1960's under contract to BLM – the survey included the entire Salt Wells Amendment Area (SaLUT, 1981).
- the existing BBCC soil survey of the current permit area, and the Order 3 soil survey of Section 26, T.18N., R.101W.
- the current soil mapping unit and soil series descriptions for Sweetwater County provided by the USDA Natural Resources Conservation Service (NRCS, 2002).
- the orthophoto/topographic maps of the amendment area at a scale of 1"=500' (Aqua Terra Consultants, 2002), and
- the USGS 7.5' Point of Rocks SE and Cooper Ridge NE topographic quadrangles.

The previous soil boundaries were used during initial field reconnaissance and observation. The entire area was traversed on foot and by vehicle where possible. Detailed soil map unit boundaries were then delineated by exposing soil profiles using a sharpshooter and bucket auger as well as observing surface conditions, vegetation, slope gradient, and slope aspect. Soil resource information for adjacent permitted areas was reviewed to determine whether soils and their recommended salvage depths were similar to those within the proposed Salt Wells Amendment Area.

Previous discussion among WDEQ-LQD, BBCC, and Intermountain Resources outlined soil sampling protocol for the Salt Wells Amendment Area. Soil sampling specifications are contained in a Memorandum from Ms. Marit Sawyer (WDEQ-LQD, Lander) to Mr. Jim Orpet (Intermountain Resources, Laramie) dated April 10, 2002 (WDEQ, 2002).

The memorandum stated one sample set should be collected for each soil series mapped on the amendment area that is present in other portions of the BBCC mine. The sample data should be compared to the existing soils data. If the data are significantly different, the sample soil should be re-classified and consideration given to collecting additional samples

to adequately characterize it. If the soil series is not mapped anywhere else in the permit area, WDEQ Guideline No.1 should be used to determine how many samples should be taken. The focus is on getting samples from the proposed disturbance area.

The soil samples were sent to Inter-Mountain Laboratories (IML) in Sheridan, Wyoming for standard analysis (WDEQ, 1994). The laboratory analyses included: pH, electrical conductivity (EC); saturation percent; calcium, magnesium, and sodium (meq/l); Sodium Adsorption Ratio (SAR); percent organic matter; percent calcium carbonate equivalent, and soil texture (percent clay, silt, and sand including very fine sand). A 10 percent duplicate analysis is conducted for quality assurance/quality control (QA/QC) purposes. The results of the IML lab analysis are included with this report.

3.0 RESULTS

The Salt Wells Amendment Area has a semi-arid climate and is within a "frigid" soil temperature regime (mean annual air temperature about 38 degrees F.), and a "typic-aridic" soil moisture regime (mean annual precipitation of about 5 to under 10 inches). The average frost-free season is about 60 days.

The amendment area is characterized by the presence of very shallow, shallow, moderately deep, and deep soils. Winton is a very shallow soil (less than 10 inches to bedrock). Boltus is both a very shallow and shallow soil (10 to 20" to shale bedrock) developing in thin residuum from clay shale. Other shallow soils include Haterton, Huguston, and Tasselman. All are developing in thin residuum from sandstone and shale bedrock. Teagulf, Terada, and Thayer Variant are moderately deep soils (20 to 40" to bedrock) developing in slope alluvium and residuum dominantly from sandstone. Chrisman and Dines are deep soils (greater than 40 inches to shale bedrock) developing in drainage alluvium from both shale and sandstone sources. Other deep soils include Kandaly, Monte, and Thayer. Kandaly is mapped on stabilized sand dunes scattered throughout the amendment area. Monte and Thayer are mapped on upland drainages and are developing in fine-loamy (between 18 and 35% clay) and coarse-loamy (less than 18% clay) alluvium, respectively. All soils except Boltus and Thayer Variant were previously identified and mapped on the current BBCC permit area.

The Salt Wells Amendment Area soil maps are attached to this report. They were compiled on BBCC Digital Quadrangle/Orthophoto-Topographic Maps of the study area supplied by Aqua Terra Consultants, Inc., of Sheridan, Wyoming. There are four soil maps (Northeast, Northwest, Southeast, and Southwest), and all are at a scale of 1"=500'. Aqua Terra constructed the base maps at the request of BBCC, and obtained the orthographic photos from the University of Wyoming web site (http://www.advc.uwyo.edu/24k/doqq.html). All of the orthographic photos were taken in the summer of 1994. The following list is a breakdown of the photo names and dates: E5-Bitter Creek – NW Photo 8/26/1994; F5-Bitter Creek – NE-SW Photo 8/26/1994; E6-Black Butte – NE Photo 7/28/1994; and F6-Bitter Creek – NW-SE Photo 6/27/1994.

Following detailed soil mapping, representative locations were selected for all major soils within the proposed disturbance area and these sites were fully described and sampled. As per the initial BBCC-WDEQ Salt Wells agreement (WDEQ, 2002), each major soil was fully described and sampled one time each. These soils included Haterton, Horsley, Huguston, Kandaly, Monte, Tasselman, Teagulf, Thayer, Terada, and Winton. Boltus silty clay loam was described and sampled three times because it was not previously described or sampled on the current BBCC permit area. Thayer Variant loam was also not mapped on the current permit area but was only described and sampled one time on the amendment area because it is only a soil inclusion in map unit 444 (Thayer fine sandy loam, 0 to 6% slopes), not a major component. Although the Chrisman and Dines soils are present on the amendment area, they were not sampled because they were not mapped in the proposed disturbance area.

As a result, a total of forty-seven soil samples were collected from fourteen sample locations on the Salt Wells Amendment Area. One additional soil site (Monte loam) with six samples was sampled in 2002 off the Salt Wells Amendment Area but within the current BBCC permit area. This additional data supports the Monte soil series and is included in the separate "Pit 10 Expansion" soils letter report and laboratory data on file at BBCC. All soil sample sites were located in the field and plotted on the soil base maps. The IML soils laboratory data is included as **Addendum D7-Salt Wells Lab Data** with this report.

The 15 soil profile descriptions completed during the sampling activity are presented below. These descriptions are in addition to those already included in the current BBCC Appendix D7 (Soils). Reference is made to those previous descriptions contained in BBCC Addendum D7-B (Soil Series). Because Chrisman and Dines soils were not mapped in the proposed disturbance area, they were not sampled nor described in this report. Reference is made to the Chrisman and Dines soil series descriptions in Addendum D7-B, pages 61 and 65 respectively, of the current BBCC permit document.

Table D7-SW1 (List of Soil Map Units and Recommended Salvage Depths) lists the soil map unit numbers, the soil map unit names, and the recommended salvage depths for each map unit within the proposed Salt Wells Amendment Area. All of the map units on the proposed amendment area, except for the new map unit 464 (Boltus-Horsley complex, 0 to 30% slopes), are similar to those described in Appendix D7 for the current BBCC permit area and will not be redescribed in this report. Reference is made to Addendum D7-A (Mapping Unit Descriptions) of the current BBCC Appendix D7 (Soils), for those similar map unit descriptions. New map unit 464 will be fully described in Section 3.1.

Table D7-SW2 (Soil Characteristics and Taxonomy) lists the soil series present on the proposed Salt Wells Amendment Area, their depth class, soil sample number, recommended salvage depth, soil taxonomic classification, and current soil series status (NRCS established, NRCS tentative, or local Sweetwater County uncorrelated soil series). This table contains updated information for soils mapped on the proposed Salt Wells Amendment Area from that presented in Appendix D7 (Soils) for the current BBCC permit area. Several soils (Leckman, Corlett, Quealman, and Wibaux Variant) were mapped on the current BBCC permit area but were not identified as present on the Salt Wells Amendment Area. In addition, two soils (Boltus and Thayer Variant) were mapped on the amendment area but were not identified on the original BBCC permit area. For update purposes, Leckman is an NRCS tentative soil series (most recent description dated 03/2003). Quealman (03/2003), Corlett (05/1981), and Wibaux (02/2000) are all NRCS established soil series.

An additional table will be completed subsequent to finalization of the Salt Wells Amendment Area Mine and Reclamation Plan for Pit 14. This table will list all soil map units on affected areas, including the new haul road corridor, their acreages, recommended salvage depths, and volumes of soil to be salvaged (acre feet, and bank cubic yards). The soils table for Pit 14 will be included in the mine and reclamation plan as well as inserted into Appendix D7 (Soils) of the current BBCC permit document.

The following text includes: (1) a full description for the new soil map unit 464 (Boltus-Horsley complex, 0 to 30% slopes), and (2) the soil series profile descriptions for all 14 soils sampled on the Salt Wells Amendment Area, as well as an evaluation of their topsoil suitability and recommended salvage depths. The soil series descriptions are presented in alphabetic order as listed in Table D7-SW2.

3.1 Soil Map Unit 464, Boltus-Horsley complex, 0 to 30% slopes

This complex occurs on level to sloping clay shale plains, sideslopes, hills, and ridge frontslopes throughout the Salt Wells Amendment Area. This complex is about 60 percent Boltus silty clay loam, 30 percent Horsley sandy clay loam, and 10 percent inclusions of Haterton sandy clay loam and shale rock outcrop. The Boltus soil is a very shallow to shallow, well drained, fine textured established soil series underlain by weathered clay shale bedrock. The Horsley soil is a very shallow, moderately fine textured, local Sweetwater County soil underlain with soft, weathered shale bedrock. Neither of these soils occupies any particular position in relation to each other. The Haterton soil inclusion is a shallow, moderately fine textured soil also underlain by soft, weathered shale bedrock.

The average annual precipitation is about 8 inches, and the average annual air temperature is about 43 degrees F. The average frost-free season is about 80 days.

The Boltus soil typically has a surface layer that is a pale brown, slightly alkaline, silty clay loam about 2 inches thick. The "C" horizon substratum is a light yellowish brown, slightly alkaline, silty clay about 2 to 5 inches thick. Weathered, light olive brown to dark gray, slightly alkaline, clay shale bedrock is encountered at 6 to 9 inches in depth.

Boltus has moderate to slow permeability, low available water capacity, and the effective rooting depth is less than 10 inches. Surface runoff is slow to rapid, and the erosion hazard is moderate to severe.

The Horsley soil typically has a surface layer that is a light brownish gray, moderately alkaline, loam about 2 to 3 inches thick. The "C" horizon substratum is light brownish gray, moderately alkaline, loam to sandy clay loam about 4 inches thick. Weathered, calcareous shale is encountered at about 7 inches in depth.

Horsley has moderate permeability, low available water capacity, and the effective rooting depth is less than 10 inches. Surface runoff is slow to medium, and the erosion hazard is slight.

The Hateron soil inclusion typically has a yellowish brown sandy clay loam surface layer that is about 3 inches thick. The substratum is yellowish brown to grayish brown, slightly alkaline, sandy clay loam about 12 inches thick. Weathered shale is at a depth of about 15 inches.

Haterton has moderate permeability, low available water capacity, and an effective rooting depth of less than 15 inches. Surface runoff is slow or medium, and the erosion hazard is slight.

Boltus, Horsley, and Haterton soils are used for grazing and wildlife habitat.

Boltus soil: Capability unit VIIs17, dryland; Shale Range Site.
Horsley soil: Capability unit VIIs17, dryland; Shale Range Site.
Haterton soil: Capability unit VIIe14, dryland; Shale Range Site.

3.2 Boltus Soil Series

The Boltus soil is an established soil series mapped primarily in central Wyoming although it has been identified on other coal mine areas in Sweetwater County. Boltus was not mapped on previous areas of BBCC's mine but it is present on the Salt Wells Amendment Area. As such, it is considered a new soil for BBCC, and was fully described and sampled three times at representative locations within the amendment area (SW9, SW11, and SW13).

Boltus silty clay loam is a very shallow (less than 10 inches to shale) to shallow (10 to 20 inches to shale), well drained soil that is developing in thin residuum from clay shale. Clay content is typically 30 to 45 percent. Boltus is mapped in complex with Horsley in Map Unit 464. Boltus is on gently sloping clay plains to somewhat steep upland hills. Boltus is classified as a "Clayey, smectitic, calcareous, frigid, shallow Typic Torriorthent".

Boltus was newly identified on the Salt Wells Amendment Area and was separately sampled at three representative locations (SW9, SW11, and SW13). Boltus sample site SW9 was located approximately 781' east, 1,063' south of the NW corner of Section 2, T.17N., R.101W. Sample site SW11 was located approximately 406' west, 2,125' south of the NE corner of Section 4, T.17N., R.101W. Sample site SW13 was located approximately 1,844' east, 1,781' north of the SW corner of Section 9, T17N., R.101W. Laboratory data for these samples is contained in Addendum D7-Salt Wells Lab Data" of this report.

Boltus Sample Site SW9: 6% slope; NW aspect; Gardner saltbush vegetation; thin residuum from clay shale; upland hill sideslope; slight erosion; slightly moist below 2 inches at the time of sampling, 7-31-02.

Boltus SW9 Soil Profile Description:

A horizon – 0 to 2 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate coarse platy parting to moderate medium granular structure; slightly hard, friable, sticky and plastic consistence; few medium, fine and very fine roots to 7 inches; slightly effervescent; slightly alkaline (pH 7.5); gradual smooth boundary.

C horizon – 2 to 7 inches; dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) silty clay, dark grayish brown (10YR 4/2) moist; massive structure; hard, firm, sticky and plastic consistence; noneffervescent, neutral (pH 7.3) gradual wavy boundary.

Cr horizon (paralithic contact) - 7 to 14 inches; dark gray (10YR 4/1) silty clay loam; massive structure; hard, firm, very sticky and very plastic consistence; noneffervescent, slightly alkaline (pH 7.6); gradual wavy boundary.

Boltus Sample Site SW11: 14% slope; north aspect; Gardner saltbush, prickly pear cactus, and some grasses vegetation; thin residuum from clay shale; upland sideslope; moderate erosion; soil profile all dry at time of sampling, 8-11-02.

Boltus SW11 Soil Profile Description:

A horizon – 0 to 2 inches; pale brown (10YR 6/3) clay loam to clay with about 20% small sandstone and shale chips on the surface and 10% in the horizon, brown (10YR 5/3) moist; moderate medium platy parting to moderate strong granular structure; slightly hard, friable, sticky and plastic consistence; few medium, fine, and very fine roots to 6 inches; moderately effervescent, slightly alkaline (pH 7.5); gradual smooth boundary.

C horizon – 2 to 6 inches; yellowish brown (10YR 5/4) silty clay loam with about 30% small soft shale chips, dark yellowish brown (10YR 4/4) moist; massive parting to weak medium subangular blocky structure; hard, friable, sticky and plastic consistence; strongly effervescent, slightly alkaline (pH 7.6); gradual wavy boundary.

