BLM

ENVIRONMENTAL ASSESSMENT

Black Butte Coal Company Lease Modification to WYW-6266

June 2017

The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

EA#**:** DOI-BLM-WY-D040-2015-0121-EA

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Environmental Assessment

for

Black Butte Coal Company Lease Modification to WYW-6266

Bureau of Land Management

Rock Springs Field Office

Wyoming

DOI-BLM-WY-D040-2015-0121-EA

June 2017

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
%	percent
ac.	acre
ACEC	Areas of Critical Environmental Concern
ANFO	ammonium nitrate fuel oil
ASLM	Assistant Secretary of Land and Minerals
AUMs	animal unit months
BACT	Best Available Control Technologies
BBCC	Black Butte Coal Company
BBCM	Black Butte Coal Mine
bgs	below ground surface
BLM	Bureau of Land Management
Btu	British thermal unit
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
E	East
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act

EPS-HDT	Economic Profile System-Human Dimensions Toolkit
FCLAA	Federal Coal Leasing Amendments Act of 1976
FLPMA	Federal Land Policy Management Act of 1976
USFWS	United States Fish and Wildlife Service
GHGs	greenhouse gases
GRRMP	Green River Resource Management Plan
Gt/yr	gigatonnes per year
H_2SO_4	sulfuric acid
HAPs	Hazardous Air Pollutants
ID	interdisciplinary
IM	Instruction Memorandum
IPCC	Intergovernmental Panel on Climate Change
LBA	lease-by-application
Leucite Hills Coal Mine	Black Butte Leucite Hills Coal Mine
MACT	Maximum Achievable Control Technology
MATS	Mercury and Air Toxics Standards
MLA	Mineral Leasing Act of 1920, as amended
mmt	million metric tons
mt	metric tons
MBTA	Migratory Bird Treaty Act
MER	Maximum Economic Recovery
N	North
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969, as amended
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act

NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NWR	National Wildlife Refuge
O_3	ozone
OHV	off-highway-vehicle
OSMRE	Office of Surface Mining Reclamation and Enforcement
PAP	permit application package
PAHs	Poly-Aromatic Hydrocarbons
PFYC	Potential Fossil Yield Classification
Pit 14 FEIS	Final Environmental Impact Statement for the Pit 14 Coal Lease-by-Application, Sweetwater County, Wyoming (Federal Coal Lease Application WYW-160394)
PHMA	Wyoming Greater Sage-Grouse Priority Habitat Management Area
PM	particulate matter
$PM_{2.5}$	particulate matter nominally 2.5 microns or less
PM_{10}	particulate matter nominally 10 microns or less
ppb	parts per billion
ppm	parts per million
QAPP	Quality Assurance Project Plan
R	Range
Recovery Program	Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin
RFFAs	reasonably foreseeable future actions
RIPRAP	Recovery Implementation Program Recovery Action Plan

ROD	Record of Decision
ROW	right-of-way
RSFO	Rock Springs Field Office
RSGA	Rock Springs Grazing Association
S	South
SAR	sodium absorption rate
SCC	social cost of carbon
SCS	Soil Conservation Service (now known as the Natural Resources Conservation Service
SGCN	species of greatest conservation need
short ton	2,000 pounds or one ton
SHPO	State Historic Preservation Office
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasure
STP	particulate concentration summaries for standard
SWAP	Wyoming State Wildlife Action Plan
T	Township
TEOM	tapered element oscillating microbalance
TDS	total dissolved solids
TMRT	Ten Mile Rim Tract
TMRT EA	Final EA for the *Proposed Ten Mile Rim Coal Lease-by-Application and Associated Rights-of-Way, Sweetwater County, Wyoming*
USACE	United States Army Corps of Engineers
VOCs	volatile organic compounds
VRI	Visual Resource Inventory

VRM	Visual Resource Management
W	West
WAAQS	Wyoming Ambient Air Quality Standards
WDEA	Wyoming Division of Economic Analysis
WDEQ	Wyoming Department of Environmental Quality
WYDOT	Wyoming Department of Transportation
WGFD	Wyoming Game and Fish Department
WLMI	Wyoming Labor Market Information
WSEO	Wyoming State Engineer's Office
WYCRO	Wyoming Cultural Records Office

1.0 INTRODUCTION

Proposed Action Title: Black Butte Coal Company Lease Modification to WYW-6266

Environmental Assessment (EA) Number: DOI-BLM-WY-D040-2015-0121-EA
Preparing Office: Bureau of Land Management (BLM)

Rock Springs Field Office (RSFO)
280 Highway 191 North
Rock Spring, Wyoming 82901

Proposed Action Type and Location: To modify the existing Federal Coal Lease WYW-6266 to include tracts of unleased federal coal lands situated within Sections 12 and 24, Township (T) 19 North (N), Range (R) 100 West (W), as shown on **Figure 1.1**.

Applicant: Black Butte Coal Company (BBCC)
c/o Lighthouse Resources, Inc.
170 South Main Street, Suite 700
Salt Lake City, Utah 84101

Lease/Serial/Case File No.: WYW-6266 (Federal Coal Lease)

1.1 Background

The Black Butte Coal Mine (BBCM) complex, located in Sweetwater County in southwest Wyoming approximately 25 miles east of Rock Springs, is operated by BBCC and consists of a surface mining operation with ongoing reclamation operations (**Figure 1.1**). The BBCM produces coal from federal, private, and state lands situated within the historic Union Pacific Railroad checkerboard land grant area.

The BBCM complex has been in production since 1977, providing thermal coal to the Jim Bridger Power Plant and other operators. The annual production of the BBCM complex is approximately three to four million tons. BBCC is a 50 percent-owned subsidiary of KCP, Inc., which is a wholly-owned subsidiary of LHR Coal, LLC; which is a wholly-owned subsidiary of Lighthouse Resources, Inc. Lighthouse Resources, Inc. is a private company incorporated under the laws of Delaware. Lighthouse Resources, Inc., formerly known as Ambre Energy North America, Inc., was acquired by private equity funds managed by Resource Capital Funds, on December 2, 2014. Resource Capital Funds is based in Denver, Colorado.

The lease modification area consists of 450 acres, which includes two proposed coal tract areas that extend to the north and south of the current Pit 10 area of the BBCM. The proposed coal tracts will facilitate an extension of Pit 10 in its southeast corner with the addition of 50 acres and a new pit (Pit 15) located north of Pit 10 on 400 acres. Portions of each proposed area are located within the existing 42,420-acre BBCM permit boundary. Approximately 68 acres or 15 percent of the lease modification area has been previously disturbed by coal mining activities under an existing BLM right-of-way (ROW) permit. These disturbances include existing access roads, a surface water retention basin, topsoil stripping to accommodate mining of the existing leased and fee coal, and topsoil and overburden stockpiles. Other previous disturbances within

the lease modification area include scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; and livestock grazing (i.e., cattle and sheep).

BBCC is seeking to modify Federal Coal Lease WYW-6266 to provide access to federal lands for the extraction of federal coal resources that would otherwise be bypassed. The expansion would allow Maximum Economic Recovery (MER) of the federal coal resource. It is a logical progression of the northern portion of the BBCM. The coal resources are needed by the BBCM to maintain mine operations and provide high-quality, low-cost fuel in support of electrical generation to the Jim Bridger Power Plant.

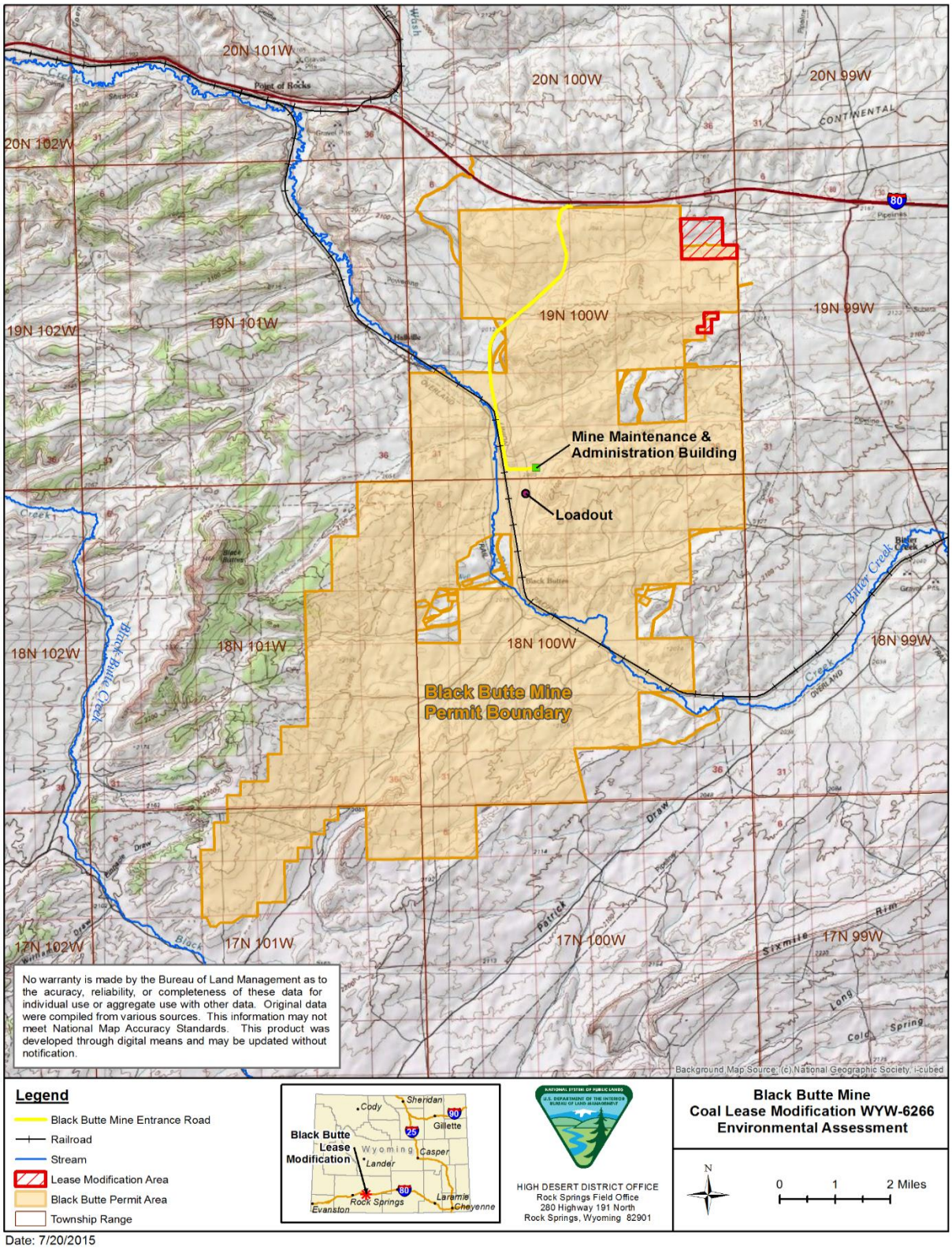
The *BLM National Environmental Policy Act Handbook H-1790-1* defines connected actions as follows:

> Connected actions are those actions that are 'closely related' and 'should be discussed' in the same NEPA document (40 CFR 1508.25(a)(1)). Actions are connected if they automatically trigger other actions that may require an EIS [environmental impact statement]; cannot or will not proceed unless other actions are taken previously or simultaneously; or if the actions are interdependent parts of a larger action and depend upon the larger action for their justification. (BLM 2008:45)

The Jim Bridger Power Plant is not considered a connected action because 1) the proposed lease modification would not automatically trigger any action at the Jim Bridger Power Plant that would require an EIS, 2) the proposed lease modification could proceed without any changes (previous or simultaneous actions) at the Jim Bridger Power Plant, and 3) the proposed lease modification is not an interdependent part of a larger action at the Jim Bridger Power Plant and does not depend on the plant for its justification because the coal could be sold elsewhere due to the coal's market value. Other coal processing plants exist and transportation infrastructure is available to transport the coal to these other locations.

The proposed lease modification would not change production levels at the Jim Bridger Power Plant or require changes to its current regulatory permits. If the proposed lease modification is rejected, the Jim Bridger Power Plant would continue to operate by obtaining coal from other sources. These other sources would consist of the surface mine in the Bridger Mine Complex, the underground mine in the Bridger Mine Complex, and outside third-party suppliers (e.g., other mines within the Powder River Basin). Although the Jim Bridger Power Plant is not considered a connected action, operating and emissions data from the power plant are included in the Air Quality and Climate Change section to provide context and to assist with analysis of the combustion of coal mined from the proposed lease modification.

Figure 1.1. Black Butte Coal Company Lease Modification WYW-6266



Date: 7/20/2015

1.2 Purpose and Need for the Proposed Action

BLM Purpose and Need

The purpose is to respond to a request from BBCC to modify Federal Coal Lease WYW-6266. The need is established by the responsibility of the BLM under the Mineral Leasing Act of 1920, as amended (MLA), the Federal Land Policy Management Act of 1976 (FLPMA), and the National Environmental Policy Act of 1969, as amended (NEPA).

Office of Surface Mining Reclamation and Enforcement's (OSMRE) Purpose and Need

The OSMRE is a cooperating agency and is responsible for reviewing plans to conduct coal mining and reclamation operations on lands containing leased federal coal. Pursuant to 30 Code of Federal Regulations (CFR) 746, the OSMRE shall prepare and submit to the Secretary of the Interior a decision document recommending approval, disapproval, or conditional approval of the proposed mining plan modification. The recommendation shall be based, at a minimum, upon:

- The permit application package (PAP), including the resource recovery and protection plan;
- Information prepared in compliance with NEPA, including this EA;
- Documentation assuring compliance with the applicable requirements of federal laws, regulations, and executive orders other than NEPA;
- Comments and recommendations or concurrence of other federal agencies and the public;
- Findings and recommendations of the BLM with respect to the resource recovery and protection plan (R2P2), federal lease requirements, and the MLA;
- Findings and recommendations of the Wyoming Department of Environmental Quality (WDEQ), who is also a cooperating agency, with respect to the mine permit application and the Wyoming State program; and
- The findings and recommendation of the OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D.

BLM Decision to be Made

According to the BLM Wyoming delegation of authority, the RSFO Manager can make decisions after preparing NEPA for proposed activities affecting lands within RSFO administrative jurisdiction, unless otherwise prohibited by law, statute or regulation. Based on the predicted effects documented in this environmental assessment, the Rock Springs FO Manager will decide what lands are acceptable to offer, if any, for lease modification to existing federal coal lease WYW-6266 and if needed, identify required mitigation measures. The Field Manager's decision does not mean a lease modification will be automatically issued. Once the Field Manager makes a decision on which lands are identified as acceptable for modification, the Wyoming State Office will take the administrative steps required by regulation to process the lease modification. Once it is determined all administrative steps have been met and acceptable, a lease modification may be approved.

The BLM decision regarding the modification of Federal Coal Lease WYW-6266 includes the following options:

- Modify Federal Coal Lease WYW-6266 as applied for;
- Modify Federal Coal Lease WYW-6266 with adjustments to the area applied for and/or include additional terms and conditions; or
- Reject the lease modification application.

If the No Action Alternative is chosen, the BLM action will result in the rejection of the application.

OSMRE's Decision to be Made

The Secretary of the Interior will issue a decision document:

- Approving the mining plan modification;
- Approving the mining plan modification with conditions; or
- Denying the mining plan modification.

1.3 Relationships to Statutes, Regulations, Plans or Other Environmental Analyses

The BBCC applied to modify Federal Coal Lease WYW-6266 on April 8, 2014. The BLM reviewed the application under the following authorities: MLA; Energy Policy Act of 2005; NEPA; Federal Coal Leasing Amendments Act of 1976 (FCLAA); FLPMA; and the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The BLM is responsible for leasing federal coal under the FCLAA.

If a coal lease modification is issued, SMCRA gives the OSMRE the primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations. Pursuant to Section 503 of SMCRA, the WDEQ developed, and in November 1980 the Secretary of the Interior approved, a program authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on non-federal lands within the State of Wyoming. In January 1987, pursuant to Section 523(c) of SMCRA, WDEQ entered into a cooperative agreement with the Secretary of the Interior authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on federal lands within the state. Pursuant to this agreement, federal coal lease holders in Wyoming must submit PAPs to OSMRE and WDEQ for proposed mining and reclamation operations on federal lands in the state. WDEQ reviews the package to ensure that the permit application complies with the permitting requirements and that the coal mining operation will meet the performance standards of the approved Wyoming State program. If it does comply, OSMRE uses the NEPA information and makes a recommendation to the Assistant Secretary of Land and Minerals (ASLM) to either approve, approve with conditions, or disapprove the federal mine plan. Then WDEQ issues the applicant a permit to conduct coal mining operations.

WDEQ enforces the performance standards and permit requirements for reclamation during the mine's operation and has primary authority in environmental emergencies. OSMRE retains oversight responsibility for this enforcement. If the coal lease is modified to include the

requested additional acreage, the lessee will be required to obtain a coal mining permit prior to mining the coal.

The BBCC proposed modification would conform to the following requirements found in 43 CFR 3432.2:

1) The modification serves the *interest of the United States;*
2) There is no competitive interest in the lands or deposits, and
3) The additional lands or deposits cannot be developed as part of another potential or existing independent operation.

Conformance to the Land Use Plan: Regulations 43 CFR 1610.5-3 requires actions to conform to the approved land use plan. The *Green River Resource Management Plan* [GRRMP] and *Record of Decision* [ROD], (signed August 8, 1997) as amended by the as amended by the Record of Decision and Approved Resource Management Plan Amendments for the Rocky Mountain Region, Including the Greater Sage-Grouse Sub-Regions of Lewistown, North Dakota, Northwest Colorado, and Wyoming (signed September 21, 2015). (BLM 1997a and BLM 2015a), allows for coal leasing and development and the BLM has determined that proposed modification of Federal Coal Lease WYW-6266 conforms to the GRRMP. The GRRMP provides land use guidance for coal leasing within the proposed lease modification area. The GRRMP decisions pertaining to this proposal include:

- Solid Leasables (Coal), page 13
    - Management Objective: The objective for management of the federal coal resources in the planning area 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.
    - Management Actions: Federal coal lands within the Coal Occurrence and Development Potential area (about 422,000 acres) are open to further consideration for coal leasing and development (i.e., new competitive leasing, emergency leasing, lease modifications, and exchange proposals, under the Federal Coal Management Program) with appropriate and necessary conditions and requirements for protection of other land and resource values and uses.

The lands under consideration for lease modification lie within the Coal Occurrence and Development Potential area (see GRRMP Map 19, BLM 1997a).

Relationship to Other Environmental Analyses: As allowed by regulations 40 CFR 1500 and 43 CFR 46 and BLM guidance (*BLM National Environmental Policy Act Handbook H-1790-1*, BLM 2008a), this environmental analysis incorporates by reference information found in the following documents:

- Final EA for the *Proposed Ten Mile Rim Coal Lease-by-Application and Associated Rights-of-Way, Sweetwater County, Wyoming* (BLM 2004) (TMRT EA). The EA analyzed the leasing and mining of federal coal reserves located within the Ten Mile Rim Tract (TMRT) in response to a lease-by-application (LBA) filed by Bridger Coal

Company, and was used by the BLM as the basis for the decision to hold a competitive, sealed-bid sale and eventual issuance of Federal Coal Lease WYW-154595.

The final TMRT EA and associated NEPA documents can be reviewed at:

http://bit.ly/10milerim

- Environmental Assessment for Bridger Coal Lease Modification: WYW-2727, Sweetwater County, Wyoming, EA#: WY-040-EA10-30 (BLM 2010a). The EA analyzed the leasing of coal and a ROW grant to support surface coal mining at the Bridger Coal Mine.

  The 2010 Bridger Coal EA and associated NEPA documents can be reviewed at:

  http://bit.ly/bridgercoalWYW2727

- Environmental Assessment, Bridger Coal Lease Modification to WYW-154595, Sweetwater County, Wyoming, WY-040-EA12-19, (BLM 2013). The EA analyzed the leasing of coal to support underground coal mining at the Bridger Coal Mine.

The 2013 Bridger Coal EA and associated NEPA documents can be reviewed at:

http://bit.ly/bridgercoalWYW154595

It is appropriate to reference to the previously mentioned documents to supplement descriptions of the affected environment and general conclusions about environmental impacts associated with the BBCM. To ensure full disclosure, this EA will provide additional analyses and description of impacts specific to this proposal.

This EA is tiered to the environmental analyses in the *Final Environmental Impact Statement (EIS) for the Pit 14 Coal Lease-by-Application, Sweetwater County, Wyoming (Federal Coal Lease Application WYW-160394)* (BLM 2006) (Pit 14 FEIS). The Pit 14 FEIS analyzed the leasing and mining of federal coal reserves located within the Pit 14 Tract in response to a LBA filed by BBCC to further surface mining operations at the BBCM, and was used by the BLM as the basis for the decision to hold a competitive, sealed-bid sale and eventual issuance of Federal Coal Lease WYW-160394.

It is appropriate to tier to this document because it analyzed the cumulative impacts associated with reasonably foreseeable future actions (RFFAs) including operations at the BBCM. The Pit 14 FEIS and associated NEPA documents can be reviewed at:

http://bit.ly/pit14LBA

1.4 Scoping, Public Involvement, and Issues

The BLM RSFO issued a news release on November 10, 2014 on the BLM Wyoming website, requesting public comment on the Proposed Action. The news release was published on the SweetwaterNow.com website on November 16, 2014. The 30-day comment period ended on

December 9, 2014. During this period, the BLM received one comment letter from a Wyoming citizen. The email comment was positive towards approving the coal lease.

Issues and concerns identified during both external scoping and internal discussions with the BLM interdisciplinary (ID) team included potential impacts to local/regional air quality; global climate change; cultural/historical resources; fish and wildlife (including migratory birds and threatened and endangered animal species); geology/minerals/energy production; surface and groundwater resources; lands/access; livestock grazing; Native American Religious Concerns; social and economic resources; soils; vegetation (including forested and rangeland) resources; potential spread of invasive species/noxious weeds; and paleontological resources.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Alternative I – No Action Alternative

The No Action Alternative is to reject the application to modify the existing Federal Coal Lease WYW-6266 and not add the additional estimated 9.2 million tons of in-place mineable coal beneath the 450 acres in Section 12 (400 acres) and Section 24 (50 acres), T19N, R100W to the BBCM complex.

Under the No Action Alternative, it is assumed that the federal coal within these lands would not be mined in the near future, if at all. Due to the relatively small size of the coal reserve, constraints due to a number of faults which isolate coal in the lease modification area, oil and gas pipelines on the northern boundary, and its location at the margin of the existing BBCM pits and economically recoverable depths, it is unlikely that BBCC, or any other coal operator, would be able to economically mine these resources once current operations move away from these lands.

Under the No Action Alternative, the BLM would continue to manage the federal surface lands comprising the lease modification area for multiple use, including but not limited to: livestock grazing, recreation, and oil and gas exploration and development.

2.2 Alternative II – Proposed Action

BBCC is proposing the development of a new pit (Pit 15) as well as extending the extent and life of Pit 10. This development would utilize the BBCM facilities to mine recoverable coal from the lease modification area and several adjacent privately owned sections. The Proposed Action is to modify Federal Coal Lease WYW-6266 and the existing mining plan to include 450 acres of coal lands, as described as follows:

Sixth Principal Meridian, Wyoming
T. 19 N., R. 100 W.
sec. 12 SW¼NE ¼, S½NW¼, SW¼, W½SE¼, and SE¼SE¼;
sec. 24 NW¼NW¼NE¼, E½NE¼NW¼, and N½SE¼NW¼
The areas described aggregate 450 acres.

The federal lands in sections 12 and 24, T19N, R100W are administered by the BLM (**Figure 2.1**). Federal Coal Lease WYW-6266 was originally issued to BBCC on April 1, 1976. This lease modification would not exceed the modified acreage limitation of 960 acres as set forth with the passage of the Energy Policy Act of 2005.