Cr horizon (paralithic contact) - 6 to 13+ inches; light olive brown (2.5Y 5/4) silty clay loam with about 60% small soft shale chips, olive brown (2.5Y 4/4) moist; massive structure; hard, firm, sticky and plastic; very few fine and very fine roots to 13 inches; strongly effervescent, neutral (pH 7.3); gradual wavy boundary.

Boltus Sample Site SW13: 10% slope; NW aspect; Gardner saltbush, occasional Wyoming big sagebrush; thin residuum from clay shale; upland sideslope-upland shale flat; slight erosion; soil profile all dry at the time of sampling, 8-14-02.

Boltus SW13 Soil Profile Description:

AC horizon – 0 to 2 inches; very pale brown (10YR 7/3) silty clay loam with about 5% mixed gravel size sandstone and shale chips, brown (10YR 5/3) moist; weak coarse platy parting to weak medium granular structure; soft to slightly hard, friable, sticky and plastic consistence; few medium, fine and very fine roots to 6 inches; moderately effervescent, slightly alkaline (pH 7.5); clear smooth boundary.

C horizon – 2 to 4 inches; light yellowish brown (10YR 6/4) clay with 15% soft small shale chips, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard to hard, friable, sticky and plastic consistence; moderately effervescent, neutral (pH 6.9); gradual wavy boundary.

C/Cr horizon – 4 to 9 inches; dark gray (10YR 4/1) silty clay loam with 35% small soft shale chips, very dark gray (10YR 3/1) moist; massive structure; hard, firm, sticky and plastic consistence; very few medium, fine and very fine roots to 9 inches; slightly effervescent, slightly alkaline (pH 7.4); gradual wavy boundary.

Boltus Soil Suitability and Recommended Salvage Depth:

Boltus is entirely suitable for salvage to the paralithic contact, an average depth of 6 inches on the Salt Wells Amendment Area.

3.3 Haterton Soil Series

The Haterton soil is an established soil series of moderate extent mapped in western and south central Wyoming. Haterton sandy clay loam is a shallow, well drained soil that is developing in thin residuum from calcareous sandstone or shale. Clay content is typically 18 to 35 percent. Haterton is mapped in complex with Horsley sandy clay loam in map units 446AB and 446CD, and in complex with Huguston and Horsley in map unit 467. Haterton is on hill and ridge summits, shoulders, and sideslopes. Haterton is classified as a "Loamy, mixed, superactive, calcareous, frigid, shallow Typic Torriorthent".

Haterton was previously sampled at 14 sites in the current BBCC permit area, and at one additional site (SW10) in the Salt Wells Amendment Area. Previous laboratory data for the 14 sample sites is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Haterton sample site SW10 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Haterton sandy clay loam, sample site SW10, was located approximately 1,906' north, 719' west, of the SE corner of Section 34, T.18N., R.101W. Sample site SW10: 6% slope; east aspect; Wyoming big sagebrush and mixed grasses vegetation; thin residuum from sandy shale to sandstone bedrock; ridge upper backslope position; slight erosion; soil profile all dry at time of sampling, 7-31-02.

Haterton SW10 Soil Profile Description:

A horizon – 0 to 3 inches; yellowish brown (10YR 5/4) sandy clay loam with about 15% gravel size sandstone chips, dark yellowish brown (10YR 4/4) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic consistence; few coarse and common medium, fine, and very fine roots to 9 inches; moderately effervescent, slightly alkaline (pH 7.6); clear smooth boundary.

Bw horizon – 3 to 9 inches; yellowish brown (10YR 5/4) sandy clay loam with about 15% gravel size sandstone chips, dark yellowish brown (10YR 4/40 moist; weak medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic consistence; moderately effervescent, slightly alkaline (pH 7.5); gradual wavy boundary.

C horizon – 9 to 15 inches; yellowish brown (10YR 5/4) sandy clay loam with about 15% gravel size sandstone chips; dark yellowish brown (10YR 4/4) moist; massive structure; hard, friable, slightly sticky and slightly plastic consistence; few coarse, medium, fine, and very fine roots to 15 inches; strongly effervescent, slightly alkaline (pH 7.6); gradual wavy boundary.

Haterton Soil Suitability and Recommended Salvage Depth:

Haterton is entirely suitable for salvage throughout its profile depth to the sandstone or shale bedrock contact, an average depth of 15 inches on the Salt Wells Amendment Area. The previous average salvage depth for Haterton over 14 sample sites on the current BBCC permit area was 14.4 inches.

3.4 Horsley Soil Series

The Horsley soil is a local Sweetwater County soil of moderate extent. Horsley sandy clay loam is a very shallow (less than 10 inches to bedrock), well drained soil that is developing in thin residuum from calcareous shale or sandstone. Clay content is typically 18 to 35 percent. Horsley is mapped in complex with Haterton sandy clay loam in map units 446AB and 446CD. Horsley is also mapped in association with Winton and Rock Outcrop in Map Units 458EF and 459, in complex with Boltus in Map Unit 464, and in complex with Huguston and Haterton in Map Unit 467. Horsley, like Haterton, is on hill and ridge summits, shoulders, and sideslopes. Horsley is classified as a "Loamy, mixed, calcareous, frigid, shallow, Typic Torriorthent".

Horsley was previously sampled at 16 sites in the current BBCC permit area, and at one additional site (SW8) in the Salt Wells Amendment Area. Previous laboratory data is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Horsley sample site SW8 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Horsley sandy clay loam, sample site SW8, was located approximately 2,406' east, 594' south of the NW corner of Section 9, T.17N., R.101W. Sample site SW8: 4% slope; SE aspect; Wyoming big sagebrush, mixed grasses, and occasional rabbitbrush vegetation; thin residuum from shale and sandstone; upland hill position; slight erosion; soil profile all dry at time of sampling, 7-30-02.

Horsley SW8 Soil Profile Description:

A horizon – 0 to 3 inches; yellowish brown (10YR 5/4) sandy clay loam with 10% sandstone channers, dark yellowish brown (10YR 4/6) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic consistence; common medium, fine and very fine, and few coarse roots to 7 inches; moderately effervescent, slightly alkaline (pH 7.4); gradual smooth boundary.

C horizon – 3 to 7 inches; yellowish brown (10YR 5/4) sandy clay loam with 15% sandstone channers, yellowish brown (10YR 5/6) moist; massive structure; hard, firm, sticky and slightly plastic consistence; strongly effervescent, slightly alkaline (pH 7.4); gradual wavy boundary.

Cr horizon (paralithic contact) 7+ inches; somewhat weathered, buff colored, calcareous sandstone.

Horsley Soil Suitability and Recommended Salvage Depth:

Horsley is entirely suitable for salvage throughout its profile depth to the sandstone or shale bedrock contact, an average depth of 7 inches on the Salt Wells Amendment Area. The previous salvage depth for Horsley over 16 sample sites on the current BBCC permit area was 6.2 inches.

3.5 Huguston Soil Series

The Huguston soil is an established soil series of moderate mapped in south-central and southwestern Wyoming. Huguston sandy loam is a shallow, well drained soil that is developing in thin residuum and slopewash from calcareous sandstone. Clay content is typically 8 to 18 percent. It is mapped in complex with Teagulf and Terada in Map Unit 436, with Teagulf in Map unit 452, with Rock Outcrop and Terada in Map Unit 466, with Horsley and Haterton in Map Unit 467, and with Kandaly and Teagulf in Map Unit 468. Huguston is on upland hills and sideslopes. Huguston is classified as a "Loamy, mixed, superactive, calcareous, frigid, shallow Typic Torriorthent".

Huguston was previously sampled at 11 sites in the current BBCC permit area, and at one additional site (SW3) in the Salt Wells Amendment Area. Previous laboratory data for the 11 sample sites is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for sample site SW3 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Huguston sandy loam, sample site SW3, was located approximately 656' north, 2,188' east of SW corner of Section 9, T.17N., R.101W. Sample site SW3: 12% slope; east aspect; Wyoming big sagebrush and mixed grasses vegetation; thin residuum and slopewash from sandstone; upland sideslope; none to slight erosion; soil profile all dry at time of sampling, 6-5-02.

Huguston SW3 Soil Profile Description:

A horizon – 0 to 3 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic consistence; common medium, fine and very fine, and few coarse roots to 14 inches; noneffervescent, neutral (pH 6.9); gradual smooth boundary.

Bw horizon – 3 to 14 inches; yellowish brown (10YR 5/4) to brown (7.5YR 5/4) sandy loam, dark yellowish brown (10YR 4/4, 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic consistence; noneffervescent to slightly effervescent, neutral (pH 7.2); gradual wavy boundary.

Cr horizon (paralithic contact) 14 to 18 inches; very pale brown (10YR 7/4) sandy clay loam (soft rock crushed for texture analysis), light yellowish brown (10YR 6/4) moist; massive structure; hard, friable, slightly sticky and slightly plastic consistence; few coarse, medium, fine and very fine roots; strongly effervescent, neutral (pH 7.3); gradual wavy boundary.

Huguston Soil Suitability and Recommended Salvage Depth:

Huguston is entirely suitable for salvage throughout its profile depth to the soft sandstone paralithic contact, an average depth of 14 inches on the Salt Wells Amendment Area. The previous salvage depth for Huguston over 11 sample sites on the current BBCC permit area was 14.5 inches.

3.6 Kandaly Soil Series

The Kandaly soil is an established soil series mapped extensively on the plains of southwestern Wyoming. Kandaly loamy sand is a deep, somewhat excessively drained soil that is developing in aeolian sand. Clay content is typically less than 8 percent. It is mapped alone in Map Unit 10 and in complex with Huguston and Teagulf in Map Unit 468. Kandaly is on duned uplands. Kandaly is classified as a "Mixed, frigid, Typic Torripsamment".

Kandaly was previously sampled at three sites I the current BBCC permit area, and at one additional site (SW2) in the Salt Wells Amendment Area. Previous lab data for the three sample sites is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Kandaly sample site SW2 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Kandaly loamy sand, sample site SW2, was located approximately 469' west, 906' south of the NE corner of Section 3, T.17N., R.101W. Sample site SW2: 25% slope; NE aspect; Wyoming big sagebrush, Douglas rabbitbrush, and Indian ricegrass vegetation; thick aeolian sand; stabilized sand dune on NE facing sideslope; no erosion; soil profile all dry at time of sampling, 6-4-02.

Kandaly SW2 Soil Profile Description:

A horizon – 0 to 2 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic consistence; common fine and very fine, and few coarse and medium roots to 28 inches; noneffervescent, moderately acid (pH 5.9); gradual smooth boundary.

AC horizon – 2 to 15 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive parting to weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic consistence; noneffervescent, neutral (pH 7.3); gradual wavy boundary.

C1 horizon – 15 to 32 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive/loose structure; slightly hard, friable, nonsticky and nonplastic consistence; few coarse, medium, fine and very roots 28 to 46 inches; noneffervescent, neutral (pH 7.2); gradual wavy boundary.

C2 horizon – 32 to 50 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive/loose structure; loose, loose, nonsticky and nonplastic consistence; noneffervescent, slightly acid (pH 6.5); gradual wavy boundary.

Kandaly Soil Suitability and Recommended Salvage Depth:

Kandaly is entirely suitable for salvage throughout its profile depth, which averages 50 inches, although the loamy sand material below 32 inches (between 32 and 50 inches) has very low organic matter content and is very droughty. Kandaly is best salvaged to 32 inches, although salvage to 50 inches is possible if this additional loamy sand material is needed. Kandaly was previously salvaged, on average, to 42 inches on the current BBCC permit area.

3.7 Monte Soil Series

The Monte soil is an established soil series of moderate extent mapped in southwestern Wyoming. Monte loam is a deep, well drained soil that is developing in medium textured slopewash and streamlain alluvium from sandstone and shale sources. Clay content is typically 18 to 35 percent in the 10 to 40 inch texture control section. Monte loam is mapped in Map unit a480 and as an alkaline and saline phase in Map Unit 480. Monte is on toeslopes, fans, and upland drainages. Monte is classified as a "Fine-loamy, mixed, frigid Typic Torriorthent".

Monte was previously sampled at 6 sites in the current BBCC permit area, and at one additional site (SW5) in the Salt Wells Amendment Area. Monte loam was also sampled in 2002 at one additional site in the Pit 10 Extension Area. This additional Monte site is mentioned because the data supports the Monte soil series. Previous laboratory data for the 6 sample sites is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Monte sample site SW5 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Monte loam, sample site SW5, was located approximately 156' east, 750' north of the SW corner of Section 35, T.18N., R.101W. Sample site SW5: 3% slope; NNE aspect; Wyoming big sagebrush, mixed grasses, Gardner saltbush, occasional greasewood; local slopewash and streamlain alluvium; upland drainage position; slight erosion; soil profile all dry at time of sampling, 7-28-02.

A horizon – 0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium platy parting to weak medium granular structure; slightly hard, friable, slightly sticky and plastic consistence; common medium, fine and very fine, and few coarse roots to 14 inches; slightly effervescent, slightly alkaline (pH 7.4); clear smooth boundary.

BC horizon – 4 to 14 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic consistence; moderately effervescent, slightly alkaline (pH 7.4); gradual wavy boundary.

C1 horizon – 14 to 24 inches; pale brown (10YR 6/3) clay loam, dark yellowish brown (10YR 4/4) moist; massive structure; hard, friable, sticky and slightly plastic consistence; few coarse, medium, fine and very fine roots 14 to 35 inches; strongly effervescent, slightly alkaline (pH 7.5); gradual wavy boundary.

C2 horizon – 24 to 35 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive structure; hard, firm, very sticky and plastic consistence; strongly effervescent, slightly alkaline (pH 7.4); gradual wavy boundary.

C3 horizon – 35 to 53 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive structure; hard, firm, very sticky and plastic consistence; moderately effervescent, slightly alkaline (pH 7.6); gradual wavy boundary.

Cr horizon (paralithic contact) 53+ inches; weathered, gray clay shale bedrock.

Monte Soil Suitability and Recommended Salvage Depth:

Monte is entirely suitable for salvage throughout its profile depth to the weathered shale or sandstone contact, an average depth of 53 inches on the Salt Wells Amendment Area. The previous average salvage depth for Monte over 6 sample sites on the current BBCC permit area was 60 inches.

3.8 Tasselman Soil Series

The Tasselman soil is a local Sweetwater County soil mapped on the current BBCC permit area as well as the Salt Wells Amendment Area. Tasselman is a shallow, well drained soil that is developing in thin residuum from sandstone. Clay content is typically about 14 to 26 percent. Tasselman is mapped in complex with Winton in Map Unit 451. Tasselman is on hill and ridge summits, shoulders, and sideslopes. Tasselman is classified as a "Loamy, mixed, calcareous, frigid, shallow Lithic Torriorthent ".

Tasselman was previously sampled at 5 sites in the current BBCC permit area, and at one additional site (SW12) in the Salt Wells Amendment Area. Previous laboratory data for the 5 sample sites is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Tasselman sample site SW12 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Tasselman sandy loam, sample site SW12, was located approximately 625' east, 1,156' north of the SW corner of Section 3, T.17N., R.101W. Sample site SW12: 10% slope; east aspect; Wyoming big sagebrush, mixed grasses, and occasional Gardner saltbush vegetation; thin residuum from sandstone; upland sideslope; slight erosion; soil profile all dry at time of sampling, 8-14-02.

Tasselman SW12 Soil Profile Description:

A horizon – 0 to 3 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) moist; moderate coarse platy parting to moderate medium granular structure; soft, friable, slightly sticky and slightly plastic consistence; common medium, fine and very fine roots to 9 inches; moderately effervescent, neutral (pH 7.3); gradual smooth boundary.

BC horizon – 3 to 9 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic consistence; moderately effervescent, neutral (pH 7.3); gradual wavy boundary.

C horizon – 9 to 14 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) moist; massive structure; hard, friable, slightly sticky and nonplastic consistence; few medium, fine and very fine roots to 14 inches; moderately effervescent, neutral (pH 7.3); gradual wavy boundary.

R (lithic contact) 14+ inches; light gray, hard sandstone bedrock.

Tasselman Soil Suitability and Recommended Salvage Depth:

Tasselman is entirely suitable for salvage throughout its profile depth to the sandstone bedrock contact, an average of 12 inches on the Salt Wells Amendment Area. The previous, corrected, average salvage depth for Tasselman over 5 sample sites on the current BBCC permit area was 12 inches.

3.9 Teagulf Soil Series

The Teagulf soil is a tentative NRCS soil series mapped extensively throughout the Green River basin of southwestern Wyoming. It was mapped on both the current BBCC permit area as well as the Salt Wells Amendment Area. Teagulf fine sandy loam is a moderately deep (20 to 40 inches to bedrock), well drained soil that is developing in slopewash alluvium and residuum from calcareous sedimentary rocks, most often sandstone. Clay content is typically less than 18 percent although the sampled pedon SW6 had slightly more, about 20 to 22 percent below 4 inches in depth. Teagulf is mapped in complex with Huguston and Terada in Map Unit 436, with Huguston in Map Unit 452, and with Kendaly and Huguston in Map Unit 468. Teagulf is on many positions including shoulders, sideslopes, and fans. Teagulf is classified as a "Coarse-loamy, mixed, superactive, frigid Typic Haplocalcid".

Teagulf was previously sampled at 5 sites in the current BBCC permit area, and at one additional site (SW6) in the Salt Wells Amendment Area. Previous laboratory data is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Teagulf sample site SW6 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Teagulf fine sandy loam, sample site SW6, was located approximately 156' west, 531' north of the SE corner of Section 4, T.17N., R.101W. Sample site SW6: 8% slope, SE aspect; Wyoming big sagebrush, rabbitbrush, mixed grasses, and prickly pear cactus vegetation; upland sideslope; thin aeolian over residuum from calcareous sandstone; slight erosion; soil profile all dry at time of sampling, 7-29-02.

Teagulf SW6 Soil Profile Description:

A horizon – 0 to 4 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic consistence; common medium, fine and very fine, and few coarse roots to 16 inches; slightly effervescent, neutral (pH 7.2); clear smooth boundary.

Bw horizon – 4 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic consistence; moderately effervescent, neutral (pH 7.3); gradual wavy boundary.

Bk horizon – 16 to 30 inches; very pale brown (10YR 7/4) loam, brownish yellow (10YR 6/6) moist; massive structure; hard, friable, sticky and slightly plastic consistence; few fine and very fine roots 16 to 25 inches; violently effervescent, neutral (pH 7.3); gradual wavy boundary.

Cr horizon (paralithic contact) 30+ inches; somewhat hard, weathered, buff-colored calcareous sandstone.

Teagulf Soil Suitability and Recommended Salvage Depth:

Teagulf is entirely suitable for salvage throughout its profile depth to the sandstone contact, an average depth of 30 inches on the Salt Wells Amendment Area. The previous average salvage depth for Teagulf over 5 sample sites was 28.6 inches.

3.10 Thayer Soil Series

The Thayer soil is a local Sweetwater County soil mapped on deep, coarse-loamy, non-saline and non-alkaline upland drainages on both the current BBCC permit area and the Salt Wells Amendment Area. Thayer is developing in moderately coarse textured slopewash and drainage alluvium from sedimentary rocks. Clay content is typically 8 to 18 percent. Thayer is mapped with major inclusions Thayer Variant and Monte in Map Unit 444. Thayer is classified as a "Coarse-loamy, mixed, calcareous, frigid Typic Torriorthent".

Thayer was previously sampled at 5 sites in the current BBCC permit area, and at one additional site (SW7) in the Salt Wells Amendment Area. Previous laboratory data is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Thayer sample site SW7 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Thayer sandy loam, sample site SW7, was located approximately 2,656' west, 2,219' north of the SE corner of Section 9, T.17N., R.101W. Sample site SW7: 4% slope, SE aspect; Wyoming big sagebrush, mixed grasses, occasional rabbitbrush, prickly pear cactus vegetation; upland drainage; slopewash and drainage alluvium; slight erosion; soil profile all dry at time of sampling, 7-29-02.

Thayer SW7 Soil Profile Description:

A horizon – 0 to 4 inches; yellowish brown (10YR 5/4) sandy loam, brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic consistence; common medium, fine and very fine, and few coarse roots to 13 inches; noneffervescent, neutral (pH 6.6); clear smooth boundary.

Bw horizon – 4 to 13 inches; yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; hard, friable, nonsticky and nonplastic consistence; noneffervescent, neutral (pH 7.3); gradual wavy boundary.

C1 horizon – 13 to 30 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive structure; hard, friable, slightly sticky and plastic consistence; common fine and very fine, and few coarse and medium roots 13 to 26 inches; slightly effervescent, neutral (pH 7.0); gradual wavy boundary.

C2 horizon – 30 to 50 inches; yellowish brown (10YR 5/4) sandy loam to sandy clay loam, dark yellowish brown (10YR 4/6) moist; massive structure; very hard, friable, sticky and slightly plastic consistence; moderately effervescent, neutral (pH 7.3); gradual wavy boundary.

Cr horizon (paralithic contact) 50+ inches; somewhat hard, weathered, buff-colored sandstone.

Thayer Soil Suitability and Recommended Salvage Depth:

Thayer is entirely suitable for salvage throughout its profile depth to the sandstone or shale contact, an average depth of 50 inches on the Salt Wells Amendment Area. The previous average salvage depth for Thayer over 5 sample sites on the current BBCC permit area was 41 inches.

3.11 Thayer Variant Soil Series

Thayer Variant loam is a new soil and was only identified in 2002 on the Salt Wells Amendment Area. It was not previously mapped in Sweetwater County or in the current BBCC permit area. Thayer Variant is a major inclusion (15%) in Map Unit 444 (Thayer fine sandy loam, 0 to 6% slopes). Thayer Variant occupies concave positions where more effective precipitation is present and the Wyoming big sagebrush and mixed grasses vegetation is more productive. Thayer Variant has a "mollic" epipedon which is a surface horizon (or horizons) at least about 7 inches thick that has a dark color and sufficient organic matter content. Although Thayer Variant does not occupy a large acreage, it is a distinct soil inclusion with Thayer in upland swale and drainage positions. Because it is only a soil inclusion, not a named soil in a map unit name, it was sampled only once on the Salt Wells Amendment Area.

Thayer Variant loam is a moderately deep (20 to 40 inches to bedrock), well drained soil that is classified as a "Fine-loamy, mixed, calcareous, frigid, Aridic Haplustoll". Typically, a Haplustoll is not mapped in a "typic-aridic" soil moisture regime but the soil is present in concave or swale positions due to increased moisture effectiveness. Laboratory data for Thayer Variant, sample site SW14, is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Thayer Variant loam, sample site SW14, was located approximately 1,344' west, 563' north of the SE corner of Section 4, T.17N., R.101W. Sample site SW14: 8% slope; east aspect; Wyoming big sagebrush (up to 3' tall); upland swale drainageway; moderately fine-textured slopewash and drainage alluvium; no erosion; slightly moist between 18 and 25 inches at the time of sampling, 8-14-02.

Thayer Variant SW14 Soil Profile Description:

A horizon – 0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate coarse platy parting to moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic consistence; common coarse, medium, fine, and very fine roots to 18 inches; noneffervescent, neutral (pH 6.7); gradual smooth boundary.

Bw1 horizon – 4 to 10 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic consistence; noneffervescent, neutral (pH 6.6); gradual smooth boundary.

Bw2 horizon – 10 to 18 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive parting to moderate medium subangular blocky structure; hard, friable, slightly sticky and nonplastic consistence; slightly effervescent, neutral (pH 7.1); gradual wavy boundary.

Bk horizon – 18 to 25 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4); massive structure; hard, friable, sticky and slightly plastic consistence; few coarse, medium, fine and very fine roots 18 to 25 inches; strongly effervescent, neutral (pH 7.3); gradual wavy boundary.

C horizon – 25 to 34 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive structure; hard, firm, sticky and slightly plastic consistence; few coarse, fine and very fine roots 25 to 34 inches; strongly effervescent, neutral, (pH 7.3); digging stopped by auger refusal – difficult to determine whether coarse fragment (cobble) or bedrock.

Thayer Variant Soil Suitability and Recommended Salvage Depth:

Thayer Variant is entirely suitable for salvage throughout its profile depth, an average depth of 34 inches on the Salt Wells Amendment area.

3.12 Terada Soil Series

The Terada soil is a local Sweetwater County soil which has been mapped on both the current BBCC permit area and the Salt Wells Amendment Area. Terada sandy loam is moderately deep (20 to 40 inches to bedrock), well drained soil that is developing in slopewash alluvium and residuum primarily from sandstone. Clay content is typically 12 to 18 percent. Terada is mapped in complex with Teagulf and Huguston in Map Unit 436, and in complex with Huguston and Rock Outcrop in Map Unit 466. Terada is on many positions including hills, ridges, sideslopes, fans, and toeslopes. Terada is classified as a "Coarse-loamy, mixed, calcareous, frigid Typic Torriorthent".

Terada sandy loam was previously sampled at 4 sites in the current BBCC permit area, and at one additional site (SW4) in the Salt Wells Amendment Area. Previous laboratory data is contained in Addendum D7-C of the current BBCC permit document. Laboratory data for Terada sample site SW4 is contained in "Addendum D7-Salt Wells Lab Data" of this report.

Terada sandy loam, sample site SW4, was located approximately 875'west, 1,438' south of the NE corner of Section 9, T.17N., R.101W. Sample site SW4: 8% slope; E aspect; Wyoming big sagebrush, mixed grasses, and occasional prickly pear cactus vegetation; upland sideslope; local alluvium over residuum from sandstone; slight erosion; soil profile all dry at time of sampling, 7-28-03.

Terada SW4 Soil Profile Description:

A horizon – 0 to 3 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic consistence; common medium, fine and very fine, and few coarse roots to 14 inches; moderately effervescent, slightly alkaline (pH 7.4); clear smooth boundary.

Bw horizon – 3 to 9 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; moderate, medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic consistence; slightly effervescent, neutral (pH 7.3); gradual wavy boundary.

C horizon – 9 to 30 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive structure; slightly hard to hard, friable, slightly sticky and slightly plastic; few coarse, medium, fine and very fine roots 14 to 30 inches; moderately effervescent, slightly alkaline (pH 7.4); gradual wavy boundary.

Cr horizon (paralithic contact) 30+ inches; somewhat hard, weathered, buff-colored sandstone.

Terada Soil Suitability and Recommended Salvage Depth:

Terada is entirely suitable for salvage throughout its profile depth to the sandstone contact, an average depth of 30 inches on the Salt Wells Amendment Area. The previous average salvage depth for Terada over 4 sample sites on the current BBCC permit area was 25.5 inches.

3.13 Winton Soil Series

The Winton soil is a local Sweetwater County soil which has been mapped on both the current BBCC permit area and the Salt Wells Amendment Area. Winton very channery sandy loam is a very shallow (less than 10 inches to bedrock), well drained soil that is developing in thin residuum from sandstone or shale. Clay content is typically about 10 to 24 percent. Winton is mapped alone in Map Unit 6, in complex with Tasselman in Map Unit 451, in association with Horsley and Rock Outcrop in Map Unit 458EF, and in association with Rock Outcrop and Horsley in Map Unit 459. Winton is on ridge crests, backslopes, and some sideslopes. Winton is classified as a "Loamy, mixed, calcareous, frigid Lithic Torriorthent".

Winton very channery sandy loam, sample site SW1, was located approximately 719' west, 656' north of the SE corner of Section 34, T.18N., R.101W. Sample site SW1: 18% slope; ESE aspect; Wyoming big sagebrush, Gardner saltbush, some mixed grasses and forbs; backslope of sandstone ridge; thin residuum from calcareous sandstone; no erosion; soil profile moist from 1 to 4 inches at the time of sampling, 6-4-02.

Winton SW1 Soil Profile Description:

A horizon – 0 to 2 inches; pale brown (10YR 6/3) very channery sandy loam with about 60% ¼ to 3" sandstone channers on the soil surface and about 20% channers in the horizon, brown (10YR 5/3) moist; moderate medium platy parting to moderate medium granular structure; slightly hard, very friable, slightly sticky and plastic consistence; common fine and very fine, and few coarse and medium roots to 7 inches; moderately effervescent, neutral (pH 7.3); gradual smooth boundary.

BC horizon – 2 to 7 inches; yellowish brown (10YR 5/4) channery sandy loam with about 25% sandstone channers, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic consistence; strongly effervescent, slightly alkaline (pH 7.4); gradual wavy boundary.

Ck horizon – 7 to 9 inches; brownish yellow (10YR 6/6) very channery sandy clay loam with about 40% sandstone channers, yellowish brown (10YR 5/6) moist; massive structure; slightly hard, friable, slightly sticky and slightly plastic consistence; few coarse, medium fine and very fine roots 7 to 9 inches; strongly effervescent, neutral (pH 7.3); gradual wavy boundary.

R (lithic contact) 9+ inches; hard, somewhat fractured, calcareous sandstone.

Winton Soil Suitability and Recommended Salvage Depth:

Winton is entirely suitable for salvage throughout its profile depth to the sandstone or shale contact, an average depth of 6 inches on the Salt Wells Amendment Area. The previous average salvage depth for Winton over 5 sample sites was 6 inches.