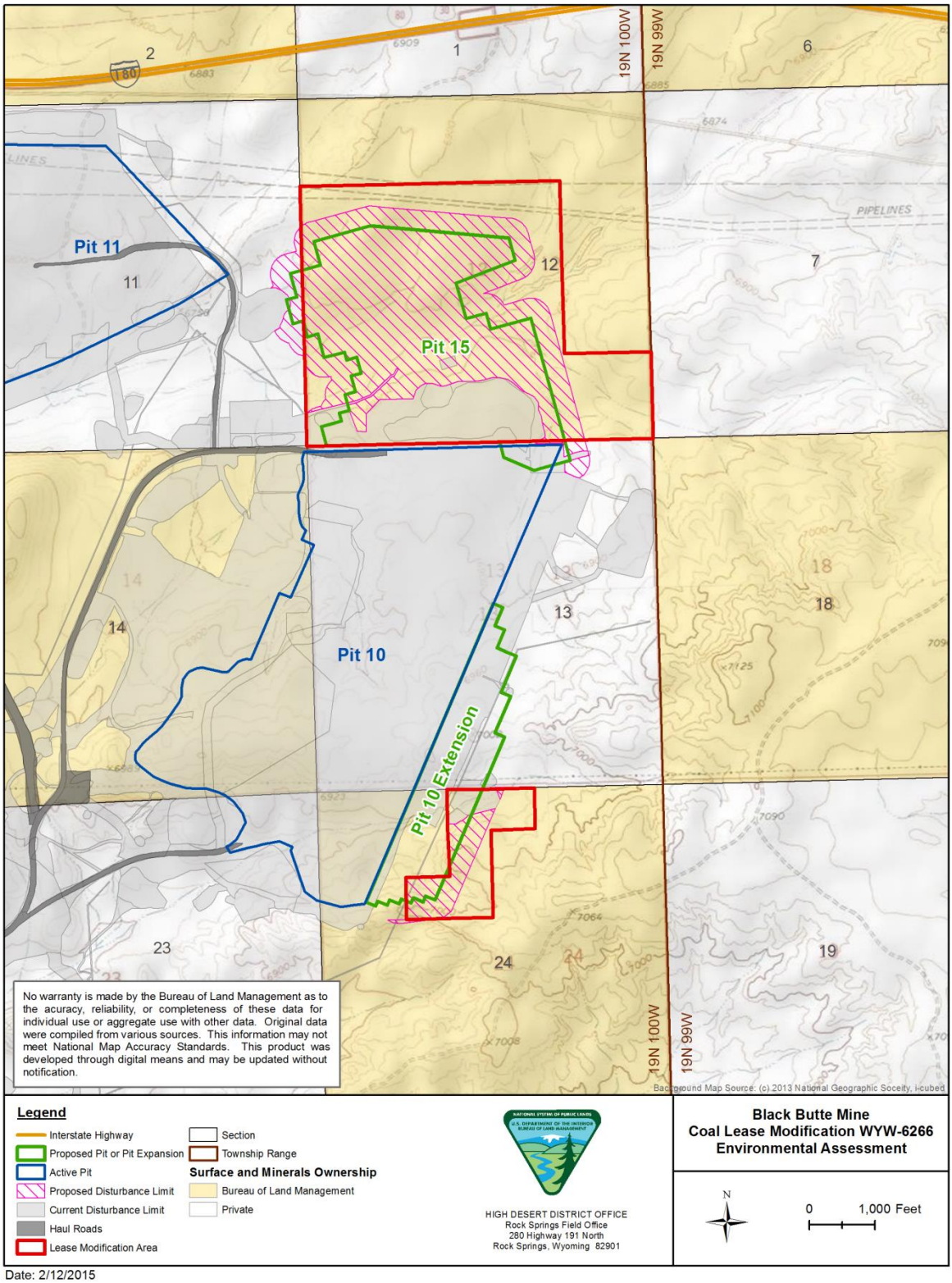
BBCC believes no other operators could develop the lease modification area due to its small size. The large overburden stripping ratio of 15:1 to the east of the proposed pit boundaries would preclude the expansion of the lease modification area, due to the unfavorable economics of mining that area. The presence of oil and gas pipelines to the north of the proposed Pit 15 boundary limits northward expansion. The presence of Pit 10 to the south limits the southern extent of Pit 15. BBCC's existing infrastructure adjoining the lease modification area facilitates the mining of the coal with minimal additional infrastructure development required.

The proposed lease modification area is adjacent to current operations. The existing BBCM infrastructure provides a technological mechanism of mining these coal resources. Mining of the approximately 9.2 million tons of in-place mineable coal in the lease modification area is anticipated to add approximately two to three years of reserves to the existing operation. The mining of the lease modification area is anticipated to occur over a five to 10 year period, depending upon power plant fueling requirements and potential future coal contracts. The coal would be mined from two seams within the Fort Union Formation. The estimated recoverable reserves within the proposed lease modification area are predicated on several factors inclusive of inherent geologic and mining conditions, coal quality, mine economics, marketability, environmental concerns, and safety.

This lease modification would provide the following:

- Serves the *interest of the United States;*
- There is no competitive interest in the lands or deposits; and
- The additional lands or deposits cannot be developed as part of another potential or existing independent operation.

Figure 2.1. Black Butte Coal Company Lease Modification WYW-6266 Surface and Minerals Ownership and Proposed Surface Disturbance



2.2.1 Surface Coal Mine

Surface coal production at the BBCM began in 1977. The BBCM complex is a dragline/dozer strip operation. Coal extraction at the BBCM is accomplished with front-end-loaders, shovels, or hydraulic excavator loading trucks. If the Proposed Action were approved, the proposed mining method used for the lease modification area would utilize a dragline/dozer strip/truck shovel surface coal operation, similar to the existing mining methods found in the current Pit 10. Dozers, front-end-loaders, trucks, and/or scrapers would be used to remove topsoil in accordance with all WDEQ regulations in advance of mining operations. Both overburden and coal would require blasting or ripping prior to removal. Various sediment ponds, clean water diversions, or alternate sediment control structures, would be used to provide surface water control within the disturbed areas. Final grading and topsoil distribution would be accomplished primarily with dozers, front-end-loaders, and trucks.

Mine related surface disturbances have occurred within the proposed lease modification area to facilitate removal of coal currently leased by BBCC at an adjoining tract, as allowed under a BLM right-of-way permit and the currently approved mine and reclamation plans. Approximately 68 acres or 15 percent of the 450-acre lease modification area has been previously disturbed by mining activities. These disturbances include existing access roads, a surface water retention basin, topsoil stripping to accommodate mining of the existing leased and fee coal, and topsoil and overburden stockpiles. As part of the Proposed Action, approximately 257 additional acres of the remaining approximately 382 undisturbed acres within the lease modification area would be disturbed by mining activities.

2.2.2 Reclamation

Reclamation is an ongoing process at the BBCM. The reclamation schedule is dependent on the WDEQ-approved mine and reclamation plan and the mining sequence. BBCC would develop a site specific post-mining detailed reclamation plan in coordination with the WDEQ, BLM RSFO, and the Wyoming Game and Fish Department (WGFD) for the Proposed Action. The reclamation 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 re-vegetation would include a certified weed-free diverse seed mix of native grasses, forbs, and shrubs (as defined by existing range sites). 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 of the reclamation requirements of the WDEQ 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.

Reclamation bond release would occur after a minimum of a 10-year bond release period (post-completion of permanent reclamation operations) on stable reclaimed land where re-vegetation standards have been met. WDEQ 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.

Reclamation would attempt to re-establish native plant communities. 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. Reclamation operations would include a certified weed-free seed mix, equipment, and methods that are appropriate for arid plains conditions and those that have been successfully used for re-vegetation at the BBCM and other mines in the area. Fall and spring seeding would occur to take advantage of available moisture. During final reclamation and bond release, as specified in the mine permit, BBCC would obtain necessary authorizations from the appropriate regulatory agencies to vacate the reclaimed permit area. Following full bond release, retirement of the mine permit will be sought by BBCC.

2.2.3 Resource Protection Measures

Beyond the standard and BLM special lease stipulations (**Appendix A**) including those contained in the GRRMP and ROD (BLM 1997a), BBCC would incorporate as part of the Proposed Action the resource protection measures described in **Sections 2.2.3.1** through **2.2.3.9**, WDEQ permit mitigation measures, and environmental performance standards measures. These stipulations, rules, and regulations would be adhered to on all project area lands.

2.2.3.1 Air Quality

Dust Suppression

BBCC, pursuant to permits (i.e., Permits to Construct CT-105 and CT-288; Operating Permit OP-55; and Air Quality Permit MD-7424), would treat access and haul roads with application of a chemical dust suppressant to limit air quality impacts by fugitive dust emissions. All conveyor systems are covered to prevent the escape of coal dust. This includes all transfer points at the coal plant and the overland conveyor. In addition, the truck dump at the overland conveyor is equipped with water spray, which operates when the crusher and belts are running. While the overland conveyor will not service the Pit 10 and Pit 15 areas, dust suppression activities at this area do lower the BBCM's overall emissions. The coal shipped from the BBCM is treated with a water spray as needed to prevent the release of coal dust during the train loading operation.

Reclamation operations are designed so that newly topsoiled areas remain bare for the minimal amount of time possible, as determined by current moisture and topsoil conditions. Seeding and mulching operations will begin as soon as moisture conditions allow to reduce fugitive dust generation from unprotected areas of topsoil.

Employees are instructed to drive only on properly constructed roads and are restricted from off-road travel. Employees are also instructed on the proper operation of equipment, which would eliminate undue dust emissions (i.e., loading haul trucks with shovels using fully loaded buckets).

The main truck dump is operated to reduce dust emissions. To accomplish this, the hoppers are operated as fully as possible to minimize the free-fall distance of the coal. This involves close coordination between the plant, operator, and the coal pit foreman.

Blasting Emissions

BBCC is currently working with blasting agent manufacturers to reduce nitrogen dioxide (NO_2) emissions by changing the size of the blasts and using different blasting agents, mixtures, and additives. BBCC has moved to utilizing a hybrid explosive by adding substances like microspheres and rice hulls, using different blends of ammonium nitrate fuel oil (ANFO) and slurries and gels, using electronic detonation systems that can vary shot timing, different shot hole patterns, and using plastic liners within the shot holes.

BBCC has developed a very extensive air quality control plan. This air quality control plan can be broken down into a series of programs that are utilized across the BBCM site and throughout the year that are considered Best Available Control Technologies (BACT). BBCC's air quality programs monitor, track, and provide real time data to assist personnel onsite to make informed decisions about how operations are to be conducted to prevent deterioration of air quality.

Particulate Emissions and Climatological Monitoring

BBCC has been monitoring particulate matter nominally 10 microns or less (PM_{10}) levels around the BBCM throughout the life of operation and would continue to do so. The current air monitoring network consists of five sites that monitor PM_{10} concentrations. The monitoring is done to determine the effectiveness of dust suppression efforts and to determine BBCM's compliance with air quality regulations.

The meteorological monitoring system at the BBCM consists of a 10-meter instrumented tower and utilizes a Campbell Scientific CR1000 datalogger to continuously measure wind speed, direction, standard deviation of horizontal wind direction, temperature, and precipitation. Hourly aggregate parameters are logged by the system. The meteorological site is located in Section 33, T19N, R100W, at 6,613 feet above mean sea level.

Using one hour and 24 hour particulate concentration data, and opacity monitoring in combination with climatological data, BBCM has instituted a real-time action plan to address elevated particulate emissions from activities at the BBCM. The actions outline for implementation include ensuring adequate water trucks are operating, focusing watering on problem areas, recording the location and quantity of watering being performed, and up to shutting down all operations in the area. The actions are documented in BBCM's January 2006, Air Monitoring Action Plan as mandated by the Air Quality Permit MD-7424.

2.2.3.2 Cultural and Paleontological Resources

Any unanticipated discoveries of archaeological, cultural, or paleontological remains would be reported to the appropriate regulatory authorities. No land disturbing activities would take place within 250 feet of such remains until they have been evaluated by the regulatory authorities, or a BLM-approved resource specialist, salvaged, if warranted, and authorization to proceed has been issued by the BLM Authorized Officer.

2.2.3.3 Fire Control

Coal fires occur in exposed coal seams, and the Pit 10 and Pit 15 mine operation proposes to limit the extent of these fires by removing the burning coal, or covering the fire. Coal fires would be extinguished as quickly as possible to limit the loss of coal and to limit environmental impacts. The Pit 10 and Pit 15 mine operation would have a water truck and a variety of earthmoving equipment available to use.

2.2.3.4 Soil Erosion Protection Measures

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

- Topsoil stockpiles would be planted with an appropriate certified weed-free seed mix.
- 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.

2.2.3.5 Water Pollution and Hydrologic Function Protection Measures

BBCC is planning to install six additional groundwater monitoring wells within close proximity of the proposed lease modification area. One full year of monitoring is required to be conducted in order to establish baseline groundwater quality and quantity. A plan for monitoring during and after mining would be developed with WDEQ consultation. Unsuitable overburden/interburden would be placed above the final anticipated groundwater recovery elevation and below the vegetation root zone.

Impacts to surface water would be minimized by timely reclamation of disturbed areas and by construction of ditches and berms to divert the flow of water off of disturbed land back into the pits or sediment ponds. Clean water diversions would be constructed around disturbed areas and route water back into downstream drainages when technically and topographically feasible. Alternate sediment control measures or sediment ponds would also be developed in consultation with the WDEQ. Controlled discharges from sediment ponds would occur, if the ponds receive inflow from a 10 year 24 hour precipitation event. Discharges from the ponds are required to meet National Pollution Discharge Elimination System (NPDES) permit discharge concentration limits. The project area is hydrologically isolated so all surface drainage stays in the mine area. In addition, sediment erosion control measures such as culverts and rerouting of minor drainages has occurred in the project area to prevent unnecessary water erosion from occurring.

Reclamation of areas no longer needed for production are ongoing in the mine area, including grading the surface to an acceptable contour and reapplying salvaged soil to an acceptable depth

over suitable overburden and reseeding of areas with a native plant seed mix. Additionally, reclamation activities following mining would re-establish existing drainages to similar locations and stream channel profile gradients to minimize the potential for head cutting of the stream channels. Sedimentation in drainage channels from upland areas would be minimized by topographic moderation, seed bed preparation to encourage infiltration of precipitation, mulching (if necessary), and re-vegetation of upland areas into sustainable landforms. Storm water retention basins receiving water from disturbed areas would be left in place until re-vegetation is complete.

2.2.3.6 Wildlife Protection Measures

Big Game

The Pit 10 and Pit 15 mining operations proposes to limit the impact of mining on big game (pronghorn antelope (*Antilocapra Americana*), mule deer (*Odocoileus hemionus*), and Rocky Mountain elk (*Cervus canadensis*)) by reclaiming the land for a post-mining use of range for livestock and wildlife. The certified weed-free diverse seed mix would consist of native grasses, forbs, and shrubs (as defined by existing range sites) which support the post-mine land use.

During the Pit 10 and Pit 15 mining operations monitoring surveys would be conducted as required by the WDEQ and the WGFD. Results of the annual monitoring surveys, existing baseline surveys, and future baseline surveys would be used to further define areas of concern and to identify developing mitigation needs.

Greater Sage-Grouse

No Greater Sage-Grouse (*Centrocercus urophasianus*) leks occur within the lease modification area. Should any be found during additional field surveys or should any new leks become established, appropriate mitigation steps would be taken. These steps may include any or all of the following techniques: re-establishment of shrubs on reclaimed lands; grading of reclaimed lands to include swales and depressions; monitoring of Greater Sage-Grouse leks in the area before, during, and after mining. These and other measures would be further developed in the WDEQ Permit Amendment.

Migratory Birds and Raptors

A pre-construction raptor and migratory bird nest clearance survey would be conducted if surface disturbance is initiated during the breeding season. State and federal regulations limit surface activities near active raptor nests. The size of the restrictive radius and the timing may be modified in consultation with the United States Fish and Wildlife Service (USFWS) depending on the species of raptor and whether or not the nest is within the line-of-sight of construction activities. These nests may be relocated under the appropriate state and federal permits if warranted. The mine plan would include operation controls to protect migratory birds and a raptor monitoring and mitigation plan approved by the USFWS and state and other federal agencies as required.

2.2.3.7 Public Health and Safety

BBCC would conduct all operations within the lease modification area in accordance with Mine Safety and Health Administration regulations and procedures. Active areas of Pit 10 and Pit 15 would be bermed or signed to prevent accidental entrance. Blasting areas within the mine and blasting schedules would be posted in the area newspapers. All applicable laws concerning the handling and disposal of hazardous wastes would be followed. Spill Prevention Control Countermeasure (SPCC) plans would be updated periodically and kept on file at the mine for use in case of spills.

2.2.3.8 Noise Impacts

The nearest town and inhabited dwellings, Point of Rocks, Wyoming, are located approximately eight miles to the northwest of the lease modification area. The prevailing wind direction at the BBCM is from the west (see **Section 3.0**, **Figure 3.1**). This wind direction and the spatial separation from Point of Rocks would minimize or eliminate impacts from the BBCM related noise to residents of Point of Rocks.

Visitors to the BBCM area may be exposed to occasional blast noise; however, it is very unlikely that the public would be exposed to high decibel mine noise. Under certain blasting circumstances Interstate 80 is shut down and patrolled for public safety. It is not anticipated that the proposed operation in the Pit 10 and Pit 15 area would require this process as a safety precaution. BBCC employees would be required to wear hearing protection in areas where the noise level may cause hearing damage.

2.2.3.9 Wetlands

During June of 2012, BBCC submitted documentation for a jurisdictional determination request concerning Pit 3, Pit 10, and Pit 11 to the United States Army Corps of Engineers (USACE), Omaha District, Wyoming Regulatory Office. On March 8th, 2013, BBCC received a response to the jurisdiction request which concluded that there are no drainages in these pit areas with evidence of wetlands as defined by the *Corps of Engineers Wetland Delineation Manual*. None of the drainages convey flow sufficient enough to establish physical indicators of an ordinary high water mark as defined at 33 CFR 328.3(e). Therefore, disturbance areas for Pit 10 are located entirely in upland. Mitigation of disturbance to any identified existing wetlands would be accomplished by creating wetlands in kind.

The proposed area for Pit 15 contains an ephemeral drainage that may qualify as a Water of the United States due to the drainage's eventual connection to Bitter Creek. BBCC would obtain required permits from the USACE and WDEQ (through the WDEQ Mine Permit) for disturbances of any qualifying drainages. Following mining, impacted drainages would be reconstructed to a topographical expression and location similar to the former drainage.

2.3 Alternatives Considered but not Analyzed in Detail

No other alternatives were identified that met the purpose and need for this action. BLM mining specialists determined that the area that would best ensure MER of the coal reserves, as required by the MLA. Different tract configurations are restricted due to the location of adjoining faults and the large stripping ratio to the east of the lease modification area. No other tract configuration would meet federal standards.

There is no competitive interest based upon utilization of the lands or mining of the deposits because:

- The applicant is the lessee of record holding the private, state, and federal leases adjacent to the lease modification area.
- This lease modification would allow a continuum of an existing mining block and would not represent an economic venture based on a stand-alone development of the property.
- There is no other nearby operation which could economically mine this area.
- The only logical access is from the applicant's surface mine and adjacent leases.

3.0 AFFECTED ENVIRONMENT

The Affected Environment of this EA for the proposed lease modification discusses physical, biological, and social resources as they currently exist within the lease modification area. Approximately 68 acres or 15 percent of the 450 acre lease modification area has been previously disturbed by coal mining activities under an existing BLM right-of-way agreement. These disturbances include existing access roads, a surface water retention basin, topsoil stripping to accommodate mining of the existing leased and fee coal, and topsoil and overburden stockpiles. Other previous disturbances within the lease modification area include scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; and livestock grazing (i.e., cattle and sheep). The lease modification area is located adjacent to an interstate highway transportation corridor and numerous subsurface oil and gas pipelines. No permanent human habitation is located in or adjoining the lease modification area.

The BLM NEPA Handbook H-1790-1 (BLM 2008a) requires that NEPA documents address specific elements of the environment that are subject to requirements specified in statute, regulation, or executive order (i.e., supplemental authorities). **Table 3.1** lists the supplemental authorities that must be addressed in all environmental analyses and includes other resources deemed appropriate for evaluation by the BLM. **Table 3.1** also identifies which potentially affected elements and other resources are appropriate for analysis.

Table 3.1. Potentially Affected Elements and Other Resources Overview

Determination[1]	Element/Resource	Rationale for Determination
PI	Air Quality/Global Climate Change/Greenhouse Gases	See discussion in Affected Environment and Environmental Effects sections.
NP	Areas of Critical Environmental Concern (ACEC)	No ACECs are present within or near the lease modification area.
PI	Cultural/Historical Resources	See discussion in Affected Environment and Environmental Effects sections.
NI	Environmental Justice	The action alternative was reviewed in accordance with Executive Order 12898 and no impacts to minority and low-income populations are expected.
NP	Farm Lands (Prime and Unique)	No prime or unique farmlands are present in the lease modification area.
PI	Fish and Wildlife (Including Migratory Birds, Bureau of Land Management (BLM) Sensitive, and U.S. Fish and Wildlife Service (USFWS) Threatened, Endangered or Candidate Animal Species)	See discussion in Affected Environment and Environmental Effects sections.
NI	Floodplains	No impacts to floodplains are anticipated due to reclamation requirements. Channel morphology would be reconstructed per Surface Mine Control and Reclamation Act of 1977 (SMCRA) requirements to function similar to current hydrological regime.
NI	Fuels/Fire Management (Presuppression)	The proposed lease modification area is within the Little Mountain Fire Management Unit. Activities and actions associated with the Proposed Action would have no impact from a hazardous fuels and fire management standpoint. In the event of coal seam fires and anthropogenic caused fires from mining

Determination[1]	Element/Resource	Rationale for Determination
		activities and/or operations, proper control measures and established protocols would be followed.
PI	Geology/Mineral Resources/Energy Production	See discussion in Affected Environment and Environmental Effects sections.
PI	Hydrologic Conditions (Including Water Resources/Quality, Municipal Supply Watersheds/Impaired Waters, and Wetlands/Riparian Zones)	See discussion in Affected Environment and Environmental Effects sections.
PI	Invasive Species/Noxious Weeds (Executive Order 13112)	See discussion in Affected Environment and Environmental Effects sections.
PI	Lands/Access	See discussion in Affected Environment and Environmental Effects sections.
NI	Public Safety	Hazards associated with mine activities have public protection measures implemented as part of the Wyoming Department of Environmental Quality (WDEQ) mine permit. Active mining areas are signed, bermed, and monitored to ensure public safety and to exclude the public from dangerous areas.
PI	Livestock Grazing	See discussion in Affected Environment and Environmental Effects sections.
PI	Native American Religious Concerns	See discussion in Affected Environment and Environmental Effects sections.
PI	Paleontological Resources	See discussion in Affected Environment and Environmental Effects sections.
NI	Rangeland Health Standards	Rangeland Health Standards apply to multiple disciplines (i.e., vegetation, hydrology, wetland/riparian, wildlife, air quality, and water quality). Initial surface disturbance would result in areas not meeting standards; however, if successful reclamation occurs, then impacts to rangeland health standards would be minimized.
NI	Recreation	No developed recreation is present in the lease modification area. Off-highway-vehicle (OHV) existing roads are present.
NP	Roadless	The lease modification area does not meet roadless criteria.
PI	Social and Economic Resources	See discussion in Affected Environment and Environmental Effects sections.
PI	Soils	See discussion in Affected Environment and Environmental Effects sections.
NP	USFWS Threatened, Endangered or Candidate and BLM Sensitive Plant Species	No USFWS threatened, endangered, or candidate plant species or habitat for these species occurs in or near the lease modification area. No Effect, so no USFWS consultation. Potential habitat does not exist for any of the BLM sensitive plant species.
PI	Vegetation, Including Forested and Rangeland (Excluding USFWS Threatened, Endangered or Candidate and BLM Sensitive Plant Species)	See discussion in Affected Environment and Environmental Effects sections.
NI	Visual Resources	Visual Resource Inventory (VRI) Class III and Visual Resource Management (VRM) Class III exist within the lease modification area. Impacts are not expected to be sufficient to change the visual resource class.
NI	Wastes	Wastes generated during the mining process would be disposed of in accordance with Solid and Hazardous waste regulations and unsuitable overburden would be placed above the water

Determination[1]	Element/Resource	Rationale for Determination
		table and below the vegetation root zone.
NP	Wild and Scenic Rivers	No wild and scenic rivers are present in lease modification area.
NP	Wilderness/Wilderness Study Area/Areas of Wilderness Character	Area fails to meet the minimum standard under Federal Land Policy Management Act of 1976 (FLPMA).
NI	Wild Horses and Burros	The lease modification area is located within the Salt Wells Creek Herd Management Area. Wild horses have the potential to be present in the lease modification area; however, impacts to the wild horses are considered to be minimal.
NP	Woodland/Forestry	No forest is present in the lease modification area.

[1]Determination:
PI: Potential impact could occur from one or more alternatives; therefore, analyzed in this National Environmental Policy Act of 1969, as amended (NEPA) document.
NP: Not present in the lease modification area.
NI: No impact expected from the action alternative, or potential impacts are negligible and are discussed in table and not carried forward for further impact analyses, or impacts have been previously addressed in reference NEPA document(s).

For each element or resource, an impact assessment area has been identified to analyze the potential, project-related impacts on the element or resource. The impact assessment area is defined as the outermost boundary of an area that encompasses potential direct, indirect, and cumulative impacts that may affect the element or resource identified for analysis. Management issues identified by the BLM RSFO, public scoping, and ID team analysis of the area have guided the material presented herein.

3.1 Air Quality/Global Climate Change/Greenhouse Gases

The impact assessment area for direct effects includes the lease modification area. Cumulative and other indirect effects would impact a larger regional airshed. The issues identified for impact analysis in **Section 4.0** for air quality are pollutant emissions from the mining of coal in the lease modification area relative to the Wyoming Ambient Air Quality Standards (WAAQS), National Ambient Air Quality Standards (NAAQS), and their impact to the regional airshed.