4.0 REFERENCES

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TABLE D7-SW1

LIST OF SOIL MAP UNITS AND RECOMMENDED SALVAGE DEPTHS SALT WELLS AMENDMENT AREA

Map Unit No.	Map Unit Name	Recommended Salvage Depth
8	Winton very channery sandy loam, 0 to 45% slopes	6"
10	Kandaly loamy sand, 6 to 15% slopes	32" or 50"[1]
436	Teagulf-Huguston-Terada complex, 0 to 6% slopes	25"
444	Thayer fine sandy loam, 0 to 6% slopes	48"
446AB	Horsley-Haterton complex, 0 to 6% slopes	10"
446CD	Horsley-Haterton complex, 6 to 15% slopes	10"
451	Tasselman-Winton complex, 3 to 30% slopes	9"
452	Huguston-Teagulf complex, 3 to 10% slopes	20"
458EF	Winton-Horsley-Rock Outcrop association, very steep	4" RO = 0"
459	Rock Outcrop-Winton-Horsley association, steep	3" RO = 0"
461	Rock Land, 0 to 75% slopes	0"
464	Boltus-Horsley complex, 0 to 30% slopes	6"
466	Huguston-Rock Outcrop-Terada complex, 6 to 30% slopes	15" RO = 0"
467	Huguston-Horsley-Haterton complex, 6 to 30% slopes	12"
468	Kandaly-Huguston-Teagulf complex, 3 to 30% slopes	25"
480	Monte loam, alkaline and saline phase, 0 to 3% slopes	--[2]
a480	Monte loam, 0 to 6% slopes	53"
481	Chrisman-Dines complex, 0 to 3% slopes	--[2]
DL	Disturbed Land	0"

[1]See discussion of Kandaly Soil Series, Section 3.6.

[2]Map Units 480 and 481 are not within the proposed disturbance areas and were not evaluated for soil suitability and recommended salvage depth.

TABLE D7-SW2

SOIL CHARACTERISTICS AND TAXONOMY
SALT WELLS AMENDMENT AREA

Soil Series	Soil Depth	Soil Sample No.	Recommended Salvage Depth	Soil Classification[1]	Soil Series Status[1]
BOLTUS	Very Sallow & Shallow	SW9, SW11, SW13	6	Clayey, smectitic, calcareous, frigid, shallow Typic Torriorthent	Established, 02/1997
CHRISMAN	Deep	--	--	Fine, mixed, superactive, calcareous, frigid Typic Torrifluvent	Tentative, 03/2003
DINES	Deep	--	--	Fine-silty, mixed, superactive, calcareous, frigid Typic Torrifluvent	Tentative, 03/2003
HATERTON	Shallow	SW10	15	Loamy, mixed, superactive, calcareous, frigid, shallow Typic Torrifluvent	Established, 03/2003
HORSLEY	Very Shallow	SW8	7	Loamy, mixed, calcareous, frigid, shallow Typic Torriorthent	Sweetwater Co, 02/1979
HUGUSTON	Shallow	SW3	14	Loamy, mixed, superactive, calcareous, frigid, shallow Typic Torrifluvent	Established, 03/2003
KANDALY	Deep	SW2	32 to 50	Mixed, frigid, Typic Torripsamment	Established, 07/1985
MONTE	Deep	SW5	53	Fine-loamy, mixed, superactive, calcareous, frigid Typic Torrifluvent	Established, 03/2003
TASSELMAN	Shallow	SW12	12	Loamy, mixed, calcareous, frigid, shallow Lithic Torriorthent	Sweetwater Co, 03/1981
TEAGULF	Moderately Deep	SW6	30	Coarse-loamy, mixed, superactive, frigid Typic Haplocalcid	Tentative, 02/1980
THAYER	Deep	SW7	50	Coarse-loamy, mixed, calcareous, frigid Typic Torriorthent	Sweetwater Co, 02/1983
THAYER VAR.	Moderately Deep	SW14	34	Fine-loamy, mixed, calcareous, frigid Aridic Haplustoll	Salt Wells amend area
TERADA	Moderately Deep	SW4	30	Coarse-loamy, mixed, calcareous, frigid Typic Torriorthent	Sweetwater Co, 02/1972
WINTON	Very Shallow	SW1	6	Loamy, mixed, calcareous, frigid Lithic Torriorthent	Sweetwater Co,02/1981

[1] Information obtained from current NRCS official Soil Series Description as present on the NRCS Official Series Description (OSD) internet site. Information for local Sweetwater County Soils (Horsley, Tasselman, Thayer, Terada, and Winton) obtained from NRCS files for Sweetwater County.

ADDENDUM D7

SALT WELLS LAB DATA

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Black Butte Coal Company

Point of Rocks, WY

Client Project ID: Salt Wells

Date Received: 06/12/02

Set #0102S10513

Report Date: 06/28/02

Lab Id	Sample Id	Depths (inches)	VFS %	Sand %	Silt %	Clay %	Texture	CO3 %	Organic Matter %
0102S10513	SW1	0 - 2	13.3	68.0	21.0	11.0	SANDY LOAM	2.9	0.8
0102S10514	SW1	2 - 7	17.7	66.0	18.0	16.0	SANDY LOAM	4.6	0.9
0102S10515	SW1	7 - 9	16.4	56.0	22.0	22.0	SANDY CLAY LOAM	5.6	0.8
0102S10516	SW2	0 - 2	11.7	86.0	8.0	6.0	LOAMY SAND	0.2	2.5
0102S10517	SW2	2 - 15	9.6	85.0	7.0	8.0	LOAMY SAND	0.5	0.7
0102S10518	SW2	15 - 32	9.3	85.0	7.0	8.0	LOAMY SAND	0.3	0.6
0102S10519	SW2	32 - 50	8.1	87.0	7.0	6.0	LOAMY SAND	0.1	0.4
0102S10520	SW3	0 - 3	14.7	78.0	14.0	8.0	SANDY LOAM	0.6	1.7
0102S10521	SW3	3 - 14	15.6	74.0	12.0	14.0	SANDY LOAM	0.9	1.1
0102S10522	SW3	14 - 18	27.6	58.0	22.0	20.0	SANDY CLAY LOAM	15.3	1.0

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____

Joey Sheeley

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Black Butte Coal Company
Point of Rocks, WY

Client Project ID: Salt Wells
Date Received: 06/12/02

Set #0102S10513
Report Date: 06/28/02

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
0102S10518	SW2	15 - 32	7.2	31.6	0.41	2.20	0.80	0.77	0.63
0102S10518D	SW2	15 - 32	7.2	32.9	0.41	2.18	0.77	0.80	0.66

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley
Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Black Butte Coal Company
Point of Rocks, WY

Client Project ID: Salt Wells
Date Received: 06/12/02

Set #0102S10513
Report Date: 06/28/02

Lab Id	Sample Id	Depths (Inches)	VFS %	Sand %	Silt %	Clay %	Texture	CO3 %	Organic Matter %
H02S10518	SW2	15 - 32	9.3	85.0	7.0	8.0	LOAMY SAND	0.3	0.5
H02S10518D	SW2	15 - 32	7.9	84.0	8.0	8.0	LOAMY SAND	0.3	0.5

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Black Butte Coal Company

Point of Rocks, WY

Client Project ID: Salt Wells

Date Received: 06/12/02

Set #0102S10513

Report Date: 06/28/02

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
0102S10513	SW1	0 - 2	7.3	26.8	0.45	2.47	0.67	0.85	0.68
0102S10514	SW1	2 - 7	7.4	26.1	0.35	1.72	0.53	0.89	0.84
0102S10515	SW1	7 - 9	7.3	26.9	0.33	1.07	0.51	1.14	1.28
0102S10516	SW2	0 - 2	5.9	38.1	0.35	1.51	0.61	0.56	0.54
0102S10517	SW2	2 - 15	7.3	31.9	0.63	2.75	1.61	0.83	0.56
0102S10518	SW2	15 - 32	7.2	31.6	0.41	2.20	0.60	0.77	0.63
0102S10519	SW2	32 - 50	6.5	31.8	0.34	1.19	0.53	1.04	1.12
0102S10520	SW3	0 - 3	6.9	35.7	0.58	3.20	1.24	0.63	0.42
0102S10521	SW3	3 - 14	7.2	29.9	0.60	3.87	1.26	0.75	0.47
0102S10522	SW3	14 - 18	7.3	37.5	0.50	2.86	1.46	0.75	0.51

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____

Joey Sheeley

Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Black Butte Coal Company

Point of Rocks, WY

Client Project ID: Topsoil

Date Received: 08/09/02

Set #0102S15272

Report Date: 08/19/02

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
0102S15272	SW4	0 - 3	7.4	29.7	0.57	3.22	1.03	0.67	0.46
0102S15273	SW4	3 - 9	7.3	29.3	0.47	2.53	0.86	0.70	0.54
0102S15274	SW4	9 - 30	7.4	23.3	5.14	20.4	39.3	6.57	1.20
0102S15275	SW5	0 - 4	7.4	41.3	0.69	3.92	1.44	0.84	0.51
0102S15276	SW5	4 - 14	7.4	33.5	0.43	1.63	0.78	1.05	0.97
0102S15277	SW5	14 - 24	7.5	36.0	0.51	1.71	0.95	1.53	1.33
0102S15278	SW5	24 - 35	7.4	49.8	3.70	23.6	15.4	3.99	0.90
0102S15279	SW5	35 - 53	7.6	56.2	4.16	22.4	22.6	7.90	1.67
0102S15280	SW6	0 - 4	7.2	31.8	0.74	4.26	1.31	0.99	0.59
0102S15281	SW6	4 - 16	7.3	29.8	0.66	4.14	1.22	0.98	0.60
0102S15282	SW6	16 - 30	7.3	37.9	0.72	2.60	1.26	1.44	1.03
0102S15283	SW7	0 - 4	6.6	40.5	0.36	1.50	0.73	0.40	0.38
0102S15284	SW7	4 - 13	7.0	32.2	0.43	1.90	0.87	0.53	0.45
0102S15285	SW7	13 - 30	7.0	32.9	0.44	2.47	1.05	0.64	0.48
0102S15286	SW7	30 - 50	7.3	33.5	0.62	3.01	1.65	1.16	0.76
0102S15287	SW8	0 - 3	7.4	34.2	0.45	2.10	0.69	0.83	0.70
0102S15288	SW8	3 - 7	7.4	33.7	0.40	2.01	0.55	0.70	0.62
0102S15289	SW9	0 - 2	7.5	48.1	2.69	23.1	4.19	1.49	0.40
0102S15290	SW9	2 - 7	7.3	56.1	3.21	19.6	12.9	2.50	0.62
0102S15291	SW9	7 - 14	7.6	67.5	8.70	16.3	127	2.90	0.34
0102S15292	SW10	0 - 3	7.6	28.9	0.40	1.95	1.07	0.71	0.58
0102S15293	SW10	3 - 9	7.5	28.1	0.42	1.64	1.13	0.85	0.72
0102S15294	SW10	9 - 15	7.6	33.2	0.37	1.51	0.52	1.10	1.10

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Sheridan, WY 82801

Black Butte Coal Company

Point of Rocks, WY

Client Project ID: Topsoil

Date Received: 08/09/02

Set #0102S15272

Report Date: 08/19/02

Lab Id	Sample Id	Depths (inches)	Very Fine Sand %	Sand %	Silt %	Clay %	Texture	CO3 %	Organic Matter %
0102S15272	SW4	0 - 3	5.70	74.0	12.0	14.0	SANDY LOAM	2.8	1.0
0102S15273	SW4	3 - 9	3.10	74.0	12.0	14.0	SANDY LOAM	1.3	0.9
0102S15274	SW4	9 - 30	8.30	82.0	6.0	12.0	SANDY LOAM	2.4	0.8
0102S15275	SW5	0 - 4	21.6	30.0	49.0	21.0	LOAM	3.5	3.7
0102S15276	SW5	4 - 14	19.7	34.0	43.0	23.0	LOAM	3.7	2.3
0102S15277	SW5	14 - 24	18.4	39.0	33.0	28.0	CLAY LOAM	5.0	1.4
0102S15278	SW5	24 - 35	13.5	19.0	41.0	40.0	SILTY CLAY	4.9	1.6
0102S15279	SW5	35 - 53	8.20	11.0	46.0	43.0	SILTY CLAY	3.1	1.2
0102S15280	SW6	0 - 4	10.6	79.0	9.0	12.0	SANDY LOAM	1.9	1.8
0102S15281	SW6	4 - 16	20.3	70.0	10.0	20.0	SANDY CLAY LOAM	2.4	1.0
0102S15282	SW6	16 - 30	26.5	46.0	32.0	22.0	LOAM	13.4	1.2
0102S15283	SW7	0 - 4	28.6	66.0	26.0	8.0	SANDY LOAM	0.6	2.5
0102S15284	SW7	4 - 13	29.7	69.0	21.0	10.0	SANDY LOAM	0.4	0.9
0102S15285	SW7	13 - 30	19.1	71.0	19.0	10.0	SANDY LOAM	0.4	0.9
0102S15286	SW7	30 - 50	31.5	66.0	20.0	14.0	SANDY LOAM	1.0	1.0
0102S15287	SW8	0 - 3	13.7	59.0	15.0	26.0	SANDY CLAY LOAM	10.9	1.7
0102S15288	SW8	3 - 7	8.80	67.0	12.0	21.0	SANDY CLAY LOAM	11.3	1.2
0102S15289	SW9	0 - 2	9.20	16.0	46.0	38.0	SILTY CLAY LOAM	4.4	1.4
0102S15290	SW9	2 - 7	8.60	17.0	43.0	40.0	SILTY CLAY	4.0	1.6
0102S15291	SW9	7 - 14	4.30	14.0	50.0	36.0	SILTY CLAY LOAM	4.5	1.4
0102S15292	SW10	0 - 3	19.4	55.0	25.0	20.0	SANDY CLAY LOAM	6.3	1.8
0102S15293	SW10	3 - 9	17.3	56.0	22.0	22.0	SANDY CLAY LOAM	7.5	1.4
0102S15294	SW10	9 - 15	16.7	53.0	22.0	25.0	SANDY CLAY LOAM	6.5	1.4

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAD= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S = Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr=Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

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Joey Sheeley

Soils Lab Supervisor

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Sheridan, WY 82801

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Point of Rocks, WY

Client Project ID: Topsoil

Date Received: 08/09/02

Set #0102S15272

Report Date: 08/19/02

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
0102S15284	SW7	4 - 13	7.0	32.2	0.43	1.90	0.87	0.53	0.45
0102S15284D	SW7	4 - 13	7.0	32.3	0.46	2.05	0.99	0.62	0.42
0102S15292	SW10	0 - 3	7.6	26.9	0.40	1.96	1.07	0.71	0.58
0102S15292D	SW10	0 - 3	7.6	27.7	0.39	1.97	0.47	0.72	0.65