The impact assessment area for direct and indirect impact analyses for climate change and greenhouse gases (GHGs) is the State of Wyoming. The impact assessment area for cumulative impact analysis for climate change and GHGs is global. The issues identified for impact analysis in **Section 4.0** for climate change and GHGs are the BBCM's contribution from the mining of coal in the lease modification area and the combustion of that coal relative to Wyoming, National, and global GHG emissions and qualitative impacts resulting from those emissions.

The air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transport of pollutants from specific source areas is strongly affected by local topography. In general, local effects are superimposed on the general synoptic weather regime and are most important when the large-scale wind flow is weak.

The lease modification area is located in a semi-arid high plateau area where climate is strongly influenced by altitude, terrain, and mountain ranges which surround the southwest portion of the state. The region's climate is characterized by a generally high percentage of possible sunshine, high wind speeds and evaporation, and low humidity and precipitation. **Table 3.2** summarizes components of climate in the region between September 14, 1962 and August 31, 2005 at the

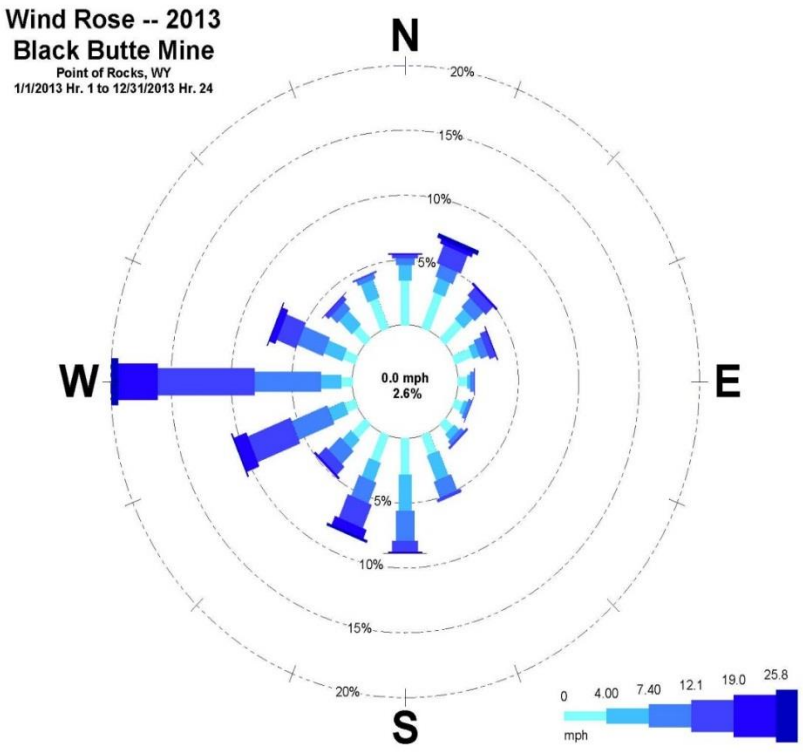
Bitter Creek Station located approximately 6.6 miles east-southeast of the BBCM. A representative wind rose for BBCM is provided as **Figure 3.1**.

Table 3.2. Period of Record Climate Summary from September 14, 1962 to August 31, 2005 at the Bitter Creek Station

Bitter Creek	Annual Averages
Average Maximum Temperature (Fahrenheit)	56.9
Average Minimum Temperature (Fahrenheit)	26.3
Average Total Precipitation (inches)	6.28
Average Total Snow Fall (inches)	17.9
Average Snow Depth (inches)	0

Source: WRCC 2005.

Figure 3.1. Black Butte Coal Mine Wind Rose



There are no Class I or Class II sensitive areas within 10 miles of the lease modification area. The closest Class I areas are the Bridger Wilderness on the Bridger-Teton National Forest, which is located approximately 70 miles to the northwest of the lease modification area, and the Mount Zirkel Wilderness on the Medicine Bow-Routt National Forest, which is located approximately 103 miles to the southeast. Nearby Class II areas include Seedskadee National Wildlife Refuge (NWR) which is 56 miles to the northwest, Pathfinder NWR which is 97 miles to the northeast, Browns Park NWR which is 56 miles to the southeast, Dinosaur National Monument which is 61

miles to the south, and Flaming Gorge National Recreation Area which is 40 miles to the southwest.

3.1.1 Air Pollutant Background Concentrations and Regulatory Standards

Pollutant concentration refers to the amount of a pollutant present in a given amount of air, and can be reported in units of measure as parts per million (ppm) by volume, parts per billion (ppb) by volume, or micrograms per cubic meter ($\mu g/m^3$). Pollutant emission concentrations are regulated as either a direct allowable emission concentrations, as a best technologically achievable pollution emission concentration, or in consideration of the emitted pollutant's incremental contribution to an air shed's concentration of that pollutant.

Monitoring, permitting, and enforcement of air quality standards are administered by the WDEQ. NAAQS and WAAQS identify maximum limits for concentrations of criteria air pollutants at all locations to which the public has access. The Clean Air Act (CAA) identifies two types of NAAQS, primary and secondary. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

An additional set of standards for hazardous air pollutants (HAPs) including mercury and volatile organic compounds (VOCs) are regulated under National Emission Standards for Hazardous Air Pollutants (NESHAPs). Emissions regulated under NESHAPs differ from criteria air pollutant standard maximum limits, as they are determined by established performance standards under the Maximum Achievable Control Technology (MACT) Standard program.

Criteria Air Pollutants

Criteria air pollutants are those for which national concentration standards have been established; criteria air pollutants include carbon monoxide (CO), lead, NO_2, ozone (O_3), particulate matter nominally 2.5 microns or less ($PM_{2.5}$), PM_{10}, and sulfur dioxide (SO_2).

The NAAQS and WAAQS are legally enforceable standards. Criteria air pollutant concentrations are compared to NAAQS and WAAQS to determine compliance. Violation of an air quality standard represents a risk to human health or welfare that, by law, requires public safeguards to be implemented. **Table 3.3** presents the current primary NAAQS and WAAQS.

Table 3.3. National and State of Wyoming Ambient Air Quality Standards

Pollutant	Averaging Time	National Ambient Air Quality Standards (NAAQS) (Primary Standard)			Wyoming Ambient Air Quality Standards (WAAQS) (Primary Standard)		
		(ppm)[1]	(ppb)[2]	($\mu g/m^3$)[3]	(ppm)[1]	(ppb)[2]	($\mu g/m^3$)[3]
Carbon Monoxide (CO)	1-hour	35	---	---	35	---	---
	8-hour	9	---	---	9	---	---

Pollutant	Averaging Time	National Ambient Air Quality Standards (NAAQS) (Primary Standard)			Wyoming Ambient Air Quality Standards (WAAQS) (Primary Standard)		
		(ppm)[1]	(ppb)[2]	(µg/m³)[3]	(ppm)[1]	(ppb)[2]	(µg/m³)[3]
Lead	Rolling 3 month average	---	---	0.15	---	---	0.15
Nitrogen Dioxide (NO_2)	1-hour	---	100	---	---	100	---
	Annual (Arithmetic Mean)	0.053	53	---	---	53	---
Ozone (O_3)	8-hour	0.075	70	---	0.075	75	---
Particulate Matter 2.5 microns or less ($PM_{2.5}$)	Annual (Arithmetic Mean)	---	---	12	---	---	12
	24-hour	---	---	35	---	---	35
Particulate Matter 10 microns or less (PM_{10})	24-hour	---	---	150	---	---	150
	Annual (Arithmetic Mean)	None			---	---	50
Sulfur Dioxide (SO_2)	1-hour	---	75	---	---	75	---
	3-hour	0.5	---	---	---	75	---

[1]ppm = parts per million
[2]ppb = parts per billion
[3]µg/m³ = micrograms per cubic meter
Source: EPA 2011 and WDEQ 2012a.

Regional Criteria Pollutant Background Conditions

Air quality in the region is generally good with measured background concentrations of all criteria pollutants below the established standards with the exception of a 24-hour particulate matter (PM) exceedance in the Wamsutter area. Background concentrations of these pollutants define ambient air concentrations in the region and establish existing compliance with ambient air quality standards. The most representative monitored regional background concentrations available for criteria pollutants as identified by WDEQ are shown in **Table 3.4**.

Table 3.4. 2013 Background Ambient Air Quality Concentrations

Pollutant	Monitoring Station	Averaging Time	Measured Background Concentration
Particulate Matter 10 microns or less	Hiawatha	NA[1]	NA[1]
	Rock Springs	Annual Arithmetic Mean/	11 µg/m³

Pollutant	Monitoring Station	Averaging Time	Measured Background Concentration
(PM_{10})	Mobile Trailer	Highest 24-hour Average	119 $\mu g/m^3$
	Moxa	Annual Arithmetic Mean/ Highest 24-hour Average	9 $\mu g/m^3$ 79 $\mu g/m^3$
	Wamsutter	Annual Arithmetic Mean/ Highest 24-hour Average	12 $\mu g/m^3$ 193 $\mu g/m^3$
Particulate Matter 2.5 microns or less ($PM_{2.5}$)	Hiawatha	NA[1]	NA[1]
	Rock Springs Mobile Trailer	Annual Arithmetic Mean/ 98 percent (%) 24-hour Average	2.0 $\mu g/m^3$ 7 $\mu g/m^3$
	Moxa	NA[1]	NA[1]
	Wamsutter	NA[1]	NA[1]
Nitrogen Dioxide (NO_2)	Hiawatha	NA[1]	NA[1]
	Rock Springs Mobile Trailer	Annual Arithmetic Mean/ Annual 98% of Daily Maximum 1-hour Average	4 ppb 31 ppb
	Moxa	Annual Arithmetic Mean/ Annual 98% of Daily Maximum 1-hour Average	2 ppb 22 ppb
	Wamsutter	Annual Arithmetic Mean/ Annual 98% of Daily Maximum 1-hour Average	4 ppb 38 ppb
Sulfur Dioxide (SO_2)	Hiawatha	NA[1]	NA[1]
	Rock Springs Mobile Trailer	NA[1]	NA[1]
	Moxa	Annual 99% 1-hour Average	20 ppb
	Wamsutter	NA[1]	NA[1]
Carbon Monoxide (CO)	Hiawatha	NA[1]	NA[1]
	Rock Springs Mobile Trailer	NA[1]	NA[1]
	Moxa	NA[1]	NA[1]
	Wamsutter	NA[1]	NA[1]
Ozone (O_3)	Hiawatha	4th Highest 8-hour Average	0.064 ppm
	Rock Springs	4th Highest 8-hour Average	0.064 ppm

Pollutant	Monitoring Station	Averaging Time	Measured Background Concentration
	Mobile Trailer		
	Moxa	4th Highest 8-hour Average	0.067 ppm
	Wamsutter	4th Highest 8-hour Average	0.064 ppm

[1]NA = Not Available, this pollutant is not monitored at this monitoring station.
Source: WDEQ 2014.

Hazardous Air Pollutants

HAPs, are comprised of a variety of toxic compounds that cause or may cause adverse health effects to human or ecological receptors. The CCA, as amended, identifies 187 pollutants as HAPs. Emissions of HAPs associated with the mining of coal and generation of electricity primarily occur from the burning of petroleum hydrocarbons such as diesel in vehicles and the burning of coal at power plants. Coal combustion in power plants emits a number of organic and inorganic HAPs that include metals, VOCs, and poly-aromatic hydrocarbons (PAHs).

Coal-fired power plants are the largest source of mercury emissions in the United States, however, most mercury deposited in the western U.S. originates in Asia (Strode and Jaffe 2008). Other metals such as arsenic, chromium, boron, and selenium can come from power plant emissions. Due to the potential for emitted mercury to undergo chemical conversion to methyl mercury and bio-accumulate in aquatic organisms and fish, the EPA has promulgated standards for emission technologies to remove mercury from power plant emissions, thereby reducing the deposition of mercury in the environment.

BBCM Direct Emissions

Criteria pollutants being evaluated as part of the Proposed Action are PM emissions or 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 sources are associated with coal crushing, storage, and handling facilities. In general, 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 BBCM's existing Air Quality Permit (MD-7424), the facility was required to implement measures to reduce air quality impacts. Based on this, BBCC has developed an extensive air quality control plan. This air quality control plan can be broken down into a series of programs that are utilized across the BBCM site and throughout the year that are considered BACT. BBCC air quality programs monitor, track, and provide real time data to assist personnel onsite to make informed decisions about how operations are to be conducted to prevent deterioration of air quality.

The operation of the particulate and meteorological monitoring network at the BBCM follows the Black Butte Coal Quality Assurance Project Plan (QAPP) which was submitted to the WDEQ in September 2008. The meteorological monitoring systems consist of a 10-meter instrumented tower and utilize a Campbell Scientific CR1000 datalogger to continuously measure wind speed, direction, standard deviation of horizontal wind direction, temperature, and precipitation. Hourly aggregate parameters are logged by the meteorological monitoring systems.

Particulate Matter (PM)

BBCC has monitored PM_{10} levels around the BBCM throughout the life of operation. BBCC is not currently required by the mine permit to monitor for $PM_{2.5}$ levels. The mine estimates $PM_{2.5}$ concentrations as a percentage of PM_{10}. The current air monitoring network consists of five Rupprecht & Patashnick Company model 1400a tapered element oscillating microbalance (TEOM) continuous monitors (I-80, Upwind, Pit 10, Pit 14, and Leucite) that monitor the 24-hour concentration of PM_{10}. These instruments have United States Environmental Protection Agency (EPA) equivalency designation for PM_{10}. The 24-hour concentration of each day is used to calculate the annual arithmetic mean. These monitoring systems provide an accurate assessment of PM_{10} concentrations near the BBCM and the Black Butte Leucite Hills Coal Mine (Leucite Hills Coal Mine) mining operations. Particulate concentration summaries for standard (STP) conditions are as follows for the last five years (2014 through Quarter 3):

Table 3.5. Black Butte Coal Company Monitored PM_{10} Concentrations (2010-2014)

(Wyoming Ambient Air Quality Standards (WAAQS) PM_{10} Standards = 50 micro grams per cubic meter ($\mu g/m^3$) Annual, 150 $\mu g/m^3$ 24-Hour)				
Year	**Site**	**Annual Average**	**24-Hour High**	**24-Hour 2nd High**
2010	I-80 TEOM	20.0	158.0	138.6
	Upwind TEOM	13.9	65.2	54.7
	Pit 10 TEOM	16.0	108.6	100.1
	Pit 14 TEOM	15.5	152.7	139.2
	Leucite TEOM[1]	14.4	54.2	49.9
2011	I-80 TEOM	18.4	93.6	78.4
	Upwind TEOM	12.1	58.6	38.3
	Pit 10 TEOM	17.9	156.7	149.8
	Pit 14 TEOM	15.9	85.3	77.8
	Leucite TEOM[1]	12.5	35.2	34.0
2012	I-80 TEOM	21.4	224.1	154.7
	Upwind TEOM	18.1	101.5	81.6
	Pit 10 TEOM	27.2	413.2	215.1
	Pit 14 TEOM	17.0	112.6	84.0
	Leucite TEOM[1]	17.7	120.4	85.4
2013	I-80 TEOM	20.6	432.1	168.5
	Upwind TEOM	12.4	52.7	49.3
	Pit 10 TEOM	19.0	261.2	104.3
	Pit 14 TEOM	13.6	78.0	62.1
	Leucite TEOM[1]	13.3	70.8	56.1

(Wyoming Ambient Air Quality Standards (WAAQS) PM_{10} Standards = 50 micro grams per cubic meter (µg/m^3) Annual, 150 µg/m^3 24-Hour)				
Year	**Site**	**Annual Average**	**24-Hour High**	**24-Hour 2nd High**
2014	I-80 TEOM	16.5	83.9	76.5
	Upwind TEOM	14.1	77.8	44.1
	Pit 10 TEOM	22.9	202.6	166.3
	Pit 14 TEOM	14.1	122.7	55.3
	Leucite$_1$ TEOM[1]	28.1	347.3	294.0

Source: IML Air Science 2010, IML Air Science 2011, IML Air Science 2012, IML Air Science 2013, and IML Air Science 2014.

[1]Leucite TEOM is located upwind, in the prevailing wind direction, from active mining operations and may be predominately impacted by other industrial activities in the area.

Nitrogen Dioxide (NO_2)

Overburden blasting sometimes produces NO_2. NO_2 is one of several products resulting from the incomplete combustion of explosives used in the blasting process. BBCC is currently working with blasting agent manufacturers to reduce NO_2 emissions by changing the size of the blasts and using different blasting agents, mixtures, and additives.

Sulfur Dioxide (SO_2)

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. 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 at coal-fired power plants.

BBCM Annual Emissions

There are two types of emission sources under Title V of the CAA, major and area (minor) sources. A source is major if its emissions exceed certain thresholds listed under sections 111 and 112(b) of the CAA and it is a listed emission source. Emission thresholds are defined in terms of tons per year emitted of a specific or group of pollutants. BBCM is not considered a major emission source. Minor emission sources within the State of Wyoming are required to report their emissions to the WDEQ. The last available annual emission inventory reports for the BBCM and Leucite Hills Coal Mine was the 2012, 2013, and 2014 inventories which included the reported emissions shown in **Table 3.6**.

Table 3.6. 2012, 2013, and 2014 Emissions Inventory for the BBCM and Leucite Hills Coal Mine

Emissions	Tons per Year		
	2012	2013	2014

Emissions	Tons per Year		
	2012	**2013**	**2014**
Carbon Monoxide (CO)	344	380	430
Nitrogen Oxides (NO_x)	233	236	258
Particulate Matter 10 microns or less (PM_{10})	437	404	443
Particulate Matter 2.5 microns or less ($PM_{2.5}$)	291	269	295
Sulfur Dioxide (SO_2)	24	22	23

Source: BBCC 2013, BBCC 2014a, and BBCC 2015a.

BBCM Indirect and Other Impact Assessment Area Emissions

Other sources of emissions in the impact assessment area include the Bridger Coal Mine, Jim Bridger Power Plant (from burning BBCM coal and coal from other sources), the generation of electricity at the Jim Bridger Power Plant for use in the operation of the BBCM (treated as a portion of emissions resulting from the burning of BBCM coal), vehicular traffic on Interstate 80, oil and gas operations, BBCM coal transport by locomotive to the Jim Bridger Power Plant, and naturally occurring windblown PM. Annual locomotive emissions for nitrogen oxides (NO_x) and VOCs are estimated to be 50 short tons and 2.5 short tons, respectively, based on the consumption of 194,180 gallons of diesel fuel transporting BBCM coal.

Table 3.7 and **Table 3.8** present available annual emissions data from the two largest non-BBCM pollutant emission sources in the impact assessment area.

Table 3.7. 2013 Annual Emissions Inventory for the Bridger Coal Mine

Emissions	2013 (Tons)
Carbon Monoxide (CO)	187
Nitrogen Oxides (NO_x)	151.7
Particulate Matter 10 microns or less (PM_{10})	2,573.2
Sulfur Dioxide (SO_2)	14

Source: WDEQ 2015a.

The Jim Bridger Power Plant is located adjacent to the Bridger Coal Mine surface mining operation. The Jim Bridger Power Plant burns eight to nine million tons of coal annually and is regulated as a major source under the CAA, which is administered by the WDEQ. The Jim Bridger Power Plant operates under Title V Operating Permit No. 3-1-120-2, issued by WDEQ that contains requirements for ambient air monitoring, recordkeeping, and annual reporting. The Jim Bridger Power Plant is considered a stationary source with the majority of emissions being emitted through the plants four stacks and a lower fraction occurring as fugitive and other emissions. The Jim Bridger Power Plant is equipped with electrostatic precipitators to control particulate emissions and wet scrubbers to control SO_2 emissions. Ninety percent of SO_2 emissions from the Jim Bridger Power Plant have been eliminated with the installation of the wet scrubbers. The Jim Bridger Power Plant operator has begun work to install selective catalytic reduction systems to remove NO_x from the plant's emissions. With the implementation of the catalytic reduction system, an overall reduction of 67 percent in NO_x emissions will have occurred since 2004 (RMP 2014). **Table 3.8** presents the 2013 annual emission inventory for the Jim Bridger Power Plant. Mercury is not specifically included in this table because it is considered a regulated hazardous air pollutant (HAP) and is included under that category. Additionally, power plants are required to have controls in place to remove and limit most of the mercury that is generated.

Table 3.8. 2013 Annual Emissions Inventory for the Jim Bridger Power Plant

Emissions	Reported Cumulative Tons	Estimated Tons from the Burning of BBCM Coal[1]
Carbon Dioxide Equivalent (CO_2^e)	14,725,680[2]	6,037,529[2]
Carbon Monoxide (CO)	6,518.78	2,672.7
Nitrogen Oxides (NO_x)	15,345.15	6,291.5
Particulate Matter 10 microns or less (PM_{10})	1,169.39	479.4

Emissions	Reported Cumulative Tons	Estimated Tons from the Burning of BBCM Coal[1]
Sulfur Dioxide (SO_2)	11,398.29	4,673.3
Volatile Organic Compounds (VOCs)	243.14	99.7
Hazardous Air Pollutants (HAPs)	146.22	59.9

[1]Calculated as a direct correlation between the percentage of coal consumed at the Jim Bridger Power Plant supplied by BBCM annually (41 percent) and the resultant indirect emissions.
[2]Carbon dioxide equivalent (CO_2e) expressed as metric tons (2,204.6 pounds per ton) and remaining units are short tons (2,000 pounds or one ton).
Source: WDEQ 2015b and EPA 2014.

In addition to control measures implemented at the Jim Bridger Power Plant for criteria pollutants, the EPA published the Mercury and Air Toxics Standards (MATS) rule in the Federal Register on February 12, 2012. The rule required the Jim Bridger Power Plant to implement mercury emission controls measures. Activated carbon injection, calcium halide coal conditioning, and soluble mercury re-emission control systems have been installed and the plant has been in compliance with the MATS rule since April 16, 2015. Significant reductions in mercury emissions from the concentrations reported for 2013 have occurred since implementation of the control measures and would continue to occur through and beyond the period coal from the lease modification area will be burned at the plant.

Other Air Quality Regulations

Section 112 of the CAA requires EPA to promulgate regulations establishing emission standards for each category or subcategory of major sources and area sources of hazardous air pollutants (National Emissions Standards for Hazardous Air Pollutants or NESHAPs). Hazardous air pollutants or HAPs (e.g., benzene, perchloroethylene, and mercury) are known or suspected to cause cancer or other serious health effects. EPA regulates 187 HAPs through Maximum Achievable Control Technology (MACT) standards, which are individual emission standards developed for a particular stationary source category. Each MACT standard applies to major sources in the industrial source category; major sources are those that emit more than 10 tons per year of a single HAP or 25 tons per year of any combination of HAPs (EPA 2013a). EPA also regulates HAPs from mobile sources such as highway vehicles and non-road equipment; at least six rules or control programs have been promulgated to reduce these emissions. The Proposed Action would not increase emissions at the Black Butte Mine Complex and would not require any changes that are subject to NESHAPs.

3.1.2 Global Climate Change/Greenhouse Gases

Gases that trap heat in the atmosphere are often called GHGs and include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several fluorinated species of gas. CO_2 is emitted from the combustion of fossil fuels, including coal. CH_4 can be emitted during the production and transport of coal. CO_2 and other GHGs are naturally occurring gases in the atmosphere; their status as a pollutant is not related to their toxicity, but instead is due to the added long-term

impacts they may have on the climate because of their increased incremental levels in the earth's atmosphere. Because they are non-toxic and non-hazardous at normal ambient concentrations, CO_2 and other naturally occurring GHGs do not have applicable ambient standards or emission limits under the major environmental regulatory programs. Currently the WDEQ does not have regulations regarding GHG emissions, although these emissions are regulated indirectly by various other regulations.

In October 2009, the EPA issued the final mandatory reporting rule for major sources of GHG emissions under 40 CFR Part 98. The rule requires a wide range of sources and source groups to record and report selected GHG emissions, including CO_2, CH_4, N_2O, and some halogenated compounds. The threshold for reporting is generally 25,000 metric tons (mt) of CO_2 equivalent (CO_2e) emitted. According to the EPA's website (EPA 2014) where the results of large facility CO_2e emission reporting is compiled, 3,185 million metric tons (mmt) of CO_2e was emitted in the United States, 67.7 mmt was emitted in Wyoming, and 22.4 mmt was emitted in Sweetwater County, Wyoming in 2013. According to the EPA, the large facility reported CO_2e emissions for the United States represent approximately half of the nationwide emissions. Annual global emissions of GHGs for the year 2004 were reported to be 50 gigatonnes (Gt) CO_2e (IPCC 2014b).

The Center for Climate Strategies prepared the *Wyoming Greenhouse Gas Inventory and Reference Case Projection 1990-2020* report for the WDEQ through an effort of the Western Regional Air Partnership. This report presents a preliminary draft GHG emissions inventory and forecast from 1990 to 2020 for Wyoming. This report provides an initial comprehensive understanding of Wyoming's current and possible future GHG emissions. The report discloses that activities in Wyoming accounted for approximately 56 mmt of gross CO_2e emissions in 2005, an amount equal to 0.8 percent of the total United States gross GHG emissions (6,668 mmt CO_2e), and approximately 60.3 mmt of gross CO_2e emissions in 2010. CO_2e emissions are projected to increase to 69.4 mmt annually by 2020 (CCS 2007). These emission estimates focus on activities in Wyoming and are *consumption-based*; they exclude emissions associated with electricity that is exported from the state. Wyoming's gross GHG emissions increased 25 percent from 1990 to 2005, while national emissions rose by only 16 percent from 1990 to 2004. Wyoming's per capita emission rate is more than four times greater than the national average of 25 mt CO_2e/year. Wyoming's emission per capita significantly exceeds national emissions per capita for the following sectors: electricity, industrial, fossil fuel production, transportation, industrial process, and agriculture. The reasons for the higher per capita intensity in Wyoming are varied, but include the state's strong fossil fuel production industry and other industries with high fossil fuel consumption intensity, large agriculture industry, large distances, and low population base (CCS 2007).

Climate changes may result from natural processes, such as changes in the sun's intensity; natural processes within the climate system (such as changes in ocean circulation); human activities that change the atmosphere's composition (such as burning fossil fuels); and the land surface (such as urbanization) (IPCC 2014a). Ongoing scientific research has identified the potential impacts of GHG emissions such as CO_2, CH_4, N_2O; water vapor; and several trace gases on global climate. Through complex interactions on a global scale, GHG emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along

with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably and may contribute to overall climatic changes, typically referred to as global warming. Aside from emissions of GHGs from fossil fuel development, other activities and occurrences contribute to the phenomena of climate change, including large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo) of the earth's atmosphere system.

The Intergovernmental Panel on Climate Change (IPCC) recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic GHG concentrations" (IPCC 2014b). In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 2.5 to 10.4 degrees Fahrenheit above 1990 levels. Numerous worldwide governmental and independent studies and reports confirm these findings and recognize that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes (NAS 2008). Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time increasing the frequency of intense storm events.

It is important to note that GHGs will have a sustained climatic impact over different temporal scales. For example, recent emissions of CO_2 can influence climate for 100 years. In contrast, black carbon is a relatively short-lived pollutant, as it remains in the atmosphere for only about a week. It is estimated that black carbon is the second greatest contributor to global climate change behind CO_2 (Ramanathan and Carmichael 2008). Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

The extraction of coal in the BBCM results in the release of CH_4 gas. Although CH_4 gas is not a criteria pollutant, it is a GHG, approximately 21 times more potent than CO_2 in terms of its warming potential. CH_4 is created during the process of coal formation and remains stored in the coal seams and surrounding rock layers. Shallow coal seams, such as those mined via surface mining operations like at the BBCM, contain less CH_4 because there is less pressure due to the overburden (i.e., the rock and soil lying on top of the seam) to keep the CH_4 from naturally escaping. CH_4 is released to the atmosphere when a coal seam is fractured during surface or underground mining. The amount of CH_4 released by mining depends on the carbon content of the coal, the depth of the coal seam (deeper seams generally contain more CH_4), and the type of mining being conducted.

Emissions of GHGs related to the mining of coal at the BBCM are from combustion of gasoline and diesel fuel in mobile equipment and in generators, propane for heating, and the use of off-site produced electricity for conveyors, building operations, and draglines. Calculations performed on BBCC's reported energy usage (including off-site generated electricity) indicate

approximately 66,817 gross mt of CO_2e were emitted directly and indirectly to facilitate mining activities in 2014 (BBCC 2015b). Locomotive transport to the Jim Bridger Power Plant accounts for 2,007 mt of CO_2e emissions based on the use of approximately 194,180 gallons of diesel fuel annually and an emission factor of 0.01034 tons CO_2e per gallon of diesel fuel burned (EPA 2009). Annual emissions of GHGs in the future are projected to be similar to current levels, based on coal production levels and equipment usage.

Emissions of GHGs related to the combustion of coal mined at the BBCM account for the majority of mine-related GHG emissions. The Jim Bridger Power Plant buys coal from BBCM as a fuel source. The Jim Bridger Power Plant is anticipated to be the only purchaser of BBCM coal during the mining of the lease modification area. Currently, total annual GHG emissions from the Jim Bridger Power Plant are 14 mmt of CO_2e, of which, approximately six mmt of CO_2e (41 percent) are derived from the combustion of BBCM coal. This condition is projected to remain at similar levels into the future.

Social Cost of Carbon

The social cost of carbon (SCC) is an estimate of the monetized damages associated with a small increase in CO2 emissions (typically 1 metric ton) in a particular year. This dollar figure also represents the value of damages avoided for a small emission reduction. SCC is meant to be a comprehensive estimate of climate change damages and includes changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change. Federal agencies use the SCC to incorporate the social benefits of reducing CO2 emissions into the cost-benefit analyses of certain regulatory actions (Interagency Working Group on Social Cost of Carbon 2010; EPA 2015g).

Although the SCC can be a helpful tool to assess the benefits of CO2 reductions, it does not include all damages given current modeling and data limitations. The models used to develop the SCC estimates do not include all of the important physical, ecological, and economic impacts of climate change because of a lack of precise data on the nature of potential damages and because the science used in the models lags behind the most recent research (EPA 2015g). The NEPA process does not require a cost-benefit analysis or a quantitative presentation of SCC cost estimates. Without the completion of a thorough cost-benefit analysis incorporating the social benefits of energy production, the inclusion of an SCC analysis in this EA would present only part of the necessary data. Therefore, the SCC protocol was not used in this analysis. GHG coal combustion emissions are quantified and compared to national and global GHG emissions above.

3.2 Cultural/Historical Resources

The impact assessment area for direct impact analysis for cultural/historical resources is the lease modification area. The impact assessment area for indirect and cumulative impact analyses for cultural/historical resources is the lease modification area and an associated quarter-mile buffer. The exception to this is for the Lincoln Highway that has a three-mile analysis buffer surrounding it. The issue identified for impact analysis in **Section 4.0** for cultural/historical resources is the potential for mining activities to disturb and visually impact cultural resource sites.

A literature search was conducted for the lease modification area through the Wyoming State Historic Preservation Office (SHPO), Wyoming Cultural Records Office (WYCRO). The search included all previously completed cultural resource inventories and identified cultural resources. Much of the BBCM permit area was originally inventoried in 1974 and 1975 for the proposed BBCM. The Pit 14 FEIS describes the prehistoric and historic context of the area (BLM 2006). The lease modification area was previously Class III inventoried in 1985 and 1986 (Hassler 1987). Two subsequent Class III inventories were performed for the Pit 10 lease modification area. The first Class III inventory was in 2002 for an Incidental Boundary Revision associated with disturbance related to the Pit 10 expansion (Pastor 2002). The second Class III inventory was an inventory of 100 acres that were amended to the BBCM permit area to expand coal recovery in the south end of Pit 10 (Pastor 2003). Since the original 1985 and 1986 cultural resource inventories, the Pit 15 lease modification area has been subjected to numerous inventories as part of pipeline, oil and gas exploration, power line, and infrastructure projects. None of the recent inventories encompassed the entire Pit 15 lease modification area. As a result of these cumulative previously completed cultural resource inventories, approximately 140 cultural resource sites have been recorded within one mile of the Pit 10 and Pit 15 lease modification areas. The majority of these sites are artifact scatters with or without associated subsurface features that range in temporal affiliation from prehistoric to historic-era. Other site types present included rock cairns, trails, mines, and segments of the Lincoln Highway (Site 48SW1834).

In order to cover areas not previously inventoried within the Pit 15 lease modification area, in 2011 a Class III inventory of 466 acres was conducted (Frankus 2012a and 2012b). As a result of the Class III inventory, 14 previously recorded and five newly recorded sites were encountered. Only one of the 14 previously recorded sites (Site 48SW6304) was determined eligible for inclusion on the National Register of Historic Places (NRHP). Site 48SW6304 - Prehistoric Artifact Scatter with Features was originally identified during the Pit 10 cultural inventory in the 1980's. In the 1990's the eastern portion of the site was subject to limited data recovery as part of the mitigation for the Pit 10 lease. In 2011 the western portion of the site was tested as part of the Pit 15 lease modification area cultural resource inventory (Frankus 2012b). The testing determined that the western half of the site was non-contributing to the site's NRHP eligibility status under Criterion D. Site 48SW6304 was revisited as part of an inventory for exploration within and outside portions of the Pit 15 lease modification area. The revisit determined that the central and eastern portions of Site 48SW6304 still retain sedimentary deposits that have a significant potential to contain intact buried cultural components and that this site remains eligible under Criterion D (Karpinski and Losey 2015). Site 48SW6304 is located within the Pit 15 lease modification area. None of the five newly recorded sites identified in 2011 are eligible for inclusion on the NRHP (Frankus 2012a and 2012b).

In 2014 BBCM requested that Tetra Tech evaluate for inclusion on the NRHP the previously unevaluated Site 48SW6298 - Prehistoric Lithic Scatter (Karpinski and Karpinski 2014) which is located outside of the Pit 15 lease modification area. The site was originally recorded in 1986 during the original BBCM permit cultural resource inventory (Hassler 1987). The evaluative testing determined Site 48SW6298 to be not eligible for inclusion on the NRHP.

During internal scoping for this EA the BLM RSFO determined that 20.3 acres of the Pit 10 lease modification area had not been covered by an adequate and recent Class III inventory. The

required Class III inventory of the 20.3 acres (as required prior to any federal coal leasing activity in compliance with Section 106 of the National Historic Preservation Act (NHPA)) was conducted in 2014 (Karpinski and Losey 2014). The 20.3-acre area also potentially included the previously recorded, but unevaluated, Site 48SW6198 – Prehistoric Artifact Scatter with Features. Site 48SW6198 was originally identified in 1974; however, site forms were not formally written until 1985 and 1986. Site 48SW6198 was also never formally evaluated for inclusion on the NRHP. During the 2014 Class III inventory, Site 48SW6198 was relocated and evaluated for inclusion on the NRHP. Site 48SW6198 was found to be located outside of the Pit 10 lease modification area Karpinski and Losey 2014). Evaluative testing determined Site 48SW6198 to be eligible for inclusion on the NRHP under Criterion D.

In 2015 BBCM requested that Tetra Tech conduct a Class III inventory for the exploration areas within and outside of the Pit 15 lease modification area (Karpinski and Losey 2015). As a result of the inventory, Site 48SW6296, a Prehistoric Artifact Scatter with Features, was revisited, updated, and evaluative tested for inclusion on the NRHP. The evaluative testing determined Site 48SW6296 to be not eligible for inclusion on the NRHP. The site is located outside of the Pit 15 lease modification area.

Site 48SW1834 is the Lincoln Highway which was the first transcontinental road and Site 48SW18099 is a historic-era rock art site associated with the 1920's alignment of the road. Numerous segments of the road have been recorded and evaluated as to its potential to contribute to the overall highway's inclusion on the NRHP. Contributing segments 48SW1834_149, _148, _145, and _144 and the entirely of Site 48SW18099 are located to the north outside of the Pit 15 lease modification area. The Lincoln Highway (Site 48SW1834) passes east to west within one mile north of the Pit 15 lease modification area. The linear site averages 0.5 mile (0.8 km) north of the lease modification boundary. Site 48SW18099 is located approximately one-third of a mile north of the lease modification area.

3.3 Fish and Wildlife

The impact assessment areas considered in the direct, indirect, and cumulative analyses and the issues identified for analysis in **Section 4.0** for fish and wildlife vary by species and are therefore discussed individually below under the appropriate subsection.

Wildlife surveys are conducted annually within one-mile of the BBCM complex as part of the wildlife monitoring plan included in the current mine permit. These surveys include prey abundance surveys (lagomorph/ground squirrels), point-count surveys for migratory birds, and monitoring of big game mortalities, raptor nests, and Greater Sage-Grouse leks (Intermountain Resources 2014). Additional wildlife surveys were conducted in 2012 under the BBCC Exploration Drill Hole Program, which encompassed the lease modification area (Intermountain Resources 2013). Results from these surveys provide information on species occurrences in or near the lease modification area. Species that may occur or be affected by the Proposed Action are discussed below. Species not addressed in this EA were excluded from analysis based on the absence of suitable habitat, or because the lease modification area was not within the species' geographic range.

3.3.1 Habitat Types

Wildlife habitat types in Wyoming have been classified and described in the Wyoming State Wildlife Action Plan (SWAP) (WGFD 2010). SWAP key habitat types present in the lease modification area include Cliff and Rock Outcrop, Desert Shrubland, and Sagebrush Shrubland. There are no wetlands or perennial streams within the lease modification area. A description of vegetation range sites within the lease modification area can be found in **Section 3.11**.

3.3.2 Threatened and Endangered Species

Of the 11 species listed under the Endangered Species Act (ESA) for Sweetwater County, Wyoming (USFWS 2014a), only the Greater Sage-Grouse, a candidate species, and the four endangered fish species are potentially present or affected by the Proposed Action. Since the Greater Sage-Grouse is a candidate species and a BLM Wyoming sensitive species, it is discussed below under Section 3.3.3. The four endangered fish species are described below.

Colorado River Endangered Fish Species

The impact assessment area for direct, indirect, and cumulative impact analyses for the USFWS endangered fish species is the lease modification area and the Green and Colorado rivers (Upper Colorado River Basin). The issue identified for impact analysis in **Section 4.0** is the potential effect of water depletions from the Upper Colorado River Basin on the Colorado River endangered fish species as a result of the Proposed Action.

The bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) are endangered fish species that are endemic to the Colorado River system. Although these species do not occur in the lease modification area, any water depletions from the Upper Colorado River Basin are considered an adverse effect. Surface water in the lease modification area flows into Bitter Creek, which flows into the Green River, a component of the Upper Colorado River Basin. Therefore, this EA analyzes impacts from water depletions or water otherwise contained from entering Bitter Creek (ground or surface water) by the Proposed Action.

3.3.3 BLM Wyoming Sensitive Species

Species are listed as BLM sensitive if there is evidence of a downward trend in population numbers, such that viability or a distinct population segment of the species is at risk across all or a significant portion of its range. A species may also be listed if it has a restricted geographic range, or requires specialized or unique habitat that occurs on BLM-administered land, and there is evidence that these areas are threatened such that the species' viability may be at risk. The BLM Wyoming sensitive species listed for the RSFO that are considered in this analysis include Greater Sage-Grouse, pygmy rabbit (*Brachylagus idahoensis*), white-tailed prairie dog (*Cynomys leucurus*), Wyoming pocket gopher (*Thomomys clusius*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), mountain plover (*Charadrius montanus*), and sagebrush obligates (i.e., Brewer's sparrow (*Spizella breweri*), sage sparrow (*Amphispiza belli*), sage thrasher (*Oreoscoptes montanus*), and loggerhead shrike (*Lanius ludovicianus*)).

3.3.3.1 Greater Sage-Grouse

The impact assessment area for direct and indirect impact analyses for the Greater Sage-Grouse is the lease modification area. The impact assessment area for cumulative impact analysis for this species is the lease modification area and an associated four-mile buffer. The issue identified for impact analysis in Section 4.0 is habitat loss due to mining related surface disturbance.

In 2010, the USFWS determined that the Greater Sage-Grouse was a candidate species for listing under the ESA, but listing was precluded by higher priority listing actions (USFWS 2010).

The Greater Sage-Grouse is a sagebrush-obligate species and requires sagebrush to meet most of its breeding, nesting, and foraging needs throughout the year. While Greater Sage-Grouse use other types of vegetation communities adjacent to sagebrush patches, it cannot survive in large expanses that lack any sagebrush component. Sagebrush shrubs are used for forage and for nesting, brood-rearing, and fall/winter cover. Greater sage-grouse congregate on leks from March through April, when the males display breeding plumage to attract hens for mating. Approximately two-thirds of hens nest within three miles of the lek where they were bred and the remainder usually nest within 15 miles of the lek where they were bred. Nesting and early brood-rearing occurs from late spring to mid-July (WGFD 2003).

The proposed lease modification area does not occur within a mapped Wyoming Greater Sage-Grouse Core Population Area (Core Area is what the State of Wyoming refers to as PHMA) as identified by the Wyoming Governor's Executive Order number 2011-05. The closest PHMA to the lease modification area is located approximately five miles to the north. The proposed lease modification area is within suitable general habitat for the Greater Sage-Grouse as mapped by WGFD.

Based on the results of the 2013 annual wildlife survey, there are no Greater Sage-Grouse leks within four miles of the lease modification area (Intermountain Resources 2014). Black Butte-1 lek is the closest lek that is monitored for the BBCM, and it is located approximately eight miles to the south of the lease modification area. This lek has not been active in 22 years, and is classified as unoccupied/abandoned by WGFD (Intermountain Resources 2014). There is an additional lek (Bitter Divide lek) located 4.5 miles to the northeast of the lease modification area, north of Interstate 80. This lek has been active every year since 2009 and was occupied by seven males in 2014. The Bitter Divide lek is not within a PHMA.

3.3.3.2 Pygmy Rabbit, White-tailed Prairie Dog, and Wyoming Pocket Gopher

The impact assessment area for direct and indirect impact analyses for pygmy rabbit, white-tailed prairie dog, and Wyoming pocket gopher is the lease modification area. The impact assessment area for cumulative impact analyses for these species is the lease modification area and an associated one-mile buffer. The issue identified for impact analysis in **Section 4.0** is habitat loss due to mining related surface disturbance.

<u>Pygmy Rabbit</u>

The pygmy rabbit occurs only in the southwestern part of Wyoming, where it inhabits dense, tall stands of big sagebrush, usually along drainages within sagebrush-grasslands. Pygmy rabbits are dependent on sagebrush, which comprises up to 99 percent of their winter diet. Soft, deep soil is

a key habitat feature since pygmy rabbits excavate their own burrows. Although suitable pygmy rabbit habitat in Wyoming is widely distributed, the habitat is naturally fragmented and very limited (WGFD 2010). Abundance and population trends in Wyoming are unknown, but the species appears to be declining range-wide (Keinath and McGee 2004).

Pygmy rabbits have been documented on or adjacent to the BBCM during previous annual lagomorph surveys, but they are not abundant. During the 2012 exploration drill hole survey, pygmy rabbits were not observed, but suspected burrows and pellets were observed five miles to the west, and 10 miles both to the northwest and southwest of the lease modification area (Intermountain Resources 2013).

White-tailed Prairie Dog

The white-tailed prairie dog is found in western and central Wyoming, where it inhabits desert shrublands, sagebrush-steppe, and grasslands (Orabona et al. 2012). Due to their colonial nature, white-tailed prairie dogs show high fidelity for their habitat once selected (Keinath 2004). White-tailed prairie dogs are still common in Wyoming, but abundance continues to fluctuate dramatically in the state with populations having recently exhibited a downward trend (Keinath 2004).

White-tailed prairie dogs are relatively common around BBCM. During the 2012 exploration drill hole survey, an active white-tailed prairie dog town was located within the proposed Pit 15 lease modification area. The prairie dogs were generally found on sites with heavier soils dominated by Gardner saltbush (*Atriplex gardneri*) and other subshrubs (Intermountain Resources 2013).

Wyoming Pocket Gopher

The Wyoming pocket gopher is found only in south-central Wyoming where it is a year-round resident. This species inhabits upland dry ridge tops and shallow or gravelly loose soils within greasewood (*Sarcobatus* sp.) communities. It typically occurs on sites with 50 to 80 percent bare ground where shrubs are absent (WGFD 2010). Population status is unknown, but this species is considered rare with a very restricted geographic range (Beauvais and Dark-Smiley 2005).

Surveys were conducted for this species during the 2012 exploration drill hole survey. No pocket gophers were observed in the lease modification area; however, two suspected pocket gopher mounds were found in habitat to the southwest and northwest of the lease modification area (Intermountain Resources 2013). The closest was approximately 1.5 miles north of the lease modification area, north of Interstate 80. There is potential habitat for this species within the lease modification area where greasewood communities are present.

3.3.3.3 Burrowing Owl, Ferruginous Hawk, Golden Eagle, Mountain Plover, and Sagebrush Obligates

The impact assessment area for direct and indirect impact analyses for burrowing owls, ferruginous hawks, golden eagles, mountain plovers, and sagebrush obligates is the lease modification area and an associated one-mile buffer. The impact assessment area for cumulative impact analyses for these species is the lease modification area and an associated four-mile

buffer. The issue identified for impact analysis in **Section 4.0** is disturbance to nesting birds and raptors due to mining activity and habitat loss due to mining related surface disturbance.

Burrowing Owl

The burrowing owl uses a wide variety of arid and semiarid environments, with well-drained, level to gently sloping areas that are characterized by sparse vegetation and bare ground. This species prefers open prairie, grassland, desert, and shrub-steppe habitats, but may also inhabit agricultural areas. It is dependent on mammals, particularly prairie dogs and ground squirrels that dig burrows, which the owl uses for nesting, roosting, and escape. It is considered an uncommon summer resident in Wyoming (WGFD 2010).

Burrowing owls have been recorded in the BBCM permit area during the breeding season in previous years but there are no known nesting burrows within one mile of the lease modification area (Intermountain Resources 2013). The lease modification area does provide foraging habitat for burrowing owls.

Ferruginous Hawk

Ferruginous hawks breed throughout most of Wyoming, and winter in southern portions of the state (Bechard and Schmutz 1995, Travsky and Beauvais 2005). Breeding occurs in arid grasslands, shrub-steppe, and desert shrublands where terrain is flat or rolling. Elevated nest sites are preferred, such as boulders, low cliffs, ridge crests, buttes, pinnacles, lone trees, and artificial nest platforms. This hawk requires areas with abundant prairie dog, jackrabbit, and/or ground squirrel populations (Travsky and Beauvais 2005). The North American population appears to be declining, but the species is relatively secure in Wyoming (Travsky and Beauvais 2005).

Twenty intact ferruginous hawk nests are located within one mile of the lease modification area. Of these nests, five have been active and one has been tended in the last six years (Intermountain Resources 2013) and two of these six nests no longer exist: FH97R was destroyed by natural causes and FH367 was removed from a power pole by the power company. In 2014, two nests (FH 342 and FH 35) were active and each produced three young (Sweeney 2014). FH342 is located on a power pole approximately one-half mile to the southwest of the Pit 10 portion of the lease modification area. This nest has been active every year from 2009 to 2014 (Intermountain Resources 2013). FH35 is located on a hilltop approximately 800 feet to the northeast of the Pit 10 portion of the lease modification area. The year 2014 was the first time this nest has been active in the past six years.

Golden Eagle

The golden eagle is found year-round in western and southern Wyoming in grassland and shrub-steppe habitat (DeLong 2004). It typically nests on cliffs but may also use large trees or artificial platforms. Golden eagles tend to return to the same territory each year, and frequently reuse nests. It preys primarily on prairie dogs, jackrabbits, and ground squirrels, and prey abundance affects reproduction (DeLong 2004). This species is a common year-round resident to Wyoming (Orabona et al. 2012) though populations across the western United States are declining (Kochert and Steenhof 2002).

There currently are no intact golden eagle nests within one mile of the lease modification area. Historically there were two nests on the Pit 10 high wall, but both have been destroyed by natural causes (Intermountain Resources 2013). Golden eagles regularly nest in other portions of the BBCM permit area and may use the lease modification area for foraging.

Mountain Plover

The mountain plover inhabits arid shortgrass prairies and other areas with low, open vegetation, such as desert shrublands. This species has adapted to sparsely vegetated and bare ground areas associated with various disturbances (e.g., fire, heavy grazing, or prairie dog colonies) (Nicholoff 2003). The core breeding area in Wyoming is concentrated in the central portion of the state, but it has been detected in every county (Smith and Keinath 2004). Approximately 25 percent of the entire North American population breeds in Wyoming (Smith and Keinath 2004). The current population trend in Wyoming is unknown, but the species is threatened by habitat loss and human disturbance (WGFD 2010).

Surveys were conducted for this species during the 2012 exploration drill hole survey, but no mountain plovers were observed in the lease modification area. Furthermore, mountain plovers have not been recorded during any other past wildlife baseline or annual monitoring surveys completed within the BBCM permit area. However, potential habitat is present in the lease modification area, including white-tailed prairie dog towns, Gardner saltbush communities, and other subshrub plant communities (Intermountain Resources 2013).

Sagebrush Obligates

Brewer's sparrow, sage sparrow, and sage thrasher are considered sagebrush obligates because they are restricted to sagebrush ecosystems and cannot survive in large expanses that lack sagebrush shrubs (WGFD 2010). The loggerhead shrike is also highly associated with sagebrush, but may also use open pinyon-juniper, grasslands, and other shrub-steppe communities where perch sites are available. These species commonly breed throughout most of Wyoming wherever sagebrush is present (WGFD 2010, Orabona et al. 2012). All four species have stable populations in Wyoming, but habitat loss is a major threat and range-wide populations have shown declines (Keinath and Schneider 2005, WGFD 2010).