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

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Point of Rocks, WY

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Date Received: 08/09/02

Set #0102S15272

Report Date: 08/19/02

Lab Id	Sample Id	Depths (Inches)	Very Fine Sand %	Sand %	Silt %	Clay %	Texture	CO3 %	Organic Matter %
0102S15284	SW7	4 - 13	29.7	69.0	21.0	10.0	SANDY LOAM	0.4	0.9
0102S15284D	SW7	4 - 13	29.0	69.0	21.0	10.0	SANDY LOAM	0.4	0.9
0102S15292	SW10	0 - 3	19.4	55.0	25.0	20.0	SANDY CLAY LOAM	5.3	1.8
0102S15292D	SW10	0 - 3	18.9	54.0	26.0	20.0	SANDY CLAY LOAM	5.8	1.7

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____

Joey Sheeley

Soils Lab Supervisor

inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Black Butte Coal Company

Point of Rocks, WY

Client Project ID: Point of Rocks

Date Received: 08/21/02

Set #0102S16075

Report Date: 09/06/02

Lab Id	Sample Id	Depths (inches)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
0102S16075	SW11	0 - 2	7.5	39.4	0.65	2.78	1.33	2.30	1.60
0102S16076	SW11	2 - 6	7.6	43.1	0.41	1.44	0.78	2.05	1.95
0102S16077	SW11	6 - 13	7.3	46.2	1.52	7.41	4.38	2.63	1.08
0102S16078	SW12	0 - 3	7.3	27.8	0.51	3.09	1.06	0.88	0.61
0102S16079	SW12	3 - 9	7.3	33.4	1.29	6.79	4.44	1.55	0.68
0102S16080	SW12	9 - 14	7.3	30.3	0.98	6.88	2.19	1.35	0.63
0102S16081	SW13	0 - 2	7.5	46.2	2.61	29.1	3.54	1.79	0.44
0102S16082	SW13	2 - 4	6.9	53.2	2.93	24.1	15.6	1.72	0.39
0102S16083	SW13	4 - 9	7.4	61.6	9.90	17.0	176	3.15	0.32
0102S16084	SW14	0 - 4	6.7	51.3	0.52	2.57	1.74	0.92	0.62
0102S16085	SW14	4 - 10	6.6	41.0	0.40	2.38	0.98	0.63	0.49
0102S16086	SW14	10 - 18	7.1	33.5	0.58	3.91	1.37	0.70	0.43
0102S16087	SW14	18 - 25	7.3	33.5	0.41	2.22	0.72	1.28	1.06
0102S16088	SW14	25 - 34	7.3	33.0	0.41	2.20	0.87	1.12	0.91

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

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Joey Sheeley

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Sheridan, WY 82801

Black Butte Coal Company

Point of Rocks, WY

Client Project ID: Point of Rocks

Date Received: 08/21/02

Set #0102S16075

Report Date: 09/05/02

Lab Id	Sample Id	Depths (Inches)	Very Fine Sand %	Sand %	Silt %	Clay %	Texture	Carbonate %	Organic Matter %
0102S16075	SW11	0 - 2	19.7	29.0	39.0	32.0	CLAY LOAM	7.8	2.1
0102S16076	SW11	2 - 6	13.6	17.0	45.0	38.0	SILTY CLAY LOAM	6.9	1.8
0102S16077	SW11	6 - 13	12.5	17.0	53.0	30.0	SILTY CLAY LOAM	11.4	1.7
0102S16078	SW12	0 - 3	14.8	69.0	15.0	16.0	SANDY LOAM	1.3	1.0
0102S16079	SW12	3 - 9	10.6	68.0	10.0	22.0	SANDY CLAY LOAM	1.7	1.1
0102S16080	SW12	9 - 14	8.0	75.0	11.0	14.0	SANDY LOAM	2.2	0.7
0102S16081	SW13	0 - 2	11.8	19.0	42.0	39.0	SILTY CLAY LOAM	4.0	1.4
0102S16082	SW13	2 - 4	11.9	24.0	32.0	44.0	CLAY	1.8	1.2
0102S16083	SW13	4 - 9	11.1	14.0	48.0	38.0	SILTY CLAY LOAM	3.8	1.3
0102S16084	SW14	0 - 4	24.9	40.0	40.0	20.0	LOAM	0.9	5.4
0102S16085	SW14	4 - 10	24.7	46.0	34.0	20.0	LOAM	0.9	3.3
0102S16086	SW14	10 - 18	21.2	56.0	26.0	18.0	SANDY LOAM	2.2	1.3
0102S16087	SW14	18 - 25	17.3	55.0	24.0	21.0	SANDY CLAY LOAM	5.6	0.8
0102S16088	SW14	25 - 34	16.8	62.0	19.0	19.0	SANDY LOAM	7.8	0.6

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

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Soils Lab Supervisor

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Black Butte Coal Company

Point of Rocks, WY

Client Project ID: Point of Rocks

Date Received: 08/21/02

Set #0102S16075

Report Date: 09/06/02

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
0102S16075	SW11	2 - 6	7.6	43.1	0.41	1.44	0.78	2.05	1.95
0102S16075D	SW11	2 - 6	7.6	43.9	0.43	1.65	0.87	1.88	1.68
0102S16080	SW12	9 - 14	7.3	30.3	0.98	6.88	2.19	1.35	0.63
0102S16080D	SW12	9 - 14	7.3	29.5	0.98	6.92	2.19	1.21	0.57

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

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Date Received: 08/21/02

Set #0102S16075

Report Date: 09/05/02

Lab Id	Sample Id	Depths (Inches)	Very Fine Sand %	Sand %	Silt %	Clay %	Texture	Carbonate %	Organic Matter %
0102S16076	SW11	2 - 6	13.6	17.0	45.0	38.0	SILTY CLAY LOAM	6.9	1.8
0102S16076D	SW11	2 - 6	13.4	17.0	45.0	38.0	SILTY CLAY LOAM	6.5	1.9
0102S16080	SW12	9 - 14	8.0	75.0	11.0	14.0	SANDY LOAM	2.2	0.7
0102S16080D	SW12	9 - 14	9.4	77.0	9.0	14.0	SANDY LOAM	2.1	0.6

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

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Reviewed By: _____

Joey Sheeley

Soils Lab Supervisor

APPENDIX H
CORRESPONDENCE WITH THE WYOMING NATURAL DIVERSITY DATABASE

UNIVERSITY
OF WYOMING

Wyoming Natural Diversity Database
Department 3381 • 1000 E. University Avenue • Laramie, WY 82071
(307) 766-3023 • fax (307) 766-3026 • e-mail: wndd@uwyo.edu • www.uwyo.edu/wyndd

12 July 2005

Jim Dunder
Wildlife Management Biologist
USDI Bureau of Land Management
280 Highway 191 North
Rock Springs, WY 82901

Dear Jim,

The attached files fill your request for information regarding rare species occurrences in T17-18N R101W, Sweetwater Co, WYunty, Wyoming. Of the species that you were interested in, only one record was found in the within the request area: White-Tailed Prairie Dog (tr_pod.xls). However, several of the species you are interested in are documented in the surrounding townships; these records can be found in the files with "buffer" in the file name and are also addressed in the attached zoological and botanical comments.

For additional information, especially about codes, abbreviations, and our data dictionary (describes field headings), or for additional data requests, please consult the data request portion of our website listed under the "Products" heading at http://www.uwyo.edu/wyndd/

Recommended citation:

Wyoming Natural Diversity Database. 2005. Data compilation for J. Dunder, completed July 12, 2005. Unpublished report. Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.

Thank you for your data request. Please do not hesitate to call if you have any questions about the search. We ask that you not disseminate these data, except for your environmental assessment, without our permission.

Sincerely,

Melanie Arnett, Database Specialist, (307) 766-2296, arnett@uwyo.edu

[1]Doug Keinath will be out of the office doing field work during the summer months. During this period Melanie Arnett will prepare the zoological comments.

ZOOLOGICAL COMMENTS

Wyoming Natural Diversity Database

Prepared for:

Jim Dunder – USDI Bureau of Land Management

14 July 2005

Project Description:

T17-18N R101W, Sweetwater County, Wyoming

Habitat Notes:

Towns: Request area is approximately 20-30 miles east/southeast of Rock Springs.

Water: Black Butte Creek runs through the western portion of the request area.

Habitat: The request area consists of Wyoming Big Sage Steppe, Juniper, Desert Shrub, and Basin Rock & Soil.

Approximate Elevation: 7,000 – 8,000 feet

Zoology Comments:

Please report new occurrences of any of these species to WYNDD so that our database continues to be current and useful to future requesters. Thank you!

This data represents what we currently have in the database as well as our informed opinion on what might occur in the request area if local habitat is appropriate. Please note that absence of a species occurrence in our database is not proof that the species in question does not exist there. It is highly possible that people have never looked for, or reported, information on the species in question in the request area. Our data for private land is particularly sparse, so absence of observations on private parcels should be viewed with caution. Also, please note that (in general) only animals likely to breed or winter near the project area have been included in this list. Other animals, particularly migratory birds, may use portions of the study area in other seasons. Finally, this list includes only species that we actively track in our database, the full list of which can be found on our website (http://uwadmnweb.uwyo.edu/wyndd/).

Animals for which we have records in our Biotics database are presented in bold face type. Biotics records generally represent observations for which information is available to suggest persistent recurrence in the area. Animals for which we have records in our Point Observation Database (POD) are presented in italics. Point observations mean that the animal in question has been documented in the area at one time, but sufficient information is not available to conclude persistence. It is particularly important to our database that people report occurrences of populations that would allow us to add Biotics records.

Prepared by: Melanie Arnett, Database Specialist, arnett@uwyo.edu

Direct questions to: Doug Keinath, Zoologist; dkeinath@uwyo.edu

Sensitive Birds Potentially in Request Area				
Common Name	**Scientific Name**	**Heritage Rank**	**Management Status**	**Habitat Notes**
Ferruginous hawk	*Buteo regalis*	G4/S4B/S5N	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Open grasslands and shrublands
Golden eagle	*Aquila chrysaetos*	G5/S3B		Open grasslands and shrublands esp. around cliffs and canyons
Merlin	*Falco columbarius*	G5/S4	WYGF NSS3	Open woodlands, grasslands, and shrublands sometimes in cities in winter
Greater sage grouse	*Centrocercus urophasianus*	G4/S4	USFWS ESA Listing Denied, USFS R2 Sensitive, Wyoming BLM Sensitive	Sagebrush basins and foothills, generally close to water
Snowy plover	*Charadrius alexandrinus*	G4/SA	USFS R2 Sensitive	Sandy beaches and shores of alkaline ponds
Mountain plover	*Charadrius montanus*	G2/S2	USFWS ESA Listing Denied, USFS R2 Sensitive, WYGF NSS4	Sparse shortgrass or milesxed grass prairie. Also in short-sagebrush plains. Often associated with prairie dog towns.
American advocet	*Recurvirostra americana*	G5/S3B		Marshes, ponds, and shores, esp. alkaline areas
Long-billed curlew	*Numenius americanus*	G5/S3B	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Meadows, pastures, shorelines, and marshes
Short-eared owl	*Asio flammeus*	G5/S2	USFS R2 Sensitive	Open grasslands, meadows, marshes, and farmland, especially around tall grass or weeds
Burrowing owl*	*Athene cunicularia [Speotyto cunicularia]*	G4/S3	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS4	Plains and basins, often associated with prairie dog towns
Loggerhead shrike	*Lanius ludovicians*	G4/S3	USFS R2 Sensitive, Wyoming BLM Sensitive	Open country with scattered trees and shrubs
Ash-throated flycatcher	*Myiarchus cinerascens*	G5/S3B	WYGF NSS3	Juniper woodlands
Western scrub-jay	*Aphelocoma californica [Aphelocoma coerulescens]*	G5/S1	WYGF NSS3	Juniper woodlands
Juniper titmouse [Plain titmouse]	*Baeolophus griseus [Parus inornatus]*	G5/S1	WYGF NSS3	Juniper woodlands
Bushtit	*Psaltriparus milesnimus*	G5/S1	WYGF NSS3	Juniper woodlands
Canyon wren	*Catherpes mexicanus*	G5/S2S3		Rocky canyons and cliffs
Sage thrasher*	*Oreoscoptes montanus*	G5/S5	Wyoming BLM Sensitive	Tall sagebrush and greasewood
Black-throated gray warbler	*Dendroica nigrescens*	G5/S2		Juniper woodlands

Sensitive Birds Potentially in Request Area				
Common Name	**Scientific Name**	**Heritage Rank**	**Management Status**	**Habitat Notes**
Sage sparrow*	*Amphispiza belli*	G5/S3	USFS R2 Sensitive, Wyoming BLM Sensitive	Medium to tall sagebrush shrubland
Brewer's sparrow*	*Spizella breweri*	G5/S5	USFS R2 Sensitive, Wyoming BLM Sensitive	Sagebrush foothills and medium-height sagebrush in basins. Also, mountain mahogany hills.
Scott's oriole	*Icterus parisorum*	G5/S1	WYGF NSS3	Juniper woodlands

Sensitive Mammals Potentially In Request Area				
Common Name	**Scientific Name**	**Heritage Rank**	**Management Status**	**Habitat Notes**
Silver-haired bat	*Lasionycteris noctivagans*	G5/S3		Occur in a wide variety of habitats across Wyoming. Roosts: trees, caves, milesnes, houses
Long-eared myotis*	*Myotis evotis*	G5/S4	Wyoming BLM Sensitive, WYGF NSS2	Found in conifer forests, especially ponderosa pine. Forage over water holes and possible openings in conifer forest. Roosts: caves, buildings, milesnes.
Hoary bat	*Lasiurus cinereus*	G5/S4		Widespread and mobile, hoary bats are found in shrublands, grasslands, and aspen-pine forests near roosting habitat. Roosts: deciduous trees.
Spotted bat	*Euderma maculatum*	G4/S3	USFS R2 Sensitive, USFS R4 Sensitive, Wyoming BLM Sensitive, WYGF NSS2	Cliff roosting, generally near perennial water in a variety of habitats (including desert, shrub-steppe, and evergreen forest).
Townsend's big-eared bat	*Corynorhinus townsendii [Plecotus townsendii]*	G4/S2	USFS R2 Sensitive, USFS R4 Sensitive, Wyoming BLM Sensitive, WYGF NSS2	Hibernates and day-roosts in caves and milesnes and will use buildings as day roosts. Typical habitat includes desert shrublands, pinyon-juniper woodlands, and dry conifer forests, generally near riparian or wetland areas.
Pallid bat	*Antrozous pallidus*	G5/S1	WYGF NSS2	Generally found in desert and grasslands. Roosts in small crevices in buildings, rocks and open places.
Wyoming ground squirrel	*Spermophilus elegans*	G5/S3S4		Found in open habitats from sage grasslands to alpine meadows.
White-tailed prairie dog	*Cynomys leucurus*	G4/S3	USFWS ESA Listing Denied, USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Found in grassland and shrub-grass communities, often with loose, sandy soils. Colonies are usually not as large or dense as black-tailed prairie dog colonies.
Wyoming pocket gopher	*Thomomys clusius [Thomomys talpoides]*	G2/S2	USFS R2 Sensitive, Wyoming BLM Sensitive	Dry upland areas (ridgetops, etc.) characterized by loose, gravel-like soil. Endemic to Wyoming, they are often observed near Bidger's Pass.

Sensitive Mammals Potentially In Request Area				
Common Name	**Scientific Name**	**Heritage Rank**	**Management Status**	**Habitat Notes**
Olive-backed pocket mouse	*Perognathus fasciatus*	G5/S4	WYGF NSS3	Dry habitats ranging from gravelly soils to sandy areas of short grass prairies to sand dunes.
Canyon mouse	*Peromyscus crinitus*	G5/S1	WYGF NSS3	Rangewide canyon mice are found in and near rock crevices. In Wyoming they have been found in a few localities around sandstone outcrops near limber and juniper woodlands, typically with sandy soils.
Swift fox	*Vulpes velox*	G3/S2	USFWS ESA Listing Denied, USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Shortgrass prairie, but can be found in sage-grasslands. They are particularly found in sparely vegetated areas such as prairie dog towns.
Black-footed ferret*	*Mustela nigripes*	G1/S1	USFWS Endangered, WYGF NSS1	Always occur in or near prairie dog colonies, generally on short or mixed-grass prairie.

Sensitive Herptiles Potentially in Request Area				
Common Name	**Scientific Name**	**Heritage Rank**	**Management Status**	**Habitat Notes**
Tiger salamander	*Ambystoma tigrinum*	G5/S4	WYGF NSS4	Found in fairly moist environments ranging from rodent burrows to window wells to burrows in sand dunes. Larvae found in intermittent streams, ponds, and lakes.
Great Basin spadefoot toad*	*Spea intermontana [Scaphioppus intermontanus]*	G5/S3	Wyoming BLM Sensitive, WYGF NSS4	Sagebrush communities at lower elevations. Wyoming occurrences are mostly in the Wyoming Basin and the Green River Valley.
Northern leopard frog	*Rana pipiens*	G5/S3	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS4	Found near permanent water in areas up to about 9,000 feet Lower elevation sites are usually swampy cattail marshes and higher ones tend to be beaver ponds.
Great Basin gopher snake	*Pituophis melanoleucus deserticola*	G5/T5/S3		Sagebrush communities in arid habitats in southwestern Wyoming.

Sensitive Fish Potentially in Request Area				
Common Name	**Scientific Name**	**Heritage Rank**	**Management Status**	**Habitat Notes**
Bluehead sucker	*Catostomus discobolus*	G4/S3	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS1	Occurs rarely in larger streams and rivers of the Little Snake, Bear, Green and Snake River drainages.

Botany Comments

Wyoming Natural Diversity Database

Prepared for:

Jim Dunder – USDI Bureau of Land Management

12 July 2005

Project Description:

T17-18N R101W, Sweetwater Co, WYunty, Wyoming

There are no known RSFO Special Status Species plant species in the request area. However, in the adjacent townships there are two known RSFO Special Status Species plant species: *Astragalus nelsonianus* (Nelson's mileslkvetch) and *Descurainia torulosa* (Wyoming tansymustard).

Astragalus nelsonianus is a regional endemic of Wyoming, Colorado, and Utah. Over half of its range is in Wyoming. It is usually found in sparsely vegetated shrub and grassland communities and on disturbed or eroded soils.

Descurainia torulosa is a Wyoming state endemic restricted to the Rock Springs Uplift and southern Absaroka Range in Sweetwater, Fremont, Park, and Teton counties. It is found in sandy soil at the base of cliffs composed of volcanic breccia or sandstone, under slight overhangs, in cavities in the volcanic rock, or on ledges.

Species abstracts providing description, more complete habitat characterization, distribution, and references are available on the WYNDD homepage (http://www.uwyo.edu/WYNDD/).

The table below provides a summary of each species with its status and ranks.

Common name	Scientific name	Tracked?	Global rank	State rank	Federal status
Nelson's mileslkvetch	*Astragalus nelsonianus*	Watch	G3	S3	Wyoming BLM Sensitive
Wyoming tansymustard	*Descurainia torulosa*	Y	G1	S1	U.S. Forest Service Regions 2 & 4 and Wyoming BLM Sensitive

Please note that the absence of a species or occurrence from this list does not mean it does not occur in the area, simply that no known observations have been made there. Many locations in Wyoming, particularly on private lands, have not been botanically surveyed.

If you have any questions about the plant species or the data provided, please feel free to contact WYNDD.

Please report new occurrences of any of these species to WYNDD so that our database continues to be current and useful to future requesters. Thank you!

Prepared by:

Joy Handley, Assistant Botanist

thuja@uwyo.edu

Data Request Data Dictionary and File Naming Conventions

Wyoming Natural Diversity Database

This Data Dictionary describes the column headings (see table) and file naming conventions (bold words on this page) for ArcView shapefiles and Excel spreadsheets generated for from our Biotics and POD databases.

ArcView shapefiles are in geographic (decimal degrees) North American Datum 1983.

A species or natural community is referred to as an Element.

Biotics Element Occurrence Representation

An Element Occurrence is an area of land and/or water in which a species or natural community is, or was, present. An Element Occurrence should have practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location. For species Elements, the Element Occurrence often corresponds with the local population, but when appropriate may be a portion of a population (e.g., long distance dispersers) or a group of nearby populations (e.g., metapopulation). For community Elements, the Element Occurrence may represent a stand or patch of a natural community, or a cluster of stands or patches of a natural community. Because they are defined on the basis of biological information, EOs may cross jurisdictional boundaries.

An Element Occurrence Representation (EOREP) is a data management tool that has both spatial and tabular components including a mappable feature and its supporting database. Element Occurrences are typically represented by bounded, mapped areas (polygons) of land and/or water. Element Occurrence Representations are most commonly created for current or historically known occurrences of natural communities or native species of conservation interest. They may also be created, in some cases, for extirpated occurrences. All Element Occurrence REPs encompass one or more observations (Source Features).

Biotics source (Source Feature)

Source Features represent individual observations of a specific element at a specific place and time. They can be represented by points, lines, or polygons. If certain criteria (e.g. “evidence of breeding” or “within X kilometers of another Source Feature of the same Element with no separation barriers”) are met, individual Source Features are incorporated into an Element Occurrence Representation. Source Features that do not qualify for inclusion in an Element Occurrence REP remain independent (INDEPEN_SF = Y).

The source feature attribute table will be populated with observation/survey data as each record is revised according to the new data methodology in Biotics. Until the records are revised, they will only contain identification numbers and the text “HDMS DEFAULT CONVERSION VALUES” in the DESCRIPTOR field. Also, please note that the point source feature for these unrevised records is equivalent to the centroid of the Element Occurrence (from the old BCD methodology). Observation and survey data for these records can still be found in the Element Occurrence _DATA field in Element Occurrence REP files (the EOREP and related SOURCE files can be cross-referenced using the ‘Element Occurrence _ID’ field). Please bear with us during this transitional period.

Point Observation Database

Point Observation Database point locations are carried over from our previous system; they are animal Elements comparable to Source Features but not yet detailed in Biotics. Please note that files containing negative survey data (the Element was searched for but not found: POS_NEG = 0) are in separate files

with the naming convention pod_negative. Note also that some fields are longer than the 254-character limit imposed on dbase files. If you are milesssing information that you require, please contact us with the RECNUM for the record(s) you are interested in.

Sensitive

Separate shapefiles are made for data that are sensitive in both Biotics and POD. These records are provided at the township scale only. Data are considered sensitive if they meet one or more of the following criteria:

- Records of source features and/or element occurrences on private land that are not documented in publicly available references, but for which WYNDD has permission from the land owner to archive and disseminate at the township level.
- Records of source features and/or element occurrences submitted to WYNDD by an outside party who has requested that the data be treated as sensitive.
- Source features and/or element occurrences that are especially sensitive to disturbance, over-harvest, over-collection, intentional destruction, or unintentional destruction.
- Element occurrences that encompass one or more source features that are considered sensitive for any reason.
- tr (township/range) Refers to the township and range of request area.
- buffer (buffer) Refers to the buffer (of townships) around request area, if any.
- boundary (boundary of township/range and/or buffer).
- Italics indicate that data are sensitive and specific location information is not released.
- .xls only = data are in Excel spreadsheets, but not ArcView shapefiles.

Biotics Source	Biotics EOREP	POD	Definition
FEATURE_ID	FEATURE_ID		A unique identification code for the shape in Biotics.
EO_ID	EO_ID		Identification number for the Element Occurrence (EO) in Biotics.
SOURCE_ID			Identification number for the Source Feature in Biotics.
		RECNUM	A unique record number in POD.
SHAPE_TYPE .xls only		SHAPE	Whether the shape is a point, line, or polygon.
		POS_NEG (negative records are in a separate shapefile)	Species presence: 1 - present 0 - absent Records with a negative value indicate that a survey was conducted but the Element was not found.

Biotics Source	Biotics EOREP	POD	Definition
ELCODE	ELCODE	ELCODE	Element code assigned to each species by NatureServe.
SNAME	SNAME	SNAME	Scientific name.
COMNAME	COMNAME	CNAME	Common name.
EO_NUM	EO_NUM		Element Occurrence number for the element.
INDEPEN_SF			Independent Source Feature: Y - Yes, Source Feature did not qualify for inclusion in an EOREP. N - No, Source Feature is part of an EOREP.
DATA_SENS	DATA_SENS	SENSITIVE	Data are sensitive: Y - Yes. Specific location is not released. N - No.
ID_CONFIRM	ID_CONFIRM	IDENTIFIED	Indicates whether identification has been confirmed by a reliable individual: Y - Yes N - No ?/Q - Questionable U - Unknown
BUFFERDIST DIST_UNIT	PRECISION ACCURACY	PRECISION	SOURCE - BUFFERDIST Estimated accuracy of the location given as a buffered distance (represented in the EOREP shapefile). SOURCE - DIST_UNIT Unit of distance measure for BUFFERDIST. EOREP and POD - PRECISION Estimated precision of the data (old method, carried over from previous system; as records are updated in Biotics this value is deleted and the next field is populated): G - Low - within 7.5 km M - Medium - within 700 S - High - within 20 m EOREP – ACCURACY Estimated accuracy of the data (new method, populated as data are updated in Biotics): Very High (>95%) High (>80%, <=95%) Medium (>20%, <=80%) Low (>0%, <=20%) Unknown
OBSERVER .xls only		OBSERVER	Observer.

Biotics Source	Biotics EOREP	POD	Definition
OBS_DATE (If multiple observations are documented at one location, more than one date will appear in this field. Observation data can be found in the supplemental Excel spreadsheet).	SURVEYDATE FIRST_OBS LAST_OBS	YEAR MONTH DAY	SOURCE - OBS_DATE Observation date(s). EOREP - SURVEY DATE Date of the last known survey at this location. EOREP - FIRST_- and LAST_OBS The first and last date, respectively, the element was observed at this location. POD - YEAR, MONTH, and Day Year of observation. Month of observation. Day of observation.
OBS_DATA .xls only	EO_DATA	BIOLOGICAL	Details of each observation, including biological.
LITERATURE .xls only	BESTSOURCE	LITERATURE	SOURCE and POD - LITERATURE Literature source for specific observation. EOREP - BESTSOURCE The best source of information for the EOREP.
COUNTY .xls only	COUNTY	COUNTY	County. POD - the first four letters only.
LOCATOR	TOWN_RANGE	TOWN RANGE SECTION	SOURCE - LOCATOR Township/Range/Section (format: 045N118W Sec 23 SE4) and sometimes a brief description of specific location. EOREP - TOWN_RANGE Township/Range. POD - TOWN, RANGE, and *SECTION* Township, Range, *Section*.
TRS_NOTE .xls only	TRS_NOTE	TRS_COM	Quarter quarter sections.
	MAPSHEET		USGS 1:24000 state quad code.
	DIRECTIONS	LOCATION	Directions to, or description of, the location.
	MIN_ELEV		Minimum elevation in feet
	MAX_ELEV		Maximum elevation in feet
	GEN_DESC		General habitat description for the location.
TRACKSTAT	TRACKSTAT	SEOTRACK	Tracking Status: Y - Element tracked by WYNDD. W - Element watched for potential tracking by WYNDD.
G_RANK	G_RANK	GRANK	Global Heritage rank assigned by NatureServe.

Biotics Source	Biotics EOREP	POD	Definition
S_RANK	S_RANK	SRANK	State Heritage rank assigned by WYNDD biologists.
USESA	USESA	USFWS_ESA	Status under the Endangered Species Act.
		ESA_CODE	Endangered Species Act status code.
AGENCYSTAT	AGENCYSTAT	USFS_R2 USFS_R4 WY_BLM WGFD	Status assigned by: U.S. Forest Service (Region 2 and 4) Wyoming BLM Wyoming Game and Fish Department
		DOCUMENTAT	Documentation comments.
DESCRIPTOR	EO_TYPE	PO_TYPE	A brief description of the Source Feature or Element Occurrence. When the DESCRIPTOR field in Biotics SOURCE files is populated with "HDMS DEFAULT CONVERSION VALUES", use the EOREP file to view data by cross-referencing EO_ID. We are currently in transition from the old BCD methodology to Biotics.
	MANAGED_AREA		Land management area (i.e. agency land ownership).
	SPECIMEN		Specimen or voucher information.
	SURVEYTYPE		Survey type.
	SIZE_OF_EO		Size of Element Occurrence in acres unless otherwise noted.
	INVENT_COM		Inventory comments.