During the 2012 exploration drill hole survey, all of these species were observed in suitable habitats throughout the lease modification area. The Brewer's sparrow, sage sparrow, and the sage thrasher were common, occurring primarily in habitats dominated by Wyoming big sagebrush (*Artemisia tridentata wyomingensis*). The loggerhead shrike was less common, but was still observed throughout the area. The loggerhead shrike was found most frequently in habitats that were dominated by tall shrubs such as greasewood and basin big sagebrush (*A.t. tridentata*), but they were also observed in mixed shrub and Wyoming big sagebrush habitats (Intermountain Resources 2013).

3.3.4 General Fish and Wildlife

The lease modification area provides habitat for a variety of birds, mammals, and reptiles that are associated with sagebrush and desert shrubland communities. There are no aquatic or mesic habitat types in the lease modification area; therefore, amphibians would not occur.

3.3.4.1 Big Game

The impact assessment area for direct and indirect impact analyses for big game species is the lease modification area and an associated one-mile buffer. The impact assessment area for cumulative impact analyses for big game is the WGFD's designated big game herd units. For pronghorn antelope this is the Bitter Creek Herd Unit, for mule deer this is the South Rock Springs Herd Unit, both of which encompass approximately 699,779 acres. For Rocky Mountain elk this is the Petition Herd Unit, which encompasses 1,835,750 acres. The issue identified for impact analysis in **Section 4.0** is habitat loss due to mining related surface disturbance.

The primary big game species that use the BBCM area are mule deer and pronghorn antelope, but Rocky Mountain elk are now found in the area almost year-round (Intermountain Resources 2013). WGFD classifies the entire lease modification area as winter/year-long range for both pronghorn antelope and mule deer (WGFD 2012a, WGFD 2012b). This means that a resident population occupies the area year-round but during the winter months additional animals enter the area from nearby seasonal ranges. The entire lease modification area is classified as undetermined/undocumented for elk, which means that the area is expected to or does support a population but no seasonal range type has been formally designated (WGFD 2014). None of the big game ranges are classified as crucial. There are no migration routes or parturition areas in the lease modification area.

The pronghorn Bitter Creek Herd Unit has been well below its population objective for the past 15 years. Factors that may be contributing to this downward trend include energy development, increased competition with wild horses in winter range, severe winters, and extreme drought (WGFD 2012c).

WGFD has designated Habitat Priority Areas throughout Wyoming based on significant biological or ecological values. The lease modification area occurs within the Bitter Creek-Red Desert Crucial Habitat Priority Area. This priority area encompasses the eastern portion of the Bitter Creek watershed, and was designated based on the occurrence of flannelmouth sucker (*Catostomus latipinnis*) populations in Upper Bitter Creek, big game and Greater Sage-Grouse habitat, and many Wyoming species of greatest conservation need (SGCN) (as designated in the SWAP) (WGFD 2009).

3.3.4.2 Migratory Birds and Raptors

The impact assessment area for direct and indirect impact analyses for migratory bird and raptors is the lease modification area and an associated one-mile buffer. The impact assessment area for cumulative impact analyses for these species is the lease modification area and an associated four-mile buffer. The issue identified for impact analysis in **Section 4.0** is disturbance to nesting birds and raptors due to mining activity and habitat loss due to mining related surface disturbance.

As outlined in Instruction Memorandum (IM) number 2008-050 (BLM 2008b), in order to fulfill its obligations under the Migratory Bird Treaty Act (MBTA) the BLM must include migratory birds in every NEPA analysis if actions may have the potential to affect migratory birds.

Analysis of migratory birds is focused on the Coal Mine List of 40 Migratory Bird Species of Management Concern in Wyoming (USFWS 2002). This list is based on the Wyoming Bird Conservation Plan (Nicholoff 2003), which ranks species in order of conservation priority. **Table 3.9** lists Priority Level 1 and Level 2 species that have suitable habitat in the lease modification area. Several of these species are ESA-listed species or BLM sensitive species, which were discussed in detail in **Section 3.3.2** and **Section 3.3.3**.

Raptor species that are classified as BLM sensitive (i.e., burrowing owl, ferruginous hawk, and golden eagle) were previously discussed in **Section 3.3.3**. Other raptors that occur in the lease modification area include red-tailed hawk (*Buteo jamaicensis*), prairie falcon (*Falco mexicanus*), great horned owl (*Bubo virginianus*), and northern harrier (*Circus cyaneus*). Potential nesting substrates in the lease modification area include rock outcrop/cliffs, utility poles, mining equipment, and mine high walls. No intact raptor nests for any of these species exist within 0.5 mile of the lease modification area. Great horned owls have historically nested on the high wall of Pit 10, but the nest site has been removed by mining operations (Intermountain Resources 2014). The lease modification area does provide foraging habitat for all of these raptor species.

Avian species are monitored annually at the BBCM through point-count surveys focused on Priority Level 1 and Level 2 species, and raptor nest surveys (Intermountain Resources 2014). Priority species that were observed at the BBCM during the 2013 annual survey or incidentally during other wildlife surveys are indicated in **Table 3.9.** Other non-priority birds observed during the surveys include Brewer's blackbird (*Euphagus cyanocephalus*), common raven (*Corvus corax*), horned lark (*Eremophila alpestris*), mourning dove (*Zenaida macroura*), rock wren (*Salpinctes obsoletus*), and Say's phoebe (*Sayornis saya*) (Intermountain Resources 2014).

Table 3.9. Priority Bird Species with Suitable Habitat in the Lease Modification Area

Conservation Priority	Species Name	Primary Habitat Type(s)	Observed at BBCM
Level I (Conservation Action)[1]	Brewer's Sparrow *Spizella breweri*	Shrub-steppe, Mountain-foothills Shrub	Yes
	Burrowing Owl *Athene cunicularia*	Shortgrass Prairie	Yes
	Ferruginous Hawk *Buteo regalis*	Shrub-steppe,Shortgrass Prairie	Yes
	Greater Sage-grouse *Centrocercus urophasianus*	Shrub-steppe	Yes
	McCown's Longspur *Rhynchophanes mccownii*	Shortgrass Prairie, Shrub-steppe	No
	Mountain Plover *Charadrius montanus*	Shortgrass Prairie, Shrub-steppe	No
	Sage Sparrow *Amphispiza belli*	Shrub-steppe, Mountain-foothills Shrub	Yes
Level II (Monitoring)[2]	Black-chinned Hummingbird *Archilochus alexandri*	Plains/Basin Riparian, Shrub-steppe	No
	Grasshopper Sparrow *Ammodramus savannarum*	Shortgrass Prairie, Shrub-steppe	No
	Lark Bunting *Calamospiza melanocorys*	Shortgrass Prairie, Shrub-steppe	No
	Lark Sparrow *Chondestes grammacus*	Shrub-steppe	Yes

Conservation Priority	Species Name	Primary Habitat Type(s)	Observed at BBCM
	Loggerhead Shrike *Lanius ludovicianus*	Shrub-steppe	Yes
	Sage Thrasher *Oreoscoptes montanus*	Shrub-steppe	Yes
	Vesper Sparrow *Pooecetes gramineus*	Shrub-steppe	Yes

[1]Level I – Species clearly needs conservation action. Declining population and/or habitat loss may be significant.
[2]Level II – The action and focus for the species is monitoring; declining populations and habitat loss are not yet significant.
Source: Nicholoff 2003.

3.4 Geology/Mineral Resources/Energy Production

The impact assessment area for direct, indirect, and cumulative impact analyses for geology/mineral resources/energy production is the lease modification area. The issues identified for impact analysis in **Section 4.0** for geology/mineral resources/energy production are the current use of the coal resource versus future use, modification of the geology in the mined area, and the temporary loss of use of land for oil and gas extraction, processing, and transport.

The lease modification area is located on the dissected arid upland on the east flank of the Rock Springs Uplift. The Rock Springs Uplift is a large anticline dome with exposures of Cretaceous and Tertiary aged rocks. The major axis of the dome trends north-south and is approximately 90 miles long and the minor axis trends east-west and is approximately 50 miles long (Love and Christiansen 1985). The topography of the lease modification area and adjoining areas is characterized by a series of north-south trending hogback ridges having steep western faces and gentle dipping (three to 10 degree) slopes to the east. The ridges are generally composed of the more resistant sandstones, while soft, and easily erodible shale's form strike valleys between them.

Total relief in the lease modification area is approximately 350 feet. Elevations vary from approximately 6,650 feet in the lowland drainage basins to 7,000 feet on the eastern extent of the Pit 10 portion of the lease modification area.

3.4.1 Stratigraphy

Sedimentary rocks in the Rock Springs Uplift range in age from middle Cambrian to Tertiary. The formations exposed at the surface are late Cretaceous and younger in age and have a composite thickness of 12,000 to 14,000 feet. The oldest exposed formation is the late Cretaceous Baxter shale. The formations, ascending through the Cretaceous, consist of the Blair, Rock Springs, Ericson, Almond, Lewis, Fox Hills, and Lance formations. The Paleocene Fort Union Formation unconformably rests on the Lance Formation, while the Eocene Wasatch Formation unconformably overlies the Fort Union (Love and Christiansen 1985).

The Wasatch grades into the Green River Formation which is overlain by the Uinta, Bridger, and Washakie formations, respectively. The Oligocene Bishop conglomerate unconformably overlies these.

These sequences reflect a depositional change in environment from the marine Baxter shale to the terrestrial Wasatch and Green River formations. The period from the late Cretaceous through the Tertiary was one of slow marine regression of the Epeiric Sea marked by periods of transgression.

3.4.2 Coal Occurrence

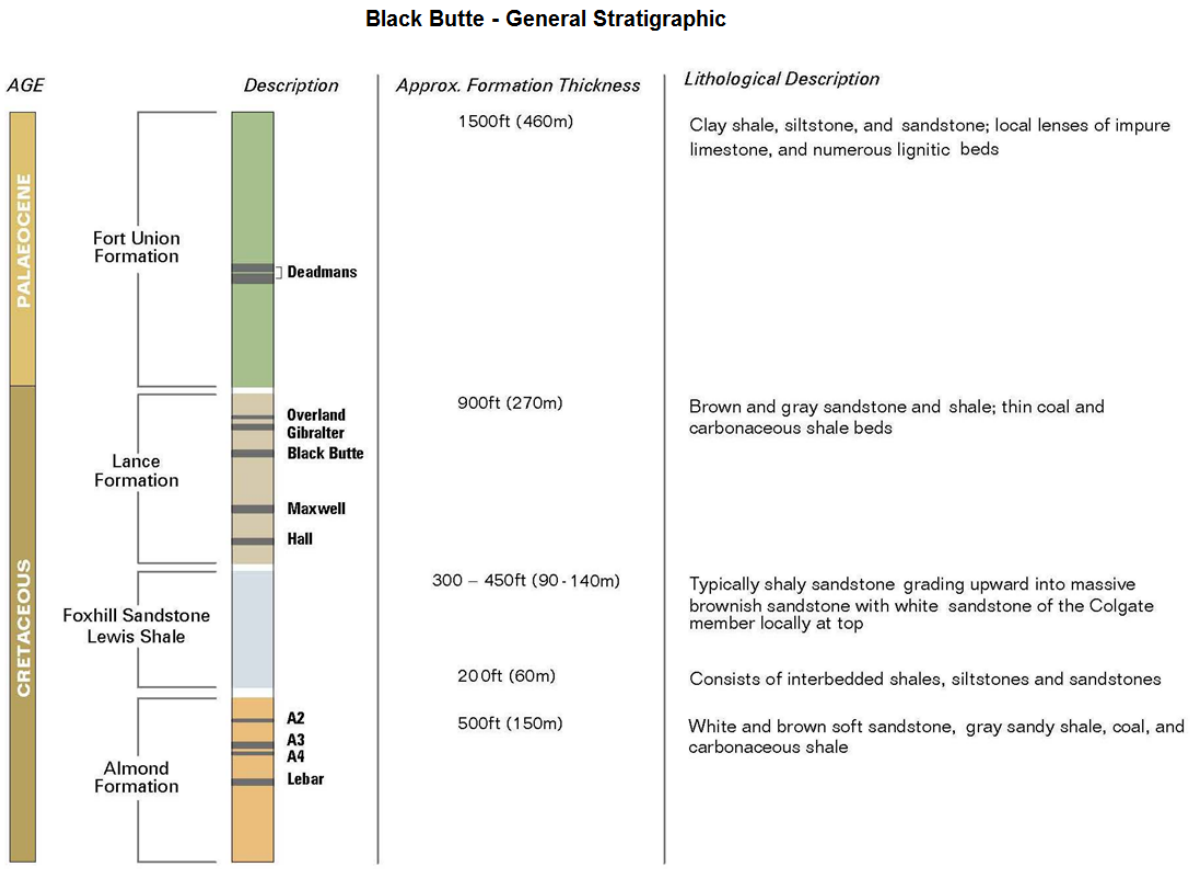
Coal beds of the Rock Springs Uplift occur within the Rock Springs, Almond, Lance, Fort Union, and the Wasatch formations. The beds generally weather shallow drab-gray slopes and valleys between hogback ridges of resistant sandstone. The soft coal weathers several feet below the surface, and is usually covered by a veneer of soil and vegetation. In isolated areas, the outcrops have been burned by spontaneous combustion, resulting in reddish-orange clinker beds. Minerals associated with the weathering of the coal beds include selenite, limonite, and some calcite.

Coal beds at the BBCM occur within the Almond, Lance, and the Fort Union formations. There are from seven to 18 coal beds in the BBCM area. The BBCM general stratigraphy can be seen on **Figure 3.2**. The coal beds range in average thickness from one to 31 feet.

The lease modification area is located in the Fort Union Formation. The Fort Union Formation outcrops as a series of drab-brown and drab-gray northeast trending ridges and valleys. The Fort Union Formation has a thickness of less than 800 feet and is composed of gray shale and interbedded gray siltstone, gray very fine grained sandstone, gray and brown carbonaceous shales, and coal. The coal bearing units are mostly present in the lower half of the Fort Union Formation (BBCC 2008a).

The drill hole logs, coal analysis, and detailed local geology for the lease modification area have been previously submitted to the BLM under a separate (confidential) data transmittal package.

Figure 3.2. Black Butte Coal Mine General Stratigraphy



Source: BBCC 2014b.

3.4.3 Other Mineral Occurrences

Prospecting for gas, oil, and coal, and possibly uranium and other minerals has occurred in the lease modification area. There are oil and gas leases in both sections 12 and 24, T19N, R100W. The oil and gas leases are part of the Arch Almond B unit held by the unit WYW-094516B, dated 1959. All of the wells in Section 12 have been plugged. There are two oil wells in Section 24 located in the northwestern quarter section. They are both outside of the lease modification area.

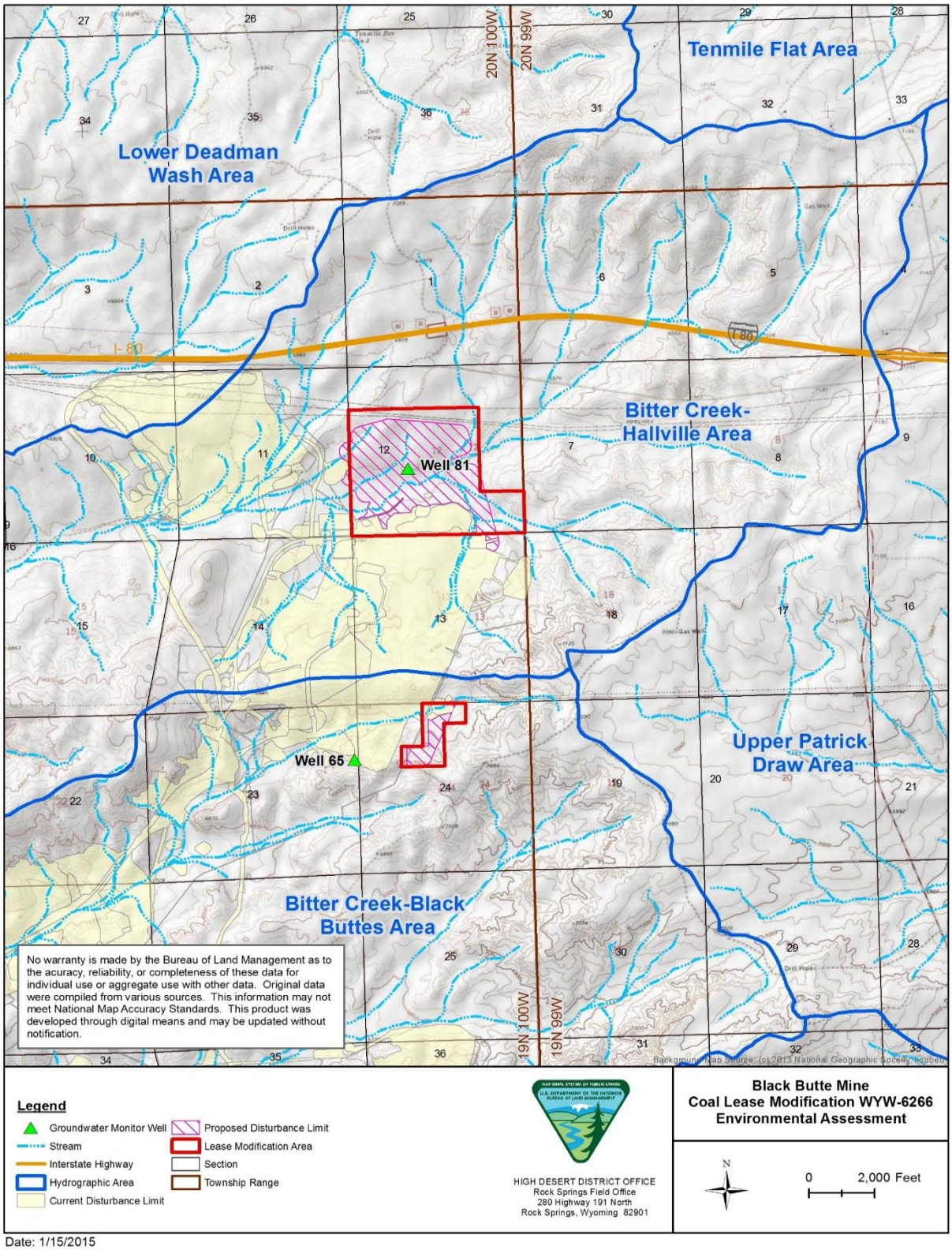
A water rights search of the lease modification area and a two mile buffer surrounding it through the Wyoming State Engineers Office (WSEO) indicated that coal bed CH_4 wells were extracting water to facilitate gas production from a depth greater than 2,000 feet below ground surface (bgs) south of the lease modification area (WSEO 2015). This depth is below the Fort Union Formation. The southern tract of the lease modification area (Pit 10) is not covered by any oil and gas leases; however, an oil and gas pipeline is located on a portion of the lease modification area in an area proposed for disturbance. No other mineral extraction activities are known to exist in the lease modification area.

3.5 Hydrologic Conditions

The impact assessment area for direct, indirect, and cumulative impact analyses for hydrologic conditions is the lease modification area and the anticipated area of groundwater drawdown and the adjoining portion of the surface watershed. The issues identified for impact analysis in **Section 4.0** for hydrologic conditions are the potential for loss of use of groundwater for other users, potential for pollution introduction into groundwater and surface water, loss of seeps/springs/wetland/riparian, and potential to increase surface water erosion/head cutting.

BBCM is located on a dissected arid upland situated on the eastern slope of a large anticlinal dome called the Rock Springs Uplift. Rocks along the southeastern flank of this uplift dip to the east-southeast at three to 10 degrees. The geologic formations which outcrop within the BBCC permit area are, in ascending order: the Ericson, Almond, Lewis Shale, Fox Hills Sandstone, and Lance formations of late Cretaceous age; the Fort Union and Wasatch formations of early Tertiary age; and the alluvial and colluvial deposits of Quaternary age. The southern tract of the lease modification area (Pit 10) contains no prominent drainages. The northern tract of the lease modification area (Pit 15) is bisected by an un-named ephemeral drainage. Both areas drain westerly and surface water flows eventually enter Bitter Creek. **Figure 3.3** presents a map of hydrologic features in the lease modification area. The Bitter Creek valley is broad and flat and underlain by alluvial deposits up to 80 feet thick.

Figure 3.3. Surface Water Drainages and Groundwater Monitoring Wells



3.5.1 Groundwater Quality and Quantity

Groundwater in the lease modification area and adjoining area that is potentially impacted by Pit 10 and Pit 15 mining activities occurs in the Fort Union Formation. The Fort Union Formation is comprised of interbedded clay shale, siltstone, and sandstone with coal beds and is locally up to 800 feet thick. The coal beds are in the lower half of the Fort Union Formation. Mining in the Pit 15 area would extend to a depth of 300 feet. Depth to the static groundwater table is reported at 87 feet bgs in monitoring Well 81 (260 foot total well depth) located within the proposed Pit 15 boundary (BBCC 2014c). Data from the BBCC's 2013 Annual Report Hydrology Section indicates that groundwater levels have declined in the Pit 15 area around 2005 and 2006 due to dewatering of Pit 11 (BBCC 2014c). Monitoring Well 81 has experienced a 20 foot decrease in its water table elevation. A fault acting as a groundwater flow boundary likely partially isolates the hydrologic system in the Pit 15 area from the Pit 10 area. Monitoring Well 65 (165 foot total well depth), located on the southern boundary of Pit 10 has experienced an approximate 45 foot drop in the water table elevation and has been dry since 2008.

Median hydraulic conductivity for the Fort Union Formation in the Green River Coal Region is reported as 0.385 feet/day (WDEQ 2008). Pit 10 inflows were reported at approximately 19 acre-feet per year in the early 1990s. Pit 11 inflows after several months of mining were reported at 32 acre-feet per year. These inflow rates are a reasonable extrapolation to what may occur in Pit 15 due to the similar geology and orientation.

A typical way of expressing the influence a mine will have on the groundwater table drawdown extent is by calculating the probable five foot drawdown distance from the mine. Previous calculations of the five foot drawdown contour for Pit 10 can be reasonably extrapolated for the northward extension of Pit 15, due to the similar geologic setting. The estimated five foot drawdown extends approximately one and a quarter mile east and north of Pit 10 (BBCC 2001). The drawdown is influenced by the presence of several northeast trending faults that limit the northward extension of drawdown resulting from Pit 10 to approximately Interstate 80. The proposed Pit 15 boundary would be similarly bounded by the faulting and likely influenced by their presence. The 2008 Cumulative Hydrologic Impact Assessment that was prepared for the Green River Coal Area which includes the Bridger Coal Mine, Leucite Hills Coal Mine, and the BBCM, indicated based on modeling that no cumulative potentiometric surface drawdowns would occur in the Fort Union Formation due to mining (WDEQ 2008). Groundwater elevations in other areas in the BBCM where mining has ceased have stabilized or are recovering (BBCC 2014c).

For backfilled spoils to re-saturate and re-establish as an aquifer, there must be a recharge source. Recharge to the backfill spoils would occur from two sources: precipitation and lateral groundwater movement from adjacent undisturbed water-bearing strata. At the BBCM, precipitation would be insignificant compared to the lateral component of groundwater recharge. The rate of lateral recharge is a function of the permeability of the backfilled spoils, the permeability of the adjacent recharge aquifer, the surface area of contact between the two, and the hydraulic gradient (BBCC 2014c). Dragline placed spoils are generally much higher in permeability than other methods of spoil placement. However, a 1982 BBCM spoil study completed at the request of the WDEQ, indicated that spoil material would exhibit similar porosities and permeabilities as undisturbed overburden (BBCC 2008a). Previous calculations of

spoil re-saturation time frames indicated a 60 to 240 year period would be required for groundwater elevation recovery. Actual recovery time frames may be less since the earlier calculations assumed recharge was from the coal seam aquifer only.

In general, Fort Union Formation groundwater is of poor quality. The formation's alluvial subcrop with Bitter Creek and an important recharge area is approximately five and three quarter miles south of Pit 10. Water quality is reportedly of a lower quality near the subcrop's intersection with Bitter Creek (BBCC 2014c). The sodium adsorption ratio (SAR), total dissolved solids (TDS), chloride, sulfate, or boron concentrations in water derived from the formation in various wells in the BBCM permit area near the Bitter Creek subcrop are elevated and fail to meet Class I, II, or III use standards. However, Class II and III use standards are met for groundwater collected from the nearest potable water wells which are located approximately 8 and 15 miles away to the northwest, near the communities of Point of Rocks and Superior, respectively.

Fort Union Formation wells 65 and 81, located in the Pit 10 area, have both been sampled since 1990 and most recently checked for the presence of water or sampled in 2013. **Figure 3.3** presents the location of the wells. Groundwater from both wells is poor in quality with high TDS concentrations present. The groundwater from both wells is predominately a sodium/potassium sulfate ion mix (BBCC 2014c). **Figure 3.4** and **Figure 3.5** are trilinear diagrams of historical analyses from wells 65 and 81, respectively. Both show variability in TDS and major constituent concentrations.

Figure 3.4. Groundwater Monitoring Well 65 Trilinear Diagram

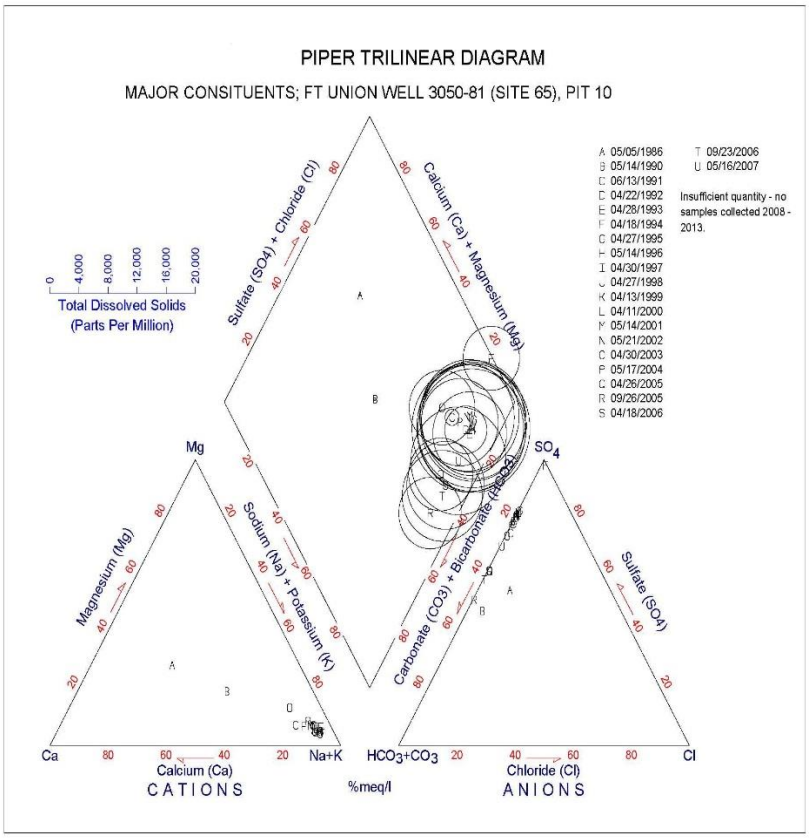
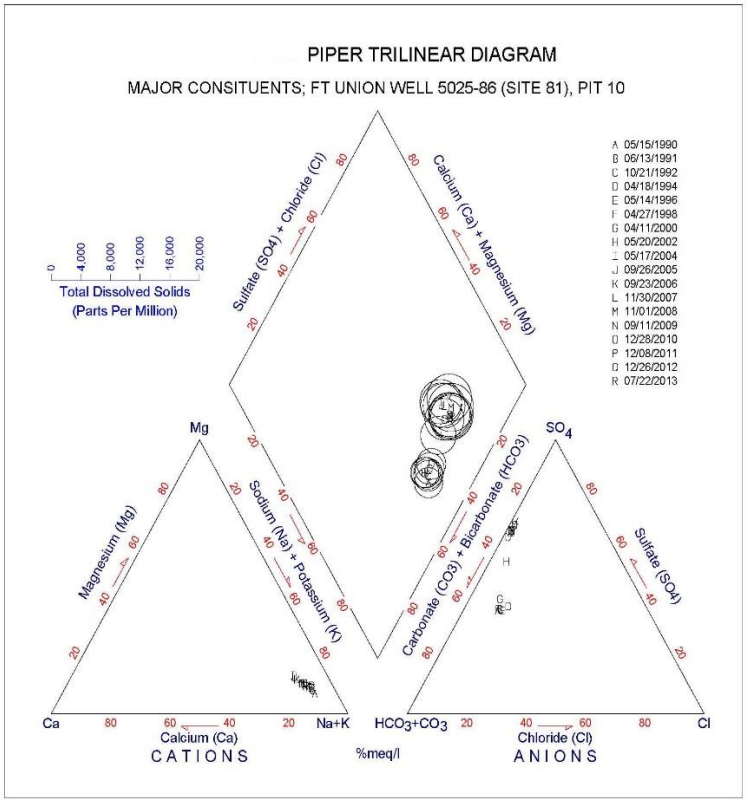


Figure 3.5. Groundwater Monitoring Well 81 Trilinear Diagram



Well 65, located south of Pit 10, is close to a structural fault. Groundwater sampled from this well showed general deterioration in quality through 1999 when laboratory measured TDS concentrations peaked at 7,920 milligrams per liter (BBCC 2014c). The measured TDS concentrations at this well then declined to 6,140 milligrams per liter prior to 2008. Subsequently, the well has maintained insufficient water to sample or has remained dry. Water quality variability through time at this location is believed to result from multiple sources of recharge along the fault zone and surface water influence in the open pit.

Spoil aquifer groundwater quality is predicted to be of suitable quality to meet post-mining land use in the Green River Coal Field Area (WDEQ 2008). Initially during water level recovery elevated TDS concentrations are expected in spoil aquifers. With time the backfill aquifer water quality is expected to improve due to flushing and geochemical precipitation (WDEQ 2008). The already low quality of water in the Fort Union Formation is not anticipated to improve much if at all above its current quality in backfilled pits. Testing of spoil water at the BBCM in the Pit 2 and Pit 3 area indicates that recharge water is of a less than expected quality. However, these pits are not representative of what would occur in the Pit 10 and Pit 15 area, due to their location next to the lower quality Bitter Creek alluvium water source recharging the spoil aquifer.

3.5.2 Surface Water Hydrologic Function, Quality, and Quantity

Surface water flows emanating from or passing through the lease modification area are part of the Bitter Creek Watershed drainage system. Bitter Creek is located three and one half miles to

the southwest of the lease modification area. The un-named drainage channel features in the lease modification area are dendritic in form, ephemeral, and are shallow to deeply incised (BBCC 2008a). Vegetation is more prevalent in and adjacent to the drainage channels. No wetlands, springs, or seeps exist in the lease modification area.

BBCM is a total containment mine requiring the use of surface water control and containment structures to minimize surface water entrance into disturbed areas and to prevent discharge of surface water from disturbed areas. The exception to this is after high magnitude storm events that use up containment storage capacity needed for a 10 year 24 hour storm event and require treatment and discharge under the mine's NPDES permit. However, typically, impounded storm water at BBCM evaporates or infiltrates and does not require discharge. Total containment ponds, sediment ponds, evaporation ponds, and retention ponds contain all disturbed land runoff.

Storm or snowmelt runoff events in the northern area (Section 12) drainages are predominately isolated from surface disturbance at Pit 11 and Pit 10, and flow without pond containment to Bitter Creek. As described in the Proposed Action, the majority of flows in Section 12 would be diverted north around Pit 15 during mining with no loss in stream flow quantities reaching Bitter Creek during storm and snowmelt runoff events. The southern area (Section 24) flows enter the Pit 10 disturbance area and evaporate, infiltrate, or are otherwise retained in the disturbance area or in the existing retention pond. The portion of the sub watershed that is associated with the southern portion of the lease modification area is minor in area. **Figure 3.3** presents the drainages relative to the lease modification area and surface disturbance boundaries.

The section of Bitter Creek adjacent to the lease modification area is classified as a Class 2C water by the WDEQ due to elevated levels of fecal bacteria and chloride levels detected by WDEQ in 1998 (WDEQ 2012b) and has the following designated uses: non-game fish, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, and scenic value (WDEQ 2013). However, the section of Bitter Creek adjacent to the lease modification area does not have the hydrologic or natural quality to support fish, and is considered to have poor quality and/or quantity and the downstream portions of Bitter Creek could be affected by actions at the mine if precautions are not taken. The BBCM Probable Hydrologic Consequence section of the mine permit indicates that for previous mine development, the construction of surface water control structures and the associated low temporary flow reduction and sediment yield have a negligible impact on Bitter Creek and its watershed (BBCC 2008a). There does not appear, based upon historic data, to be any significant increasing or decreasing trends in the water quality (particularly total suspended solids and TDS concentrations) occurring between Bitter Creek surface water monitoring sites SBC1-75 and SBC2-75. These sites are located upstream and downstream, respectively, of the ephemeral drainages draining into the Pit 10 area and other active and reclaimed portions of the BBCM.

WDEQ classifies this section of Bitter Creek as 2C, which requires that the aquatic life standards of less than 1.4 ppb and a chronic value of less than .77 ppb of mercury are met. Periodic monitoring of mercury concentrations in surface water at monitoring sites SBC1-75 and SBC2-75 has occurred since 1976. As of May 2015, a total of 38 and 35 water samples have been analyzed respectively. With the exception of three detections in the single digit ppb range, no other detections of mercury have occurred (BBCC 2015c). Monitoring site SBC1-75 read 7 ppb in December 1978 and 1 ppb in September 1982. Between these two isolated detections, nine

water samples from SRC1-75 were taken and tested. None of these samples showed detectable levels of mercury. Monitoring site SBC2-75 read 1 ppb in June 1982. Previous and subsequent samples at this location did not show results above the levels of detection.

All water sample tests from these monitoring sites since 1982 have registered no mercury above the level of detection. Water from SBC1-75 has been analyzed 23 times since 1982, and SBC2-75 has been sampled 20 times since 1982, the last of which for both sites was May 5, 2015 (BBCC 2015c). The three mercury reading exceptions occurred prior to March 2014, which was when Jim Bridger Power Plant was issued the permits to install mercury controls.

Mercury could be entrained in surface water through deposition from the burning of coal at the Jim Bridger Power Plant and other power plants upwind of the region. Once in the surface water system and under the anoxic conditions the mercury could be transformed into a biologically available form and be accumulated in aquatic organisms. However, at this time based on the available analytical data, mercury does not appear to be an issue of concern.
Previous Waters of the United States jurisdictional determinations by the USACE of the drainage system intersected by Pit 10 have indicated that they are not considered jurisdictional (USACE 2013). The southern portion of the lease modification area drainages flow into the Pit 10 disturbance area and do not have the characteristic of a defined stream channel with adequate flow necessary to qualify as a jurisdictional Water of the United States. The northern lease modification area contains a larger drainage that may be considered a jurisdictional Water of the United States. Future delineation and a jurisdictional determination request for this ephemeral drainage is required to support the SMCRA permitting process which would define whether Clean Water Act, Section 404 permitting would be required due to the temporary incorporation of this drainage channel into Pit 15.

Once reclamation is completed on disturbed areas, approval is obtained from the WDEQ and drainage control structures are removed, this runoff volume would be allowed to re-establish its natural flow back into the reconstructed ephemeral stream channel and on to Bitter Creek. Reconstructed stream channels are typically constructed to be similar in profile and location to the pre-mining condition. The channel bottoms may be armored and water velocity slowing features are typically built at reclaimed areas where appropriate to create sustainable channel form that resists incising by storm water flow. Monitoring is performed by BBCM personnel on both drainage channels and uplands to ensure appreciable erosion is not occurring and that the BBCM is meeting its SMCRA permit conditions and eventually would be a candidate for reclamation bond release.

3.5.3 Water Rights

Based on a water rights search performed through the WSEO e-permit online database, all water rights within at least one and one-half mile of the lease modification area are registered to BBCC (WSEO 2015). The exceptions to this are for several coal bed CH_4 wells located in sections 23, 26, and 25, T19N, R100W that are greater than 2,000 feet deep. Most of these coal bed CH_4 well water rights have been cancelled. The other exception is for a 500-foot deep water supply well owned by the Wyoming Department of Transportation (WYDOT) located in Section 2 SW1/4 SW1/4, T19N, R100W. The well is over one mile northwest of the Pit 15 boundary and is separated from Pit 15 by geologic faulting and is located one quarter mile north of Pit 11. The

well appears to be completed in the Lance or Fox Hills Sandstone formations. The static water level is listed at 60 feet bgs on the WSEO website. Water rights owned by BBCC listed on the website in or adjacent to the lease modification area include monitoring wells, pit dewatering wells, Pit 10, and surface water retention ponds.

3.6 Lands/Access

The impact assessment area for direct, indirect, and cumulative impact analyses for lands/access is the lease modification area. The issues identified for impact analysis in **Section 4.0** for lands/access are loss of use of infrastructure or leases due to mining activities.

All of the lands within the lease modification area are administered by the BLM. The surface ownership pattern adjacent to the lease modification area is checkerboard, i.e., even-numbered sections are federally administered by the BLM, and odd-numbered sections are privately owned.

Major land uses at the BBCM have been wildlife habitat and livestock grazing, these land uses are addressed in **Section 3.3** and **Section 3.7**, and therefore are not discussed further here. Additional activities include prospecting for gas, oil, coal, uranium, and other minerals. A federal oil and gas lease exists on the proposed Pit 15 area of the lease modification in Section 12; however, the leaseholder has not yet initiated oil and gas operations within the lease modification area. No active locatable mineral mines or construction aggregate quarries are known in the lease modification area. Coal mining is a dominant land use in the area surrounding the lease modification area. BBCM is the only operating mine located adjacent to the lease modification area.

The lease modification area has not undergone any farming techniques. This lack of farming activity is corroborated by the Southwestern Wyoming Environmental Statement in which the BLM and Soil Conservation Service (now the USDA Natural Resources Conservation Service or NRCS) determined that no prime farmlands exist on the lease modification area (BLM 1978).

No officially designated vehicle transportation corridors are present within the lease modification area with the exception of those supporting the BBCM. Two oil and gas pipelines are present in the northern portion of the lease modification area (Section 12). The pipelines are north of the proposed surface disturbance limit. A telecommunication line adjoins the northern boundary of the lease modification area outside of the proposed surface disturbance boundary. No other infrastructure is present in the lease modification area other than that owned and operated by BBCC.

Sweetwater County has no applicable countywide land use plans, and the lease modification 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.

3.7 Livestock Grazing

The impact assessment area for direct and indirect impact analyses for livestock grazing is the lease modification area. The impact assessment area for cumulative impact analysis for livestock grazing is the portion of the Rock Springs Allotment south of Interstate 80 and east of Flaming

Gorge National Recreation area within the BLM RSFO area, approximately 1,030,219 acres. The issues identified for impact analysis in **Section 4.0** for livestock grazing are loss of animal-unit months (AUMs), spread of noxious weeds, livestock and vehicle collisions, and forage modification.

The Taylor Grazing Act of 1934, FLPMA, Public Rangelands Improvement Act of 1978, CFR, Subchapter D – Range Management (4000), 43 CFR 4000, and the GRRMP and ROD (BLM 1997a) contain the federal regulatory framework for grazing on lands administered by the BLM. BLM-administered rangelands are managed following the Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management (BLM 1997b), which specifies the minimum acceptable health, productivity, and sustainability conditions. Reclamation, including re-vegetation of the BBCM would be required as part of the WDEQ Permit Amendment for the lease modification area.

Livestock grazing is a major land use in the region and in the lease modification area. The lease modification area falls within the Rock Springs Grazing Allotment (#13018). The Rock Springs Grazing Allotment consists primarily of lands within the checkerboard land grant, with approximately half being privately owned or leased by the Rock Springs Grazing Association (RSGA). **Table 3.10** displays the land ownership within the Rock Springs Grazing Allotment.

Table 3.10. Rock Springs Grazing Allotment Land Ownership

Allotment Name - Allotment Number	Public Acres	Other Federal Acres	State Acres	Private Acres	Total Acres
Rock Springs Grazing Allotment - 13018	956,682	98,795	20,782	984,803	2,061,062

Source: BLM 2010a.

No specific grazing breakdown is available solely on the lands encompassed by the lease modification area (BBCC 2014b). There are 45 AUMs within the lease modification area. Winter and spring use accounts for the majority of the AUMs, which are predominantly used for sheep grazing by the RSGA. The remaining AUMs are used exclusively by cattle during the winter and spring months (BBCC 2014b). No water features, cattleguards, corrals, or other livestock or range infrastructure are located in the lease modification area.

3.8 Native American Religious Concerns

The impact assessment area for direct, indirect, and cumulative impact analyses for Native American Religious Concerns is the lease modification area and an associated quarter-mile buffer. The issues identified for impact analysis in **Section 4.0** for Native American Religious Concerns are potential impacts to three sites that occur within a quarter-mile of the lease modification area. Human burials, rock alignments, and rock art are examples of sites that are sensitive or sacred to Native Americans and that would be identified for protection, if present.

On February 8, 2012, letters were mailed to the following Native American tribes: Northern Arapaho, Eastern Shoshone, Shoshone Bannock, Ute Tribe of the Uintah, and Ouray Reservation. Two of these tribes, the Northern Arapaho and the Eastern Shoshone, requested a field visit. On April 16, 2012, the Northern Arapaho and Eastern Shoshone tribes visited four sites, three of which are within a quarter-mile of the lease modification area. Both of these tribes did not have an issue with the proposed leasing and pit projects, as long as the sites are not directly disturbed (Stadler 2015).

3.9 Social and Economic Resources

The impact assessment area for direct, indirect, and cumulative impact analyses for social and economic resources is Sweetwater County, Wyoming. The issues identified for impact analysis in **Section 4.0** for social and economic resources are potential impacts to the population, housing, community services, local economy (primarily employment and earnings in the mining industry and other sectors of the economy), and local, state, and federal tax revenues in Sweetwater County due to the Proposed Action and BBCM operation.

3.9.1 Population

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). Rock Springs and Green River are the two largest cities in the county and are located approximately 10 miles apart. The BBCM complex is located approximately 25 miles east of Rock Springs and approximately 35 miles east of Green River.

The population of Sweetwater County, Rock Springs, and Green River were up in 2010 from 2000. Rock Springs is the closest major city to the lease modification area and is the largest incorporated city in Sweetwater County. The second largest Sweetwater County population center is Green River (**Table 3.11**). According to the most recent population data available from the United States Census, the population in Sweetwater County has increased slightly between 2010 and 2013 (United States Census 2013). The most recent population forecasts available from the Wyoming Division of Economic Analysis (WDEA) projects that the population levels in Sweetwater County will increase by 12 percent by 2020, to 49,280 (WDEA 2011) (**Table 3.11**).

The majority of the workers employed by BBCC for the BBCM live in Rock Springs and Green River. The existing workforce at the BBCM, 185 people, would be used for the Proposed Action.

Table 3.11. Historic and Projected Population in Sweetwater County

Population				Projected Population	
Location	**1990[1]**	**2000[1]**	**2010[2]**	**2020[3]**	**2030[3]**
Sweetwater County	38,823	37,613	43,806	49,280	51,960
Rock Springs	19,050	18,657	23,036	25,915	27,324
Green River	12,711	11,808	12,515	14,079	14,845

Source: [1]BLM 2006, [2]U.S. Census 2010, and [3]WDEA 2011.

The median age of the population in Sweetwater County was 33.2 in 2013 (Economic Profile System-Human Dimensions Toolkit (EPS-HDT) (EPS-HDT 2015). The age profile of Sweetwater County shows that in 2010, more than half the population (31,937) was 18 years old and over. The second largest age group is made up of those 50 to 64 years old, followed by those 35 to 49 years old (United States Census 2010).

The majority of the population (88.4 percent) of Sweetwater County in 2010 was made up of white persons. In 2010, very small percentages of the population were made up of African American (one percent), Asian (0.8 percent), American Indian and Alaska Native (one percent), Native Hawaiian and Pacific Islander (0.1 percent) (United States Census 2010) (**Table 3.12**).

Of the 2010 Sweetwater County population (43,806), 6,689 were Hispanic or Latino (United States Census 2010).

Table 3.12. 2010 Population of Sweetwater County by Race

Ethnicity	2010 Population	Percent (%) of Population
White	38,748	88.4
African American	438	1.0
Asian	336	0.8
American Indian and Alaska Native	423	1.0
Native Hawaiian and Pacific Islander	42	0.1
Other	2,799	6.4
Persons reporting two or more races	1,020	2.3

Source: United States Census 2010.

3.9.2 Housing

In 2013, the total housing units in Sweetwater County were 18,785 of which 16,682 (88.8 percent) were occupied and 2,103 were vacant (EPS-HDT 2015). The median value of a home (structure) in Sweetwater County from 2008 to 2012 was $174,600 (the age of a structure influences its value). In 2008 to 2012, Sweetwater County households with a mortgage accounted for 59 percent of all households or 6,962 housing units. The remaining 41 percent or 4,830 units had no mortgage. The median rent in Sweetwater County from 2008 to 2012 was $755 dollars as compared to $618 dollars statewide (WCDA 2014). Most individuals working in the mining industry where they have year-round employment tend to buy homes.

3.9.3 Community Services

Education - Sweetwater County has two school districts. Western Wyoming Community College is located in Rock Springs and has a satellite campus in Green River. In-town facilities for young children include the Child Development Center in Rock Springs and Head Start. Head Start, serves the development needs of preschool children, and their low-income families (BLM 2006).

Law Enforcement - Green River, which is the county seat, is home to the District and Circuit courts. There are two police departments, Rock Springs and Green River. The Sweetwater County Sheriff's Office, located in Green River provides public safety services to the remainder

of the unincorporated county. The Wyoming State Highway Patrol has an office in Rock Springs and serves the western two-thirds of Sweetwater County (BLM 2006).

Fire Protection - Rock Springs and Green River have municipal fire departments. In addition, there is the Sweetwater County Fire Department which is located in Rock Springs (BLM 2006).

Ambulance and Health Care - Ambulance services are provided by Castle Rock Medical Center (Green River) and Vase Emergency Medical Services (Rock Springs). Air-Med, provides service to out-of-area hospitals (such as Salt Lake City) for specialized care. Memorial Hospital of Sweetwater County which is located in Rock Springs, is the primary hospital in the county. There are also other medical centers and clinics located in Rock Springs and Green River (BLM 2006).

Public Assistance, Libraries, Recreation, and Parks – There are numerous social services and welfare organizations located in Green River and Rock Springs. There are three libraries and five rural branch libraries in the county operating under the Sweetwater County Library System. Recreation opportunities include two indoor recreation centers in Rock Springs and one in Green River, a golf course in each of these cities, a white water park in Green River, and 18 community parks between the two communities. 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 (BLM 2006).

3.9.4 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). The portions of the retail and service sectors that serve visitors (travel, tourism, and recreation) are considered basic. In general, trona and coal mining and related mining support services account for a large portion of the region's existing economy (BLM 2006).

In 2013, the agriculture, forestry, fishing and hunting, and mining industry was the largest employment sector, 4,392 (19.2 percent) of the workforce in Sweetwater County. The second largest was education, health care, and social assistance (4,000 or 17.5 percent). Retail Trade employed 2,493 (10.9 percent), followed by arts, entertainment, recreation, accommodation, and food at 2,072 (9.1 percent), and transportation, warehousing, and utilities at 2,049 (9.0 percent) (EPS-HDT 2015). According to the Wyoming Labor Market Information (WLMI), the total employment (number of jobs) in Sweetwater County in November 2014 was 24,599. Unemployment in November 2014 for Sweetwater County was 891 (3.5 percent) (WLMI 2014).

The median household income in 2013 for Sweetwater County was $71,525. In the 2009 to 2013 period, the income category in Sweetwater County with the most households was $100,000 to $149,999 (21.2 percent of households). The income category with the fewest households was $10,000 to $14,999 (2.7 percent of households) (EPS-HDT 2015). Of the 16,682 households in

2013 for Sweetwater County, 86.7 percent (14,484) receive earnings from labor with mean earnings of $79,905 (EPS-HDT 2015).

In 2012, Wyoming's 19 coal mines employed a total of 6,902 workers, a 47 percent increase over the past 10 years. The industry also employs an additional 2,500 contractors directly. Coal industry jobs are among the best paying in Wyoming. Wyoming coal miners take home an average of $81,174 before benefits which is almost twice the statewide average of $44,579 per worker. The estimates indicate that each coal industry position drives the need for three additional jobs in Wyoming (WMA 2014).

3.9.5 Local, State, and Federal Revenues

Coal remains a significant source of energy in the 21st century, generating nearly 42 percent of the nation's electricity. Wyoming is home to nine of the top 10 producing mines in the nation and Wyoming's mines are still the low-cost leaders of the industry. Electrical power generation is by far the largest consumer of coal in the United States, using about 91 percent of all of the coal mined. Wyoming coal provides 20 percent of the United States domestic electric power generation. Coal is an important source of income for Wyoming and is the second largest source of tax revenue for local and state governments. Coal mining companies pay royalty payments and taxes to all branches of government, local, state, and federal. In 2012, coal's estimated contribution to Wyoming was over $1 billion (WMA 2014).

Approximately 9.2 million tons of in-place mineable coal would be mined over the next five to 10 years if the lease modification is approved. The average price for Wyoming coal in 2012 was $14.15 per ton, up 6.5 percent from 2011 (WMA 2014). BBCM's coal British thermal unit (Btu) per short ton (2,000 pounds or one ton) and quality is in between the Powder River Basin and the Uinta Basin. The value of this coal under current market conditions (Powder River Basin spot coal price is $11.55 dollars per short ton and Uinta Basin spot coal price is $38.13 dollars per short ton as of January 9, 2015) would be between $106,260,000 to $350,796,000. The exact price of the coal is determined by contracts negotiated between the mine and the power generator(s) and is not publicly available. The percentage of revenue from the sale of coal going to pay local, state and federal royalties, severance taxes, and ad valorem would be approximately 28 percent (WMA 2014).