APPENDIX I
CUMULATIVE PERSONAL EARNINGS BY INDUSTRY FOR 2000

Industry Type	Earnings in $1,000s
Farm earnings	305
Nonfarm earnings	952,591
Private earnings	813,637
Agricultural services, forestry, fishing & other	1,390
Agricultural services	1,336
Forestry, fishing, and other	54
Forestry	0
Fishing	54
Other	0
Mining	318,679
Metal Mining	(D)
Coal Mining	(D)
Oil and gas extraction	151,471
Nonmetallic minerals, except fuels	130,377
Construction	56,715
General building contractors	7,748
Heavy construction contractors	28,349
Special trade contractors	20,618
Manufacturing	115,381
Durable goods	2,911
Lumber and wood products	0
Furniture and fixtures	0
Stone, clay, and glass products	1,843
Primary metal industries	0
Fabricated metal products	0
Industrial machinery and equipment	1,063
Electronic and other electric equipment	0
Motor vehicles and equipment	0
Other transportation equipment	(D)
Instruments and related products	0
Miscellaneous manufacturing industries	(D)
Ordinance	(N)
Nondurable goods	112,470
Food and kindred products	(D)
Tobacco products	0
Textile mill products	(D)
Apparel and other textile products	0
Paper and allied products	0
Printing and publishing	1,605
Chemicals and allied products	109,600
Petroleum and coal products	0
Rubber and miscellaneous plastics products	0
Leather and leather products	0
Transportation and public utilities	100,301

Industry Type	Earnings in $1,000s
Railroad transportation	(D)
Trucking and warehousing	21,492
Water transportation	(D)
Other transportation	5,714
Local and interurban passenger transit	1,846
Transportation by air	1,965
Pipelines, except natural gas	0
Transportation services	1,903
Communications	7,787
Electric, gas, and sanitary services	44,935
Wholesale trade	21,856
Retail trade	67,451
Building materials and garden equipment	4,677
General merchandise stores	8,439
Food stores	10,978
Automotive dealers and service stations	18,342
Apparel and accessory stores	1,250
Home furniture and furnishings stores	3,496
Eating and drinking places	15,581
Miscellaneous retail	4,688
Finance, insurance, and real estate	26,455
Depository and nondepository institutions	(D)
Other finance, insurance, and real estate	(D)
Security and commodity brokers	(D)
Insurance carriers	1,209
Insurance agents, brokers, and services	2,629
Real estate	9,273
Combined real estate, insurance, etc.	(N)
Holding and other investment offices	2,761
Services	105,409
Hotels and other lodging places	10,987
Personal services	5,011
Private households	(D)
Business services	22,288
Automotive repair, services, and parking	6,235
Miscellaneous repair services	4,138
Amusement and recreation services	1,384
Motion pictures	578
Health services	22,721
Legal services	3,910
Educational services	(D)
Social services	6,136
Museums, botanical, zoological gardens	0
Membership organizations	3,596

Industry Type	Earnings in $1,000s
Engineering and management services	13,744
Miscellaneous services	(D)
Government and government enterprises	138,954
Federal, civilian	16,575
Military	3,208
State and local	119,171
State government	9,240
Local government	109,931

(E) The estimate shown here constitutes the major portion of the true estimate.
(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.
(L) Less than $50,000
(N) Data not available for this year.
Source: U.S. Bureau of Economic Analysis

APPENDIX J
FEDERAL AND STATE MITIGATION AND MONITORING REQUIREMENTS INHERENT TO THE PROPOSED ACTION

In the case of surface coal mining, various federal and state law require mitigation and monitoring designed to ensure that reclamation standards are met following mining. The major mitigation measure and monitoring measure that are required by state or federal regulation are summarized in the following table. More specific information about some of these mitigation and monitoring measures have been described in Chapter 2 – Proposed Action.

Measures that are required by regulation are considered to be part of the Proposed Action. These requirements, mitigation plans, and monitoring plans are in place as part of the current approved mining and reclamation plan for the existing Black Butte Mine. If the LBA tract is leased, these requirements, mitigation plans, and monitoring plans would be included in the mining and reclamation plan amendment required for the LBA tract and the project area as a whole. This mining and reclamation plan would have to be approved before mining could occur on the tract, regardless of who acquires the tract.

If impacts are identified during the leasing process that are not mitigated by existing required mitigation measures, BLM can include additional mitigation measures (stipulations) on the new lease within the limits of its regulatory authority. In general, the levels of mitigation and monitoring required for surface coal mining by SMCRA and Wyoming state law are more extensive than those required for other surface disturbing activities; however, concerns are periodically identified that are not monitored or mitigated under existing procedures.

The following page presents a table of required mitigation and monitoring measures inherent in the Proposed Action for resources with identified issues.

Required Mitigation and Monitoring Measures Inherent in the Proposed Action for Resources with Identified Issues

Resource	Regulatory Compliance or mitigation Required by Stipulations, State, or Federal Law	Monitoring
Air Quality	Dispersion modeling of Mining plan for annual average particulate pollution impacts on ambient air; Using particulate pollution control technologies; Using work practices designed to minimize fugitive particulate emissions; Using EPA- or state-mandated BACT, watering or using chemical dust suppression on haul roads and exposed soils, Containment of truck dumps and primary crushers; Revegetation of exposed soils, Watering of active work areas, Reclamation plan to minimize surface disturbances subject to wind erosion, Paving of access roads, Haul truck speed limits, Following voluntary and required measures to avoid exposing the public to NO2 from blasting clouds, including: Monitoring weather and atmospheric conditions prior to decisions to blast, Minimizing blast sizes, Posting signs on public roads.	On-site air quality monitoring for PM_{10}; off-site ambient monitoring for PM_{10}; meteorological monitoring; on-site compliance inspections.
Geology & Minerals	Identifying and selectively placing or mixing chemically or physically unsuitable overburden materials to minimize adverse effects to vegetation or groundwater. Restoring to approximate original contour or other approved topographic configuration.	LQD requires monitoring in advance of mining to detect unsuitable overburden. LQD checks as-built vs. approved topography with each annual report.

Resource	Regulatory Compliance or mitigation Required by Stipulations, State, or Federal Law	Monitoring
Soil	Salvaging soil suitable to support plant growth for use in reclamation; Protecting soil stockpiles from disturbance and erosional influences; Selectively placing at least four feet of suitable overburden on the graded backfill surface below replaced topsoil to meet guidelines for vegetation root zones.	Monitoring vegetation growth on reclaimed areas to determine need for soil amendments.
Surface Water	Building and maintaining sediment control ponds or other devices during mining; restoring approximate original drainage patterns during reclamation;	Monitoring quality of discharges;
Groundwater	Evaluating cumulative impacts to water quantity and quantity associated with proposed mining; Replacing existing water rights that are interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality.	Monitoring wells track water levels in overburden, coal, interburden, underburden, and backfill.
Vegetation	Permanently revegetate reclaimed areas according to a comprehensive revegetation plan using approved permanent reclamation seed mixtures consisting predominantly of species native to the area; Reclaiming 20 percent of reclaimed area with native shrubs at a density of one per square meter; Controlling erosion on reclaimed lands prior to seeding with final seed mixture using mulching, cover crops, or other approved measures; Chemically and mechanically controlling weed infestation; Direct hauling of topsoil, whenever possible; Planting sagebrush; Creating depressions and rock piles; Using special planting procedures around rock piles; Posting reclamation bond covering the cost of reclamation. Monitoring revegetation growth and diversity until release of final reclamation bond (minimum 10 years).	Monitoring erosion to determine need for corrective action during establishment of vegetation. Using annual monitoring during revegetation evaluation to determine suitability for post-mining land uses.
Wildlife (including special status species)	Restoring pre-mining topography to the maximum extent possible; Planting a diverse mixture of grasses, forbs and shrubs in configurations beneficial to wildlife; Raptor-proofing power transmission poles; Increasing habitat diversity by creating rock clusters and shallow depressions on reclaimed land; Reducing vehicle speed limits to minimize mortality; Instructing employees not to harass or disturb wildlife; Avoiding bald eagle disturbance; Using raptor safe power lines; Preparing raptor mitigation plans.	Baseline and annual wildlife monitoring surveys; Annual monitoring for MBHFI.
Wild Horses Need language	Suitably restoring reclaimed areas	
Land Use	Suitably restoring reclaimed area for historic uses (grazing and wildlife).	Revegetation evaluation to determine suitability for post mining land uses.
Visual Resources	Restoring landscape character during reclamation through return to approximate original contour and revegetation with native species.	No specific monitoring program.

Resource	Regulatory Compliance or mitigation Required by Stipulations, State, or Federal Law	Monitoring
Cultural Resources	Conducting Class I and III surveys to identify cultural properties on all state and federal lands and on private lands affected by federal undertakings; Consulting with SHPO to evaluate eligibility of cultural properties for the NRHP; Avoiding or recovering data from significant cultural properties identified by surveys, according to an approved plan; Notifying appropriate federal personnel if historic or prehistoric materials are uncovered during mining operations; Instructing employees of the importance of and regulatory obligations to protect cultural resources. Notifying Native American tribes with known interest in this area of leasing action and request for help in identifying potentially significant religious or cultural sites	Monitoring mining activities during topsoil stripping; Cessation of activities and notification of authorities if unidentified sites are encountered during topsoil removal.
Socioeconomics	Paying royalty and taxes as required by federal, state, and local regulations.	Surveying and reporting to document volume of coal removed.

APPENDIX K
NEAR-FIELD MONITORING PROTOCOL AND RESULTS

POLLUTANT DISPERSION MODEL ASSUMPTIONS

General Assumptions

Several key assumptions will apply to the inventorying of emissions and performance of atmospheric dispersion modeling for the Pit 14 EIS:

- The entire Black Butte mine will be analyzed for emissions and modeled for ambient impacts, with Pit 14 included as a maintenance tract to extend existing mining operations.
- PM_{10} and NO_x emissions will be projected for the maximum-production-case of 7 million tons per year, based on the existing permit limit. Within this scenario, the year with maximum PM_{10} emissions will be modeled for ambient impacts.
- Average annual concentrations of the criteria pollutants PM_{10} and NO_2 will be modeled.

Dispersion Modeling Assumptions and Proposed Protocol

The purpose of the modeling will be to predict air quality impacts from the proposed project. Impacts will be predicted in the form of annual average ambient concentrations of PM_{10} and NO_2, using the ISCLT3 dispersion model (version 95250). Assumptions and model options used in the analysis include:

- Calculations for annual concentration
- Emission rates do not vary temporally
- Rural dispersion
- Regulatory default option
- Final plume rise
- Stack-tip downwash
- Buoyancy induced dispersion
- Default wind profile exponents
- Default vertical potential temperature gradients
- No exponential decay for rural mode
- Flat terrain
- No flagpole receptors
- No dry deposition algorithms to be used
- Pollutant types: PM_{10}, NO_2

Point sources are not located near buildings. Therefore, building downwash effect on point sources will not be considered in the analyses.

Emission Sources

This modeling study treats the proposed lease as a maintenance tract; therefore all sources will be included in the impact analyses. These include both Pit 14 sources and existing Black Butte mine sources as identified in the mine plan. PM_{10} and NO_x emission sources will each be quantified and spatially coordinated for the worst-case (i.e. highest emissions) year during the projected life of Pit 14. Emission factors from Wyoming DEQ Air Quality Division and EPA AP-42 guidance documents will be used to quantify annual PM_{10} and NO_x emissions. Where emission control technologies are employed, applicable control efficiencies will be applied to these emission factors.

PM_{10} sources treated as area sources will include:

- The active pit areas for topsoil stripping, blasting, overburden excavation and coal loading.
- Haul roads used for coal and overburden haulage.
- Total disturbed areas subject to wind erosion such as access roads, storage and parking facilities, pre-stripped topsoil areas, etc.

- Overburden backfill areas and stockpiles, if applicable.
- Topsoil stockpiles.

Some of the PM_{10} sources are best represented in the model as point sources. They include a truck dump and hopper at Pit 8, a crusher and train loadout at the Mine headquarters, and conveyor transfer points. For modeling, the emissions from these sources will be represented as coming from a 1 meter diameter stack at ambient temperature and having no exit velocity.

Potential sources of NO_x will be identified and quantified for the projected, worst-case PM_{10} year. All NO_x sources from the proposed project will be treated as area sources, including equipment tailpipe emissions and blasting emissions. NO_x emissions will be quantified in terms of total NO_x and NO_2. The criteria pollutant NO_2 will be modeled using ISC3LT. The modeled sources of NO_2 emissions in Pit 14 will include:

- Gases produced from blasting (NO_x emissions from blasting will be assumed to contain 1 ton of NO for every 2.4 tons of NO_2) (Chaiken et al 1974).
- Gases released from tailpipes of diesel-powered mobile equipment and gasoline-powered service vehicles (equipment NO_x emissions are assumed to be 90% NO and 10% NO_2) (Cole and Summerhays 1979, EPA 1997).

Receptors

PM_{10} and NO_2 impacts will be estimated at receptors on a 500-meter, rectangular grid, emanating outward from the combined boundaries of the Pit 14 lease and the existing mine permit. The receptor grid will extend at least 5 kilometers in all directions from these boundaries. If the model predicts significant impacts (concentrations greater than 1 $\mu g/m^3$) beyond 5 kilometers, the receptor grid will be expanded accordingly. Grid spacing beyond 5 kilometers will be 1000 meters. In addition, points around the lease/permit boundary, spaced 250 meters apart, will form a boundary receptor grid. Receptors will be on flat terrain (no elevation input).

Meteorological Data

Near-surface meteorological data used in this impact analysis were collected at the Black Butte Mine during a three-year period from 1/1/2002 through 12/31/2004. This measurement site is located approximately 8 miles northeast of the Pit 14 site, at an elevation of approximately 6,600 ft. above sea level. Anemometer height is 10 meters. All meteorological instruments meet or exceed EPA specifications. The quality assurance and processing of meteorological data also meet EPA requirements. A wind speed summary and wind rose will be generated from the meteorological data.

Meteorological data from the Black Butte monitoring site will be input to the ISC3LT model. Pasquill-Gifford stability class will be determined for each hour of data using the lateral turbulence criteria (σ_θ) for the initial estimate, then wind-speed adjusted for determining the final estimate. Hourly data will be processed to produce a joint frequency distribution (JFD) for the year 2004. Averaging period will be three full years. Average mixing heights will be taken from annual average values for Wyoming, obtained from the Wyoming DEQ Air Quality Division. Ambient temperatures will be input in the form of 3-year averages for each of the six stability classes.

Modeling Outputs

- ISC3 main output print file, containing receptor concentrations as annual average PM_{10} and NO_2 ($\mu g/m^3$) for worst-case year.
- Top 10 receptor concentrations of annual average PM_{10} and NO_2 in worst-case year.
- ISC3 plot file with receptor concentrations and coordinates, from which to generate isopleth maps for worst-case year.
- Isopleth maps (contour lines of constant concentration) will be generated for PM_{10} and NO_2. Isopleths will be overlain on the area map, which will show the Pit 14 lease boundary, mine permit boundary, and receptor grid area.