3.10 Soils

The impact assessment area for direct, indirect, and cumulative impact analyses for soils is the lease modification area. The issues identified for impact analysis in **Section 4.0** for soils are modification of soil structure and type due to mining related surface disturbance.

The BBCM area has a semi-arid climate and is within a frigid soil temperature regime (mean annual air temperature of about 38 degrees Fahrenheit), and a typic-aridic soil moisture regime (mean annual precipitation of about five to 10 inches). The average frost-free season is about 60 days.

An Order 2 soil survey was conducted for Pit 10 in 1982 and 1983 (BBCC 2008b). An additional 250 acres lying in advance of the active Pit 10 were mapped to an Order 2 intensity in 2002 in preparation for the pit expansion (Nyenhuis 2002). Best available soils data for the Pit

15 area are from the *Soils of Wyoming*, which is a digital statewide soils map at a 1:500,000 scale (Munn and Arneson 1998). **Table 3.13** lists the soil map units found on the lease modification area. Approximately 68 acres of these soils are currently disturbed from existing mining practices. Other disturbances have occurred in the lease modification area due to oil and gas activities.

Table 3.13. Lease Modification Area Soil Map Units and Acreages

Soil Map Unit	Acreage	Percent (%) of Lease Modification Area
Pit 10 Area[1]		
Winton Channery Loam, 0-45 percent slopes	7.1	2
Winton Horsley Rock Outcrop Association, Very Steep	24.1	5
Huguston Horsley Haterton Complex, 6-30 percent slopes	13.2	3
Monte Loam, 0-6 percent slopes	4.5	1
Pit 15 Area[2]		
Rock Outcrop & Typic Torriorthents	237.8	53
Ustic Haplocambids & Ustic Torrirorthents	161.9	36

Source: [1]Nyenhuis 2002 and [2]Munn and Arneson 1998.

3.11 Vegetation (Including Forestry and Rangeland) and Invasive Species/Noxious Weeds

The impact assessment area for direct, indirect, and cumulative impact analyses for vegetation (including forestry and rangeland) and invasive species/noxious weeds is the lease modification area. The issues identified for impact analysis in **Section 4.0** for vegetation and invasive/noxious weeds are loss of native vegetation communities and the spread of invasive plant species and noxious weeds due to mining related surface disturbance.

No ESA-listed plant species or habitat for these plant species occur in or near the lease modification area. Potential habitat does not exist for any of the BLM sensitive plant species. A pre-mining vegetation survey will be performed to verify the absence of ESA-listed and BLM sensitive plant species. Therefore, ESA-listed and BLM sensitive plant species are not considered further.

3.11.1 Vegetation Range Sites

A range site and condition class inventory of the BBCM was conducted by the SCS in 1975. Range site complexes were mapped rather than range sites alone due to the size of the area to be

mapped and the heterogeneous nature of the range sites in relation to one another. Identification and mapping of SCS range site complexes was accomplished using on-site inspection of soil and vegetation combinations to construct a 1"- 2000' scale range site complex map for BBCM. Range site complexes were identified in relation to SCS soil mapping units.

Three range site complexes comprise the lease modification area. The majority (65 percent) of the lease modification area is mapped as the Shallow Sandy 50 percent-Shale 50 percent complex, which encompassed 289 acres. Twenty-eight percent (128 acres) is mapped as Saline Upland, and the remaining seven percent (31 acres) is mapped as Sandy 64 percent-Shallow Sandy 36 percent complex. **Table 3.14** describes the range sites that comprise these complexes.

Since this range site map was completed, disturbed areas have been created within the lease modification area from current mining practices and existing ROWs for pipelines and oil and gas activities. These areas that have been impacted by human activities are generally devoid of vegetation and topsoil.

Table 3.14. Vegetation Range Sites

Vegetation Range Site	Description
Shale	Generally located in scattered locations on steep outcrop faces or small knolls on the dip slope. Soils are characterized by very shallow clays lying over shale. Plant growth is sparse. The few plant species that occupy the range site generally exhibit a low growth form. Major plants growing include: Gardner saltbush (*Atriplex gardneri*), bud sagebrush (*Artemisia spinescens*), big sagebrush (*Artemisia tridentata*), squirreltail (*Sitanian hystrix*), and molly (*Kochia americana*).
Saline Upland	Located in the low-lying areas and drainages. Soils are generally heavy saline clays. Two distinct vegetation cover types occur. Greasewood (*Sarcobatus vermiculatus*) is a major component of the vegetation near flow lines, generally 10 to 30 meters on either side of the flow line. Greasewood becomes sparser as one move away from the flow line until Gardner saltbrush becomes the major plant species. Major plants growing include: Gardner saltbrush, greasewood, Sandberg bluegrass (*Poa sandbergii*), big sagebrush, squirreltail, and Indian ricegrass (*Achnatherum hymenoides*).
Shallow Sandy	Generally located on the gently sloping dip slopes. Extends from sparsely vegetated areas near the top of rock outcrops to fairly heavy sagebrush areas where it merges with the sandy range site. Sagebrush in most shallow sandy areas is generally less than 50 centimeters in height. Soils are coarse, sandy loams usually found on southwest facing slopes. Major plant species occurring include: big sagebrush, thickspike wheatgrass (*Agropyron dasystachyum*), shadscale (*Atriplex confertifolla*), Indian ricegrass, Hood's phlox (*Phlox hoodii*), and green rabbitbrush (*Chrysothamnus viscidiflorus*).
Sandy	Generally small in size and located on the lee side of draws or knolls, giving this range site a patchy distribution. Soils of the sandy range site are characterized by deep, coarse textured, loamy sands. Sagebrush is often over 50 centimeters in height. Major plant species include: big sagebrush, thickspike wheatgrass, squirreltail, and spiny hopsage (*Grayia spinosa*).

Source: BBCC 2014b.

3.11.2 Invasive Species/Noxious Weeds

Invasive plant species, noxious weeds, and non-native plants are species that are highly competitive, highly aggressive, and spread easily. In the broadest sense, a weed is any plant growing where it is not wanted. Weeds can be native or non-native, invasive or non-invasive, and noxious or non-noxious. Although many noxious weeds are invasive, invasive plant species are not necessarily the same as noxious weeds. Invasive plant species include not only noxious weeds, but other plants that are not native to the United States or the area where they are growing. The BLM considers plants invasive if they have been introduced into an environment where they did not evolve. Some invasive plant species can produce significant changes to vegetation, composition, structure, or ecosystem function. Legally, a noxious weed is: "any plant designated by a federal, state or county government as injurious to public health, agriculture, recreation, wildlife or property." It is also commonly defined as "a plant that grows out of place and is competitive, persistent, and pernicious" (BLM 2010b).

The Federal Noxious Weed Management Act (as amended by Section 15, Management of Undesirable Plants on Federal Lands, 1990) authorizes cooperation among federal and state agencies in the control of weeds.

The BLM policy relating to the management and coordination of noxious weeds and invasive plant species activities is set forth in the BLM Manual 9015 – Integrated Weed Management (BLM 1992). The primary focus of the BLM is providing adequate capability to detect and treat smaller weed infestations in high-risk areas before they have a chance to spread. Noxious weed control is based on a program of prevention, early detection, and rapid response.

According to the BLM RSFO Botanist, some scattered weeds including black henbane (*Hyoscyamus niger*), halogeton, thistles, cheatgrass (*Bromus tectorum*), and foxtail barley (*Hordeum jubatum*) are known to occur in the area (Glennon 2014).

3.12 Paleontological Resources

The impact assessment area for direct, indirect, and cumulative impact analyses for paleontological resources is the lease modification area. The issues identified for impact analysis in **Section 4.0** for paleontological resources are loss of paleontological resources due to mining related surface disturbance.

The BLM has implemented a Potential Fossil Yield Classification (PFYC) system for classifying paleontological resources on public lands. Under the PFYC system, geologic units are classified from Class 1 to Class 5 based on the relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to adverse impacts. A higher classification number indicates a higher fossil yield potential and greater sensitivity to adverse impacts.

A reconnaissance paleontological survey was conducted for the lease modification area at the request of the BLM RSFO, in accordance with BLM policies and guidelines established as a result of the FLMPA, the Paleontological Resources Preservation of the Omnibus Public Lands Act of 2009, and the IM 2009-011 issued by the BLM.

`A literature search, records search, and a reconnaissance paleontological field survey were conducted by Stratigraphic rex LLC for the proposed lease modification area. The literature search was conducted using the GeoRef database to determine if any previously recorded fossil localities exist in the study area as well as the fossil richness of the formations and rock units involved. Paleontological records that were easily accessible, such as GIS-based locality data, aerial photos, soils maps, and other known paleontological locality information were consulted. The reconnaissance paleontological field survey, a pedestrian survey, was conducted in November and December 2014. Paleontological surveys have been conducted from 1977 through 1982 for the existing BBCM. Historical fossil localities are known in the region. Based on published geological maps, the lease modification area includes sediments associated with the Fort Union Formation (Love and Christianson 1985) and previously disturbed deposits. The Fort Union Formation has a PFYC Class of 3. PFYC Class 3 is described as:

- Moderate or unknown;
- Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.
    - Often marine in origin with sporadic known occurrences of vertebrate fossils.
    - Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.

    or

    - Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

Fossil remains were found during the field survey; however, these remains were poor quality and had little to no significant scientific value. No significant fossil remains were discovered. The lack of fossil remains could be a normal feature for this formation. The PFYC Class 3 rating makes it a rock unit that is known for fossil remains, but those remains can be inconsistent from one location to the next (Stratigraphic rex LLC 2014).

4.0 ENVIRONMENTAL EFFECTS

Consistent with 40 CFR 1502.16, this section includes a discussion of the potential environmental consequences of implementing the Proposed Action and the No Action Alternative on each of the affected resources. An environmental impact is defined as the 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 Council on Environmental Quality (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.

Direct and Indirect 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.

Cumulative Impacts

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions (RFFAs), 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. 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 lease modification area.

Direct, Indirect, and Cumulative Impact Assessment Areas

For each element or resource, an impact assessment area has been identified to analyze potential, project-related impacts on the element or resource. The impact assessment area is defined as the outermost boundary of an area that encompasses potential direct, indirect, and cumulative impacts that may affect the element or resources identified for analysis. Management issues identified by the BLM RSFO, public scoping, and ID team analysis of the area have guided the material presented herein.

The impact assessment areas for direct, indirect, and cumulative impact analyses vary by resource and are described in **Section 3.0** and below under each resource analyzed. For some of the resources, since the lease modification area is mostly undeveloped with little existing or planned developments, cumulative impacts would be essentially the same as the direct and indirect impacts discussed for each resource. The exception to this are for air quality/global climate change/greenhouse gases, cultural/historical resources, fish and wildlife, hydrologic

conditions, livestock grazing, Native American Religious Concerns, and social and economic resources.

Analysis Assumptions and Guidelines

The relationship between the short-term use of the environment versus the 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 9.2 million tons of in-place mineable coal from the lease modification area would be a short-term use of the environment that would benefit the short-term productivity of the BBCM. WDEQ permitting and Secretary of the Interior approval of the mining plan modification would be required prior to the beginning of mining. The mining plan and reclamation plan are 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 re-vegetation would promote the following long-term resource effects:

- Soil productivity re-establishment;
- Native vegetation re-establishment;
- Wildlife re-habitation;
- Livestock grazing use;
- Groundwater resource recovery; and
- Surface water and watershed function stabilization.

The 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 subsections within this section.

Unless otherwise specified, "short-term" is the period starting with the development of the lease modification area, mining of coal, and ending with surface reclamation and vegetation seeding, and is anticipated to last approximately five to 15 years from the initiation of mining. "Long-term" is defined as those effects that would occur or remain after surface reclamation has been performed and includes the monitoring and bond release period and beyond. Long-term effects could potentially last, as in the case of groundwater table recovery 60 to 240 years, however most resource impacts are anticipated to be much shorter in duration.

Effects are quantified where possible, primarily by geographic information system 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 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.

All mining and reclamation operations would comply with SMCRA, Wyoming statutes, and the 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. This impact assessment assumes that the resource protection measures described in **Section 2.2.3** would be successfully implemented.

4.1 Air Quality/Global Climate Change/Greenhouse Gases

4.1.1 Air Pollutant Concentrations

The impact assessment area for direct, indirect, and cumulative impact analyses for air quality includes the lease modification area and an associated 10-mile buffer. The issues identified for impact analysis for air quality are pollutant emissions from the mining of coal in the lease modification area relative to the WAAQS, NAAQS, and their impact to sensitive airsheds in the near vicinity.

4.1.1.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to air quality other than those already authorized would occur. If the Proposed Action is not implemented, the life of the BBCM would be two to three years shorter and a corresponding shortening of the future emission time frame would occur. During the interim, air quality impacts would not be expected to change from current conditions, as reflected in **Table 3.6**.

Alternative II – Proposed Action

Air emissions and air pollutant impacts are limited by state and federal regulations, standards, and implementation of plans established under the CAA as administered within the State of Wyoming by the WDEQ. BBCC has implemented a fugitive dust plan to address periodic exceedances of particulate emissions. If exceedances continue to occur, the WDEQ would require that more stringent control measures be implemented at the BBCM to prevent future occurrences. These measures could also include those punitive in nature.

If the Proposed Action is approved, mining would continue at the BBCM for two to three years longer and result in a continuation of emissions from mining activities that are similar to what is occurring currently. This is anticipated due to the sequencing of mining from old pits to new pits to supply the relatively constant coal contract terms with the Jim Bridger Power Plant. Improvements in blasting agent formulations are expected to decrease the amount of NO_2 being emitted at the BBCM. Fugitive dust control measures would decrease or eliminate the incidence of NAAQS/WAAQS exceedances for PM. With the exception of potential future technical improvements in emission control techniques, emissions of pollutants subject to the NAAQS are

expected to be similar to those outlined in **Table 3.6** for direct impacts from operations at the BBCM during the mining of the lease modification area. Following mining of coal and reclamation in the lease modification area, emissions of air pollutants from this area would cease. The impacts to air quality from the Proposed Action would be adverse, and vary between minor and moderate in intensity depending on climatic conditions (wind events) at the lease modification area. However, the duration of the impacts would be short term.

Indirect impacts to air quality from the Proposed Action include air pollution generated from the combustion of coal from the BBCM and locomotive transport of the coal to the Jim Bridger Power Plant. Off-site electrical generation supporting BBCM comes from the combustion of coal mined at the BBCM and is considered a small portion of the indirect coal combustion emissions.

Locomotive emissions from hauling the mined and processed coal are currently occurring in the impact assessment area and would continue at similar levels under the Proposed Action. New emission standards for new and reconstructed locomotives may decrease current locomotive emissions as the locomotive engines reach their expected lifespan of 10 years. In March 2008, the EPA finalized a three part program that will dramatically reduce emissions from diesel locomotives of all types. The rule will cut PM emissions from these engines by as much as 90 percent and NOx emissions by as much as 80 percent when fully implemented. Therefore, it is reasonable to conclude that rail emissions from the transport of coal to the Jim Bridger Power Plant would decrease in the future.

Combustion of the mined and processed coal would produce the majority of the pollutants emitted indirectly from implementation of the Proposed Action Alternative. BBCC's coal sales electrical generation contracts are with the Jim Bridger Power Plant and are expected to remain so during the mining of the lease modification area (personal communication, Jordan Sweeney, BBCC, 2015). The amount of BBCC coal combusted at the Jim Bridger Power Plant is expected to remain similar to the current levels during the mining of the lease modification area. **Table 3.8** presents the portion of emissions from the combustion of coal estimated to be attributable to the BBCM operations. These emissions are expected to be similar during the period of time the lease modification is proposed to be mined. However, future emissions of NOx are anticipated to decrease by 67 percent with the implementation of the new EPA mandated pollution control measures at the Jim Bridger Power Plant. Similarly, the mercury emission controls measures installed under the plant's CAA permit including activated carbon injection, calcium halide coal conditioning, and soluble mercury re-emission control systems operating at the plant since April 16, 2015 would provide substantial reductions in mercury emissions from the burning of Pit 15 coal relative to mercury emissions considered in the Pit 14 EIS.

Direct and indirect impacts from the implementation of the Proposed Action Alternative will be similar to current conditions respective to public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. The extremely rural setting of the impact assessment area makes these impacts negligible. Visibility impacts are expected to improve with the implementation of locomotive and Jim Bridger Power Plant emission control measures required as upgrades and replacement of locomotives occur (EPA 2009). Negligible impacts to animals, crops, vegetation, and buildings are anticipated.

4.1.1.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area and an associated 10-mile buffer) for air quality that have and are expected to contribute sources of emissions are: BBCC operations, Bridger Coal Mine, the pending Bridger Coal Mine lease modification, Jim Bridger Power Plant, highway traffic, and scattered oil and gas developments. No significant new sources of emissions are currently being considered in the cumulative impact assessment area.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Cumulative impacts are expected to be similar to those described in the TMRT EA, Bridger Coal EAs, and the Pit 14 FEIS, resulting in the extension of current air quality impacts for up to approximately two to three years. The contribution to air quality impacts from mining of the lease modification area would be a minor component in comparison to the combined emissions from the other sources in the area. For instance, assuming 2013 particulate emissions (depicted in **Tables 3.6**, **3.7**, and **3.8)** remain relatively unchanged as is anticipated, the BBCM particulate emissions during mining of the lease modification area would amount to approximately 10 percent of the combined Bridger Coal Mine and Jim Bridger Power Plant emissions.

Cumulative impacts from implementation of the Proposed Action Alternative will be similar to current conditions respective to public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. The extremely rural setting of the cumulative impact assessment area in the prevailing wind direction makes these impacts negligible. Visibility impacts are expected to improve with the implementation of locomotive and Jim Bridger Power Plant emission control measures. However, PM or fugitive dust is expected to continue to be a minor impact during high wind events. Negligible cumulative impacts to animals, crops, vegetation, and buildings are anticipated.

4.1.2 Global Climate Change/Greenhouse Gases

The impact assessment area for direct and indirect impact analyses for climate change and GHGs is the State of Wyoming. The impact assessment area for cumulative impact analysis for climate change and GHGs is global. The issues identified for impact analysis for climate change and GHGs are BBCM's contribution from the mining of coal in the lease modification area and the combustion of that coal relative to Wyoming, National, and global GHG emissions and qualitative impacts resulting from those emissions. Coal from the lease modification area could supply Jim Bridger Power Plant two to three years of coal at BBCM's current production levels. Assuming the lease modification area coal would be the sole source of coal from BBCM to the Jim Bridger Power Plant for two to three years, a conservative estimation of the annual direct and indirect GHGs emissions attributable to the lease modification area coal can be

made. This direct and indirect GHG emission estimate is based on current annual GHG emission levels and assume they will occur over a two to three year period, as discussed in the following sections. Actual annual GHG emissions would be less than estimated, due to the lease modification area coal being mined at varying production levels over a five to 10 year period.

4.1.2.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional emissions of GHGs would occur other than those previously authorized under the existing mine permit at the BBCM. Impacts to climate change would be similar in scale annually, but shorter in duration under the No Action Alternative.

Alternative II – Proposed Action

Activities in Wyoming accounted for approximately 60.3 mmt of gross CO_2e emissions in 2010 and are projected to emit 69.4 mmt annually by 2020 (CCS 2007). To determine the amount of CH_4 potentially liberated from the mined coal in the lease modification, an IPCC-derived conversion factor (0.08) for interior west coal emissions of CH_4 in cubic meters per ton of coal mined was used to determine the CH_4 CO_2e (Irving Unknown Date). The amount of CO_2e emitted from the mined coal would be approximately 10,510 mt. Based on the calculated 2014 BBCM CO_2e emissions of 66,817 mt and mined coal CH_4 liberation of 10,510 mt CO_2e, direct BBCM-related emissions amount to 0.1 percent of the 2010 statewide emissions. This includes emissions from the off-site generation of electricity used for the mine operation.

Indirect contributions to GHGs from the mining of the lease modification area include the combustion of BBCM coal at the Jim Bridger Power Plant and locomotive coal transport emissions. The estimated annual GHG emissions from the combustion of BBCM coal at the Jim Bridger Power Plant are approximately six mmt of CO_2e (41 percent) (**Table 3.8**) and those associated with the transport of coal to the Jim Bridger Power Plant are 2,007 mt of CO_2e. The percentage of CO_2e emissions attributable to direct and indirect emissions from the BBCM are 10 percent of the 2010 statewide emissions.

The tools necessary to quantify climatic impacts from projects such as lease modifications are presently unavailable. However, the direct and indirect climate impacts from the project are likely minor to undetectable, based on the estimated low overall CO_2e contributions resulting from implementation of the Proposed Action relative to national and global CO_2e emissions. It may be difficult to discern whether global climate change is already affecting resources in the impact assessment area. It is important to note that projected changes are likely to occur over several decades to a century. Therefore, many of the projected changes associated with climate change may not be discernible within the reasonably foreseeable future. However, the following climate change predictions were identified by the EPA for Wyoming regarding GHG emissions (EPA 2015):

- Projected increases in temperature and more frequent droughts will further stress the region's aquifers.

- Changes in water availability are likely to present challenges to agriculture and key wetland habitats.
- Rural populations more susceptible to droughts and temperature changes will be more directly affected.

Since GHGs and associated climate change are inherently global in scope, further discussion of impacts are presented in **Section 4.1.2.2** and **Section 3.1.2**.

4.1.2.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (global) for climate change and GHGs include industrial production, transportation, agriculture, energy generation, and other activities and processes that generate CO_2e. These activities and processes are expected to increase as the human population increases and countries increase their industrial base.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those resulting from other global GHG inputs. Impacts to climate change and GHGs would be similar in annual scale, but two to three years shorter in duration under the No Action Alternative relative to the Proposed Action Alternative.

Alternative II – Proposed Action

Annual global emissions of GHGs for the year 2004 were reported to be 50 gigatonnes per year (Gt/yr) CO_2e (IPCC 2014b). BBCM's 2014 direct and indirect emissions of six mmt CO_2e would represent 0.012 percent of the total global emissions for 2004. BBCM's direct and indirect emissions of GHGs associated with the lease modification area coal are expected to be similar to emissions calculated for 2014, but will occur over a two to three year period. Based on global growth projections, GHG emissions have and will continue to rise (IPCC 2014b) which means BBCM's overall contribution to annual GHG emissions will decrease as global emissions increase.

At this time, there is no national policy or law in place that regulates GHG emissions. Therefore, climate change analysis in this EA is limited to accounting for and disclosing of factors that contribute to climate change. To the extent that emission data were available or could be inferred from representative type data, potential GHG emissions that could result from development of the proposed lease modification have been identified.

Regardless of the accuracy of emission estimates, predicting the degree of impact any single emitter of GHGs may have on global climate change, or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. As such, the controversy is to what extent GHG emissions resulting from continued mining may contribute to global climate change, as well as the accompanying changes to natural systems cannot be adequately quantified. The degree to which an observable change can, or would be attributable to the Proposed Action cannot be reasonably predicted at this time.

To provide some additional context, the EPA has recently modeled global climate change impacts from a model source emitting 20 percent more GHGs than a 1500 megawatt coal-fired steam electric generating plant (approximately 14,132,586 mmt per year of CO2e, 273.6 mt per year of N_2O, and 136.8 mt per year of CH_4). The model estimated a hypothetical maximum mean global temperature value increase resulting from such a project. The results ranged from 0.00022 and 0.00035 degrees Celsius occurring approximately 50 years after the facility begins operation. The modeled changes are extremely small, and any downsizing of these results from the global scale would produce greater uncertainty in the predictions. The EPA concluded that even assuming such an increase in temperature could be downscaled to a particular location, it "would be too small to physically measure or detect", see Letter from Robert J. Meyers, Principal Deputy Assistant Administrator, Office of Air and Radiation re: "Endangered Species Act and GHG Emitting Activities, October 3, 2008. The project emissions are a fraction of the EPA's modeled source and are shorter in duration, and therefore it is reasonable to conclude that the project would have no measurable impact on the climate. Additionally, according to the IPCC, the world's surface temperatures have risen at a slower rate over the past 15 years than at any time since 1951.

Assessing the impacts of GHG emissions on global climate change requires modeling on a global scale which is beyond the scope of this analysis. However, global impacts from GHG emissions have been modeled by researchers to determine the effect of climate change on ecosystems and humankind. For instance, computer modeling indicates that increases in temperatures will likely be accentuated at higher latitudes and sea levels are expected to rise (NAS 2008). **Section 3.1.2** presents a more thorough discussion of how climate change is expected to affect the environment.

4.2 Cultural/Historical Resources

The impact assessment area for direct impact analysis for cultural/historical resources is the lease modification area. The impact assessment area for indirect and cumulative impact analyses for cultural/historical resources is the lease modification area and an associated quarter-mile buffer. The exception to this is for the Lincoln Highway that has a three-mile analysis buffer surrounding it. The issue identified for impact analysis for cultural/historical resources is the potential for mining activities to disturb and visually impact cultural resource sites.

4.2.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to cultural/historical resources other than those already authorized at the BBCM would occur.