2010 PM_{10} EMISSION SOURCE INVENTORY

Source	Area or Point Source Name	Allocation Basis	Units	Aggregate PM_{10} TPY	Allocated PM_{10}TPY	Total PM_{10} TPY by Source
Primary Crusher	Primary Crusher	2,269,000	tons	1.53	1.53	1.53
Secondary Crusher	Secondary Crusher	7,000,000	tons	4.73	4.73	4.73
Train Loadout	Train Loadout	7,000,000	tons	29.40	29.40	29.40
Uncontrolled Conveyor Belt Transfer	Belt Transfer	4,731,000	tons	12.06	12.06	12.06
Pit 8 Truck Dump Hopper	Pit 8 Truck Dump	4,731,000	tons	9.05	9.05	
Pit 8 Feeder Breaker	Pit 8 Truck Dump	4,731,000	tons	3.19	3.19	12.24
Main Stockpile	Main Stockpile	1,500,000	tons	43.55	43.55	43.55
Blade	Pit 10 Haul Road	12,319	hours	22.44	5.37	
Coal Haul Truck	Pit 10 Haul Road	1,863,000	tons	41.47	18.70	
Light Vehicles	Pit 10 Haul Road	50,000	hours	123.52	8.23	
Water Truck	Pit 10 Haul Road	2,591	hours	0.83	0.20	32.50
Highwall Miner Coal Discharge	Pit 10 Production	1,863,000	tons	3.56	3.56	
Coal Loading	Pit 10 Production	1,863,000	tons	2.36	0.63	4.19
Blade	Pit 11 Haul Road	12,319	hours	22.44	6.55	
Coal Haul Truck	Pit 11 Haul Road	2,269,000	tons	41.47	22.77	
Light Vehicles	Pit 11 Haul Road	200,000	hours	123.52	32.94	
Water Truck	Pit 11 Haul Road	2,591	hours	0.83	0.24	62.50
Coal Blasting	Pit 11 Production	2,269,000	tons	0.40	0.18	
Dozer	Pit 11 Production	16,020	hours	10.56	10.56	
Coal Loading	Pit 11 Production	2,269,000	tons	2.36	0.77	
OB Blasting	Pit 11 Production	19,240,000	bcy	0.12	0.07	
OB Dragline Excavation	Pit 11 Production	19,240,000	bcy	76.49	76.49	88.06
Blade	Pit 14 Haul Road	12,319	hours	22.44	8.27	
Coal Haul Truck	Pit 14 Haul Road	2,868,000	tons	26.57	26.57	
Light Vehicles	Pit 14 Haul Road	200,000	hours	123.52	32.94	
Water Truck	Pit 14 Haul Road	2,591	hours	0.83	0.31	68.09
Coal Blasting	Pit 14 Production	2,868,000	tons	0.40	0.23	
Dozer	Pit 14 Production	16,025	hours	10.56	10.56	
Coal Loading	Pit 14 Production	2,868,000	tons	2.36	0.97	
OB Blasting	Pit 14 Production	11,925,000	bcy	0.12	0.05	
OB Dragline Excavation	Pit 14 Production	11,925,000	bcy	76.51	76.51	88.31
Dozer	Pit 3 Reclamation	7,310,000	bcy	6.58	6.58	6.58
Dozer	Pit 8 Reclamation	1,270,000	bcy	1.14	1.14	1.14
Pit 8 Stockpile	Pit 8 Stockpile	918,000	tons	42.34	42.34	42.34
Light Vehicles	Service Road	300,000	hours	123.52	49.41	
Blade	Service Road	12,319	hours	22.44	2.24	
Water Truck	Service Road	2,591	hours	0.83	0.08	51.73
Disturbed Acreage Wind Erosion	Disturbed Acres	7,013	acres	525.98	525.98	525.98
				Totals	**1074.94**	**1074.94**

2010 NO_2 EMISSION SOURCE INVENTORY

Source	Area or Point Source Name	Allocation Basis	Units	Aggregate NO_2 TPY	Allocated NO_2 TPY	Total NO_2 by Area
Light Vehicles	Access Road	180,000	hours	0.29	0.06	0.06
Diesel Locomotive	Main Stockpile			7.64	7.64	
Dozer	Main Stockpile	1,500,000	tons	8.03	0.87	8.51
Blade	Pit 10 Haul Road (highwall)	1,863,000	tons	0.81	0.22	
Coal Haul Truck	Pit 10 Haul Road (highwall)	1,863,000	tons	11.47	3.05	
Light Vehicles	Pit 10 Haul Road (highwall)	180,000	hours	0.29	0.06	
Water Truck	Pit 10 Haul Road (highwall)	1,863,000	tons	0.57	0.15	3.48
Dozer	Pit 10 Production (highwall)	328,117	tons	8.03	0.19	0.19
Blade	Pit 11 Haul Road	2,269,000	tons	0.81	0.26	
Coal Haul Truck	Pit 11 Haul Road	2,269,000	tons	11.47	3.72	
Light Vehicles	Pit 11 Haul Road	180,000	hours	0.29	0.06	
Water Truck	Pit 11 Haul Road	2,269,000	tons	0.57	0.19	4.23
Coal Blasting	Pit 11 Production	2,269,000	tons	110.12	3.44	
DMM3 Drill	Pit 11 Production	(total)		4.50	4.50	
Dozer	Pit 11 Production	1,224,000	tons	8.03	0.71	
Front End Loader	Pit 11 Production	2,269,000	tons	4.55	2.01	
OB Blasting	Pit 11 Production	19,240,000	bcy	110.12	64.89	75.55
Blade	Pit 14 Haul Road	2,868,000	tons	0.81	0.33	
Coal Haul Truck	Pit 14 Haul Road	2,868,000	tons	11.47	4.70	
Light Vehicles	Pit 14 Haul Road	180,000	hours	0.29	0.06	
Water Truck	Pit 14 Haul Road	2,868,000	tons	0.57	0.23	5.33
Backhoe	Pit 14 Production	(total)		0.12	0.12	
Coal Blasting	Pit 14 Production	1,030,000	tons	110.12	1.56	
DM45 Drill	Pit 14 Production	(total)		1.15	1.15	
Dozer	Pit 14 Production	1,307,000	tons	8.03	0.76	
Front End Loader	Pit 14 Production	2,868,000	tons	4.55	2.54	
OB Blasting	Pit 14 Production	11,925,000	bcy	110.12	40.22	46.35
Dozer	Pit 3 Reclamation	7,310,000	bcy	8.03	4.24	4.24
Dozer	Pit 8 Reclamation	1,270,000	bcy	8.03	0.74	0.74
Dozer	Pit 8 Stockpile	918,000	tons	8.03	0.53	0.53
Light Vehicles	Service Road	180,000	hours	0.29	0.06	0.06
				Total	**149.26**	

MODEL OUTPUTS

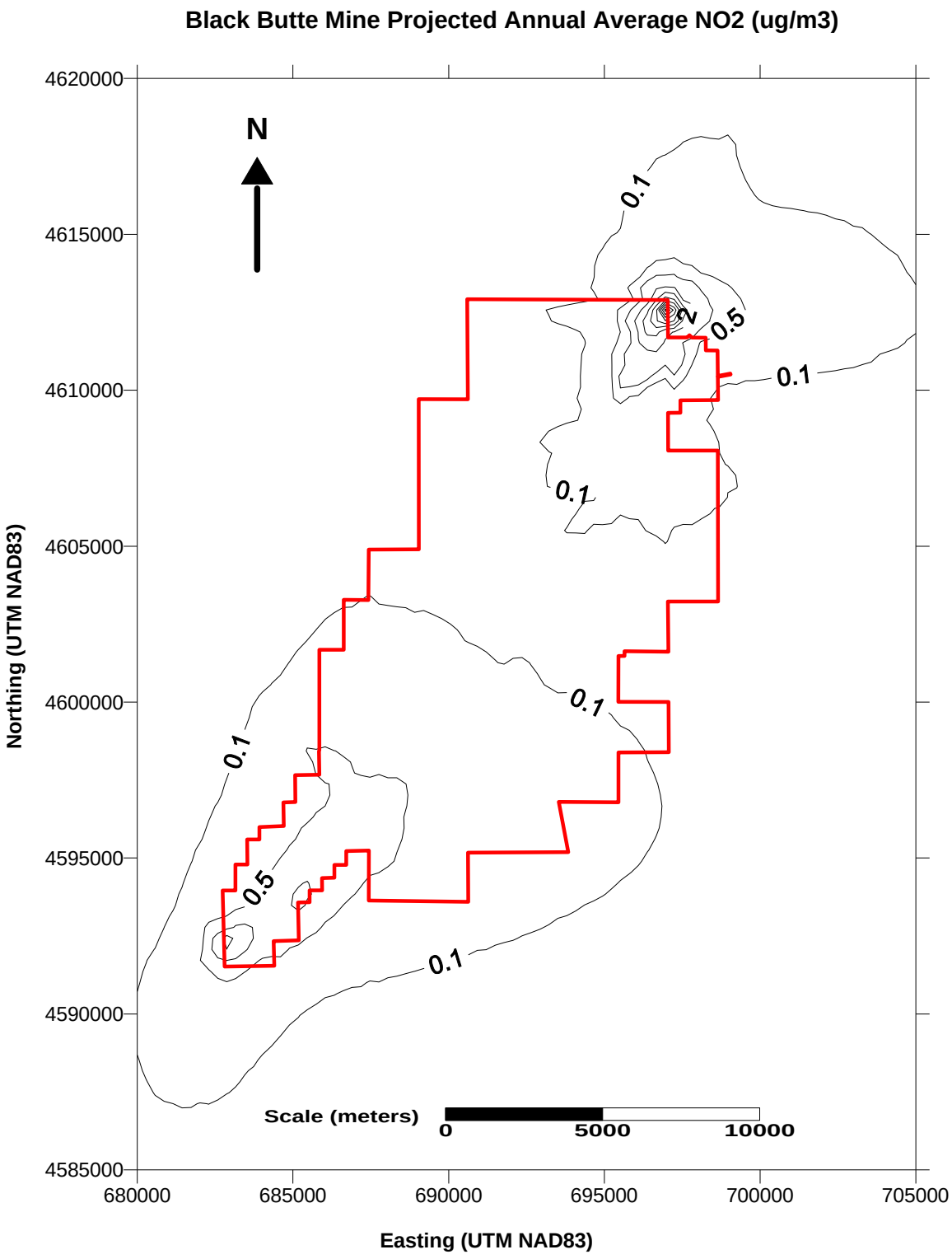
PM10

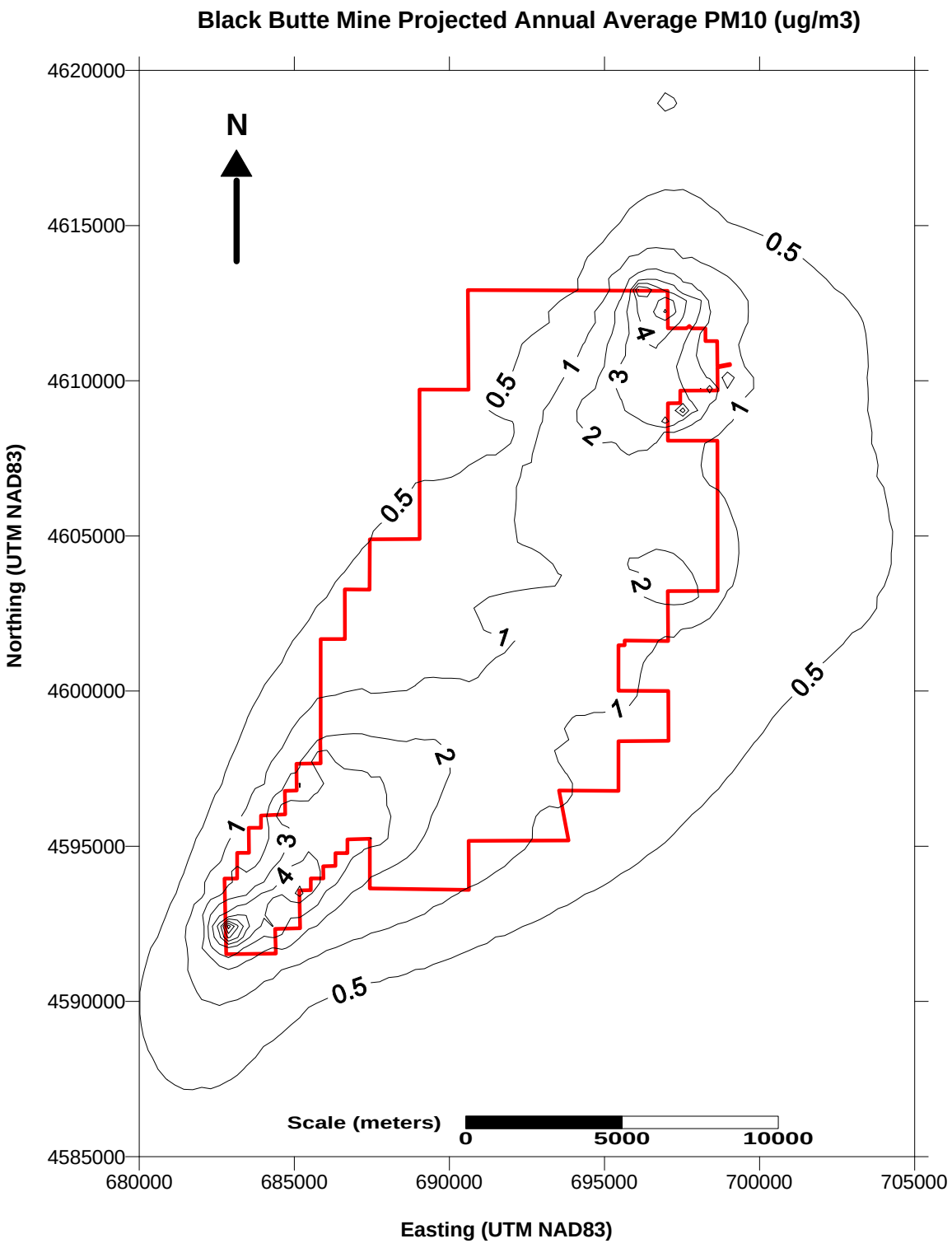
*** THE MAXIMUM 10 ANNUAL AVERAGE CONCENTRATION VALUES FOR GROUP: ALL ***
INCLUDING SOURCE(S): MASTK , P3REC , P8REC , P8STK , P10R1 , P10R2 , P10R3 , P10R4 , P10R5 , P10R6 , P10R7 , P10PR , P11R1 , P11R2 , P11R3 , P11R4 , P11R5 , P11R6 , P11R7 , P11R8 , P11PR , P14R1 , P14R2 , P14R3 , P14R4 , P14R5 , P14PR , SVRD1 , SVRD2 , SVRD3 , . . . ,

** CONC OF TOXICS IN MICROGRAMS/CUBIC-METER **

RANK CONC AT RECEPTOR (XR,YR) OF TYPE RANK CONC AT RECEPTOR (XR,YR) OF TYPE

- - - -


Black Butte Mine Projected Annual Average NO2 (ug/m3)
N
0.1
2
0.5
0.1
0.1
0.1
0.1
0.5
0.1
Scale (meters)
0
5000
10000
4620000
4615000
4610000
4605000
4600000
4595000
4590000
4585000
Northing (UTM NAD83)
680000
685000
690000
695000
700000
705000
Easting (UTM NAD83)


Black Butte Mine Projected Annual Average PM10 (ug/m3)
N
Northing (UTM NAD83)
Easting (UTM NAD83)
4620000
4615000
4610000
4605000
4600000
4595000
4590000
4585000
680000
685000
690000
695000
700000
705000
0.5
1
2
3
4
Scale (meters)
0
5000
10000