Alternative II – Proposed Action

BLM policy states that a decision maker's first choice should be avoidance of historic properties (BLM Manual 8140.06(C)). If historic properties cannot be avoided, mitigation measures must be applied to resolve the adverse effect. Based on the results of the Class III inventories conducted for the BBCM permit area and the lease modification area, only one prehistoric and

two historic NRHP eligible sites (Site 48SW6304, 48SW1834, and 48SW18099, respectively) face direct or indirect impacts due to the implementation of the Proposed Action. Site 48SW6198 initially appeared to be within the Pit 10 lease modification area, but during the Class III inventory conducted in 2014 the site was relocated and found to be located outside of the Pit 10 lease modification area. This site is within a quarter of a mile of the lease modification area. Evaluative testing determined Site 48SW6198 to be eligible for inclusion on the NRHP under Criterion D. Site 48SW6198 will not face direct impacts under the Proposed Action. Sites eligible under Criterion D cannot be indirectly impacted; therefore, this site will not face indirect impacts under the Proposed Action.

The prehistoric NRHP eligible Site 48SW6304 faces direct impact from mining activity in the form of total destruction. According to SMCRA, leasing of federal coal is the responsibility of the BLM and all other activities after leasing are the responsibility of the OSMRE. Mitigation measures for the site would include recording site features to preserve knowledge of impacted sites. However, mitigation measures will be developed in consultation with SHPO in relation to direct impacts to Site 48SW6304 and will be completed by OSMRE prior to surface disturbing activities.

The Lincoln Highway (Site 48SW1834) passes east to west within one mile north of the Pit 15 lease modification area. The linear site averages 0.5 mile (0.8 km) north of the lease modification boundary. Site 48SW18099 is located approximately one-third of a mile north of the lease modification area. The potential for indirect impacts to the contributing segments of Site 48SW1834 (the Lincoln Highway) and Site 48SW18099 (Historic Rock Art Site) due to the Proposed Action, were visually assessed by Frankus (2012a and 2012b). The visual assessments concluded that the visual setting has already been significantly compromised due to modern-era development; therefore, no indirect impacts would occur to these NRHP eligible sites under the Proposed Action.

Resource protection measures discussed in **Section 2.2.3**, which will be implemented for the Proposed Action, require that any unanticipated discoveries be reported to the appropriate regulatory authorities and no land disturbing activities take place within 100 feet of such remains until they have been evaluated by the regulatory authorities and salvaged, if warranted.

4.2.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area and associated quarter-mile buffer) for cultural/historical resources are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); BBCM coal mining activities within the lease modification area under an existing BLM right-of-way agreement; and the adjacent BBCM.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

The Proposed Action and past, present, and RFFAs would and have incrementally impacted cultural sites in the cumulative impact assessment area. Cumulative activities will have an adverse impact on the prehistoric NRHP eligible Site 48SW6304. Mitigation measures will record site features and will preserve knowledge of impacted sites. Mitigation may include recordation of site features etc. However, Mitigation measures will be developed in Consultation with SHPO in relation to direct impacts to eligible Site 48SW6304 will be completed by OSMRE prior to surface disturbing activities.

Past and present projects near the prehistoric NRHP eligible sites, Site 48SW1834 (Lincoln Highway) and Site 48SW18099, have impacted their visual setting; however, cumulative impacts from the addition of the Proposed Action and other RFFAs would be negligible, based on the existing visual impacts in the area.

4.3 Fish and Wildlife

4.3.1 Threatened and Endangered Species

4.3.1.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to threatened and endangered species other than those already authorized at the BBCM would occur. Candidate species are also BLM Wyoming sensitive species and are therefore addressed under **Section 4.3.2**.

Alternative II – Proposed Action

Colorado River Endangered Fish Species

The impact assessment area for direct and indirect impact analyses for the USFWS endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) is the lease modification area and the Green and Colorado rivers (Upper Colorado River Basin). The issue identified for impact analysis is the potential effect of water depletions from the Upper Colorado River Basin on the Colorado River endangered fish species as a result of the Proposed Action.

Assuming all surface water runoff was captured (0.1 to 0.2 inches annually (BBCC 2008a)) on the entire 450 acres of the lease modification area, the Proposed Action would result in annual water depletions from the Upper Colorado River Basin of between 3.7 to 7.5 acre-feet per year. This assumes a clean water bypass ditch is utilized to pass runoff around the lease modification area. Any water depletions from the Upper Colorado River Basin greater than 0.1 acre-ft per year may affect and are likely to adversely affect the Colorado River endangered fish species. In 1984, OSMRE submitted a formal consultation for continued operation and a proposed mine plan modification for the Black Butte Mine. An interim biological opinion (BO) was issued in 1984 contingent on the outcome of the Flaming Gorge Dam BO. The interim BO addressed the effects of consumptive water use to the species and critical habitats of the endangered Colorado

pikeminnow and humpback chub. A final BO for the Black Butte coal mine was issued in 1988 for 72 acre-feet per year. In 2003, consultation was re-initiated to cover an increase in consumptive water use from the Colorado River Basin in the amount of 160 acre-feet/year. A fee was also paid at that time to the Colorado River Fish Recovery Implementation Program. Water depletions associated with the Proposed Action are covered under the 2003 section 7 consultation and annual water depletions still remain under the amount of 160 acre-feet/year.

Under the directives of the ESA, a Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin (Recovery Program) was developed. The Recovery Program and its Recovery Action Plan (RIPRAP) identify conservation actions needed to recover these fish while offsetting depletion impacts and allowing for new water development (USFWS 2014b). Under the Recovery Program and RIPRAP for the Colorado River endangered fish species (USFWS 2014b), recovery activities would be implemented for new projects that result in water depletions from the Upper Colorado River Basin, including payment of fees to fund recovery actions. The Recovery Program and RIPRAP are intended to provide a reasonable and prudent alternative for water depletion projects undergoing Section 7 consultation. If the Proposed Action is implemented, the items in the Recovery Program and RIPRAP are sufficient to avoid the likelihood of associated water depletions jeopardizing the Colorado River endangered fish species or adversely modifying their critical habitat (USFWS 2014b).

The four Colorado River endangered fish species may also be impacted by changes in water quality. However, these impacts would be minor because standards for water quality for the Colorado River are required through the mine permitting process and include monitoring and enforcement provisions.

4.3.1.2 Cumulative Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those resulting from previously authorized actions at the BBCM and other past, present, and RFFAs in the area.

Alternative II – Proposed Action

Colorado River Endangered Fish Species

The impact assessment area for cumulative impact analyses is the same as the direct and indirect impact assessment area (lease modification area and Green and Colorado rivers, or the Upper Colorado River Basin). The issue identified for impact analysis is the potential effect of water depletions from the Upper Colorado River Basin on the Colorado River endangered fish species associated with the Proposed Action and past, present, and RFFAs.

In conjunction with the Proposed Action, past, present, and RFFAs that incrementally deplete water from the Upper Colorado River Basin may cumulatively affect and are likely to adversely affect the four Colorado River endangered fish species. Cumulative impacts are addressed through the Recovery Program. The Recovery Program and RIPRAP for these species provides

a reasonable and prudent alternative for the Proposed Action, and other actions in the cumulative impact assessment area, to avoid jeopardizing these species and adversely affecting their critical habitat (USFWS 2014b).

4.3.2 BLM Wyoming Sensitive Species

4.3.2.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to BLM Wyoming sensitive species other than those already authorized at the BBCM would occur.

Alternative II – Proposed Action

Greater Sage-Grouse

The impact assessment area for direct and indirect impact analyses for the Greater Sage-Grouse is the lease modification area. The issue identified for impact analysis is habitat loss due to mining related surface disturbance.

Impacts to Greater Sage-Grouse from mining development are discussed in detail in the 12-Month Findings for Petitions to List the Greater Sage-Grouse as Threatened or Endangered, and are summarized here (USFWS 2010). Direct impacts from mining would primarily be from loss of sagebrush habitat. No nesting, breeding, brood-rearing, or winter sage-grouse habitat exists within the lease modification area, but general sage-grouse habitat exists that may be used for foraging or cover. Surface disturbance associated with the Proposed Action would result in a loss of approximately 257 additional acres of general sage-grouse habitat in the impact assessment area. This impact would be both temporary and long-term. Reclamation of the disturbed habitat would occur through the mine permit and reclamation plan approved by WDEQ and OSMRE and would minimize impacts to general sage-grouse habitat in the long-term. Reestablishment of sagebrush at a level adequate for Greater Sage-Grouse use may require 20 to 30 years. Mining activities may also increase opportunities for invasive and noxious weeds to establish, which would alter habitat suitability for Greater Sage-Grouse. This impact would be minimized via the weed control portion of the BBCM Reclamation Plan. In addition to habitat effects, Greater Sage-Grouse may be directly impacted by vehicle/equipment collisions, but such an event is expected to be rare and have a negligible effect on the population. Greater sage-grouse may also be impacted by noise and ground shock from blasting and changes in topography. These impacts may result in temporary displacement of individual Greater Sage-Grouse from the area, but are not expected to have population-level effects or interfere with breeding since there are no leks within four miles of the lease modification area.

The lease modification area does not occur within a mapped Core Area. The Wyoming Sage-grouse Executive Order 2011-5, states that for activities outside of Core Areas, no more than a one-quarter mile no surface occupancy standard and a two mile seasonal buffer should be applied to occupied leks (State of Wyoming 2011). The closest lek to the lease modification area is 4.5 miles to the northeast, north of Interstate 80. Therefore, neither the no surface occupancy

stipulation nor the seasonal buffer applies to the lease modification area. According to the resource protection measures discussed in **Section 2.2.3**, should any new leks be found during future field surveys, appropriate mitigation steps would be taken. Given the protection and reclamation measures that would be in place, the Proposed Action may affect but is unlikely to adversely affect Greater Sage-Grouse.

Pygmy Rabbit, White-tailed Prairie Dog, and Wyoming Pocket Gopher

The impact assessment area for direct and indirect impact analyses for pygmy rabbit, white-tailed prairie dog, and Wyoming pocket gopher is the lease modification area. The issue identified for impact analysis is habitat loss due to mining related surface disturbance. Implementation of the Proposed Action would result in a temporary and long-term loss of approximately 257 additional acres of habitat for these species as a result of removing vegetation, disturbing soil, and changing topography. One prairie dog colony would be lost as a result of the Proposed Action. Other impacts would include mortality of individuals, temporary or permanent displacement, restriction of movement (caused by fences, pits, or other infrastructure), and disturbance from noise, increased traffic, and human presence. In general, these impacts would temporarily decrease the number and diversity of species using the area. In the long-term, reclamation following completion of mining activities would minimize adverse effects from habitat loss. Given that abundant suitable habitat is available adjacent to the lease modification area and that these species have rapid reproductive rates, the Proposed Action is unlikely to have population-level effects. For these reasons, direct and indirect impacts to pygmy rabbit, white-tailed prairie dog, and Wyoming pocket gopher are expected to be negligible in the long-term.

Burrowing Owl, Ferruginous Hawk, Golden Eagle, Mountain Plover, and Sagebrush Obligates

The impact assessment area for direct and indirect impact analyses for burrowing owl, ferruginous hawk, golden eagle, mountain plover, and sagebrush obligates (i.e., Brewer's sparrow, sage sparrow, sage thrasher, and loggerhead shrike) is the lease modification area and an associated one-mile buffer.

Habitat in the impact assessment area provides foraging and/or breeding habitat for burrowing owls, ferruginous hawks, golden eagles, mountain plovers, and sagebrush obligates (i.e., Brewer's sparrow, sage sparrow, sage thrasher, and loggerhead shrike). There would be a temporary and long-term direct impact to an approximately 257 additional acres of foraging and/or breeding habitat in the impact assessment area due to the Proposed Action. Reclamation following completion of mining activities would minimize adverse effects from habitat loss. Reclamation would occur gradually and vegetation production could become established within approximately three to five years following reclamation. Consequently, some disturbed areas could become available for use by these species in the short term. However, the re-establishment of sagebrush shrubs can take 20 to 30 years; therefore sagebrush obligates would be unable to fully use this area until habitat reclamation is complete. The loss of habitat would displace these species into surrounding habitats near the lease modification area. Due to the abundance of suitable habitat available surrounding the lease modification area and ability of these species to fly to other areas, population-level effects are not expected.

Other impacts on breeding birds could include temporary displacement from the area; interference with breeding activities and nest abandonment as a result of construction or

operations noise, vibration, and other human activity; increased predation of eggs or young as a result of land use changes; and/or decrease in prey populations. Avian species are less likely to incur direct mortality compared to species that cannot fly, but vehicle/equipment collisions are possible.

No golden eagle nests or burrowing owl burrows would be affected by the Proposed Action because none exist within the impact assessment area. There are twenty intact ferruginous hawk nests and one intact red-tailed hawk nest within the impact assessment area. None of these nests would be destroyed by the Proposed Action because none are within the proposed disturbance area. Individuals using these nests may be displaced during blasting and initial ground clearance if the Proposed Action is implemented. These individuals could move to one of the alternative nest sites available in the vicinity. Ferruginous hawks and other raptors at BBCM have a history of successfully nesting adjacent to active mine pits, including on artificial nest platforms and pit high walls (Intermountain Resources 2014). Raptors using the BBCM area appear to be capable of habituating to baseline noise levels associated with drag-line and other day-to-day pit operations. Resource protection measures discussed in **Section 2.2.3**, would ensure the protection of active raptor nests and prevent take of sagebrush obligates. These include annual monitoring of raptor nests and prey populations, instituting spatial buffers as needed during the nesting season, or other mitigation measures determined in consultation with the USFWS.

The reclamation plan and resource protection measures would minimize potential direct and indirect impacts to burrowing owls, ferruginous hawks, golden eagles, mountain plovers, and sagebrush obligates, resulting in negligible effects.

4.3.2.2 Cumulative Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those resulting from previously authorized actions at the BBCM and other past, present, and RFFAs in the area.

Alternative II – Proposed Action

Greater Sage-Grouse

The impact assessment area for cumulative impact analysis for Greater Sage-Grouse is the lease modification area and an associated four-mile buffer (46,977 acres). The issue identified for impact analysis is habitat loss due to mining related surface disturbance.

Past, present, and RFFAs in the cumulative impact assessment area include continued expansion and reclamation of the BBCM and Bridger Coal Mine Complex and associated mining exploration activities; oil and gas exploration, production, and transport (pipelines); livestock grazing; transportation corridors (vehicle and rail); and electrical transmission corridors.

Implementation of the Proposed Action would result in a long-term loss of approximately 257 additional acres of general sage-grouse habitat which equates to 0.55 percent of the cumulative

impact assessment area. The Proposed Action, and past, present, and RFFAs within the cumulative impact assessment area have and may continue to incrementally alter and/or remove Greater Sage-Grouse habitat. Cumulative impacts on general sage-grouse habitat would be minimized with successful implementation of the BBCM Reclamation Plan. There are no PHMAs or leks within the cumulative impact assessment area. Therefore, there would be no impact to PHMAs or leks or interference with breeding activities. For these reasons, cumulative impacts to Greater Sage-Grouse are expected to be minimal.

Pygmy Rabbit, White-tailed Prairie Dog, and Wyoming Pocket Gopher

The impact assessment area for cumulative impact analyses for the pygmy rabbit, white-tailed prairie dog, and Wyoming pocket gopher is the lease modification area and an associated one-mile buffer (6,361 acres). The issue identified for impact analysis is habitat loss due to mining related surface disturbance.

Past, present, and RFFAs in the cumulative impact assessment area include continued expansion and reclamation of the BBCM and associated mining exploration activities, oil and gas pipelines, livestock grazing, transportation corridors (vehicle and rail), and electrical transmission corridors.

Implementation of the Proposed Action would result in a long-term loss of approximately 257 additional acres of habitat for these species which equates to four percent of the cumulative impact assessment area. The Proposed Action and past, present, and RFFAs within the cumulative impact assessment area have and may continue to disturb and incrementally remove habitat for these species. Given that abundant suitable habitat is available surrounding the cumulative impact assessment area and that these species have rapid reproductive rates, the Proposed Action is unlikely to add to cumulative population-level effects. Cumulative impacts on these species' habitat from the Proposed Action would be minimized through implementation of the BBCM Reclamation Plan.

Burrowing Owl, Ferruginous Hawk, Golden Eagle, Mountain Plover, and Sagebrush Obligates

The impact assessment area for cumulative impact analyses for the burrowing owl, ferruginous hawk, golden eagle, mountain plover, and sagebrush obligates includes the lease modification area and an associated four-mile buffer (46,977 acres). The issue identified for impact analysis is habitat loss due to mining related surface disturbance.

Past, present, and RFFAs in the cumulative impact assessment area include continued expansion and reclamation of the BBCM and Bridger Coal Mine Complex and associated mining exploration activities; oil and gas exploration, production, and transport (pipelines); livestock grazing; transportation corridors (vehicle and rail); and electrical transmission corridors.

Implementation of the Proposed Action would result in a long-term loss of approximately 257 additional acres of habitat for these species which equates to 0.55 percent of the cumulative impact assessment area. The Proposed Action and past, present, and RFFAs within the cumulative impact assessment area have and may continue to disturb and incrementally remove habitat for these species. Cumulative impacts on these species would be minimized with

successful implementation of the BBCM Reclamation Plan and raptor and other avian protection measures.

4.3.3 General Fish and Wildlife

4.3.3.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to big game (i.e., mule deer, pronghorn antelope, and Rocky Mountain elk) and migratory birds other than those already authorized at the BBCM would occur.

Alternative II – Proposed Action

Big Game

The impact assessment area for direct and indirect impact analyses for big game is the lease modification area and an associated one-mile buffer. The issue identified for impact analysis is habitat loss due to mining related surface disturbance.

Direct impacts on pronghorn antelope, mule deer, and Rocky Mountain elk would include loss of habitat, mortality from animal-vehicle collisions, and harassment (intentional and unintentional). Other potential impacts could include habitat alteration as a result of invasive and noxious weed establishment. Temporary direct impacts from surface disturbance would leave approximately 257 additional acres of pronghorn antelope and mule deer winter/year-long range as well as general habitat for Rocky Mountain elk unavailable for use in the long-term. Suitable habitat is present surrounding the lease modification area such that big game would be displaced to nearby areas. Once reclamation is initiated vegetation production could become established within approximately three to five years such that some areas could become available for big game use in the short term.

According to the resource protection measures discussed in **Section 2.2.3**, the Pit 10 and Pit 15 mining operations propose to limit the impact of mining on big game by reclaiming the land for a post-mining use of range for livestock and wildlife. The Pit 10 and Pit 15 mining operations would also conduct monitoring surveys as required by the WDEQ and the WGFD. Results of annual monitoring surveys, existing baseline surveys, and future baseline surveys would be used to further define areas of concern and to identify developing mitigation needs. Given that the lease modification area does not provide crucial habitat or parturition areas, that a reclamation and monitoring plan would be in place, and that these species are wide-ranging and could move to other nearby habitat, impacts to big game would be negligible.

Migratory Birds and Raptors

The impact assessment area for direct and indirect analyses for migratory birds and raptors is the lease modification area and an associated one-mile buffer. The issue identified for impact analysis is disturbance to nesting birds and raptors due to mining activity and habitat loss due to mining related surface disturbance.

Habitat in the lease modification area provides foraging and/or breeding habitat for numerous raptors and other migratory bird species. There would be a temporary and long-term direct impact to an approximately 257 additional acres of foraging and/or breeding habitat due to the Proposed Action. Reclamation following completion of mining activities would minimize adverse effects from habitat loss. Reclamation would occur gradually and vegetation production could become established within approximately three to five years following reclamation. Consequently, some disturbed areas could become available for use by these species in the short term. However, the re-establishment of sagebrush shrubs can take 20 to 30 years. The loss of habitat as well as mine operation activities would displace these species into surrounding habitats near the lease modification area. Due to the abundance of suitable habitat available surrounding the lease modification area, population-level effects are not expected.

Other impacts to breeding birds could include habitat fragmentation, temporary displacement, mortality from vehicle/equipment collisions, interference with breeding or nest abandonment as a result of construction or operations noise and activity, increased predation of eggs or young, and alteration of habitat due to invasion of invasive and noxious weeds. Direct take would be minimized by resource protection measures discussed in **Section 2.2.3** regarding the protection of active nests. The reclamation plan and resource protection measures ensure that direct and indirect impacts on migratory birds and raptors would be negligible.

4.3.3.2 Cumulative Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those resulting from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Big Game

The impact assessment area for cumulative impact analyses for big game is the WGFD's designated big game herd units. For pronghorn antelope (Bitter Creek Herd Unit) and mule deer (South Rock Springs Herd Unit) the cumulative impact assessment area encompasses approximately 699,779 acres. For Rocky Mountain elk (Petition Herd Unit), the cumulative impact assessment area encompasses 1,835,750 acres. The issue identified for impact analysis is habitat loss due to mining related surface disturbance.

The primary past, present, and RFFAs in the cumulative impact assessment area include coal mining and exploration, oil and gas exploration, production, and transport (including the Hiawatha natural gas project), dispersed recreation, and livestock grazing.

Implementation of the Proposed Action would result in a long-term loss of approximately 257 additional acres of big game habitat which equates to 0.037 percent of the cumulative impact assessment area. The Proposed Action and past, present, and RFFAs within the cumulative impact assessment area have and may continue to incrementally remove or alter pronghorn

antelope and mule deer winter/year-long range as well as general habitat for Rocky Mountain elk. The Proposed Action would contribute minimally to cumulative effects to big game with successful implementation of the BBCM Reclamation Plan and the resource protection measures discussed in **Section 2.2.3** for big game.

Migratory Birds and Raptors

The impact assessment area for cumulative impact analyses for migratory birds and raptors is the lease modification area and an associated four-mile buffer (46,977 acres). The issue identified for impact analysis is disturbance to nesting birds and raptors due to mining activity and habitat loss due to mining related surface disturbance.

Past, present, and RFFAs in the cumulative impact assessment area include continued expansion and reclamation of the BBCM and Bridger Coal Mine Complex and associated mining exploration activities; oil and gas exploration, production, and transport (pipelines); livestock grazing; transportation corridors (vehicle and rail); and electrical transmission corridors.

Implementation of the Proposed Action would result in a long-term loss of approximately 257 additional acres of migratory bird and raptor breeding and foraging habitat which equates to 0.55 percent of the cumulative impact assessment area. The Proposed Action and past, present, and RFFAs within the cumulative impact assessment area have and may continue to incrementally remove or alter habitat for migratory birds and raptors. Cumulative impacts on these species would be minimized with successful implementation of the BBCM Reclamation Plan and raptor and other avian protection measures.

4.4 Geology/Mineral Resources/Energy Production

The impact assessment area for direct, indirect, and cumulative impact analyses for geology/mineral resources/energy production is the lease modification area. The issues identified for impact analysis for geology/mineral resources/energy production are the current use of the coal resource versus future use, modification of the geology in the mined area, and the temporary loss of use of land for oil and gas extraction, processing, and transport.

4.4.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to geology/mineral resources/energy production other than those already authorized would occur. The coal resource would be available for future extraction, however, the size and isolated nature of the coal make it unlikely this would happen under current economic conditions; therefore, the coal would most likely be bypassed. This would result in the loss of the use of the resource and federal revenues from the leasing and sale of the coal.

Alternative II – Proposed Action

The mining operation would remove the coal and return non-coal rock back into Pit 10 and Pit 15. The surficial geology would be disturbed on approximately 257 additional acres. Approximately 68 acres (15 percent) of the lease modification area has been previously disturbed

by mining activities under a BLM right-of-way agreement. The total surface disturbance would be approximately 325 acres or 72 percent of the lease modification area. The geology of the mined out pits 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 rock types and sizes back into the mined out pits. Rock types containing elevated mineral concentrations considered unsuitable for placement in close proximity to groundwater and surface water resources would be segregated for appropriate placement in the backfilled pits. The impact on geology would be moderate and long-term.

The mining of the coal as proposed, to be performed by BBCC with active operations located adjacent to the coal tract, represents the only opportunity to economically extract the coal under current and reasonably foreseeable future economic conditions. The mining of the coal would allow the continuation of mining activities at the BBCM, but would remove the opportunity to mine it in the future. An additional 9.2 million tons of in-place mineable coal would be added to the existing permitted in-place minable coal reserves and the new coal would be mined over a five to 10 year period. This would extend the overall life of the mine by approximately two to three years. Once BBCM's coal reserves in the lease modification area are mined, they would no longer be available for future use. The impact on the potential future use of the coal resource would be negligible to minor and long-term.

There are no known conflicts between oil and gas development and mining on the lease modification area. Oil and gas development can still occur adjacent to the mining operation. There would be a short-term impact on access to a portion of the oil and gas leases in Section 12, T19N, R100W. Based on current oil and gas extraction activity in the adjoining area, this impact would be minor.

4.4.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area) for geology/mineral resources/energy production are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); and BBCM coal mining activities under an existing BLM right-of-way agreement.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Under the Proposed Action, an additional 9.2 million tons of in-place mineable coal would be added to the existing permitted in-place minable coal reserves and the new coal would be mined over a five to 10 year period. This would extend the overall life of the mine by approximately two to three years. Once BBCM's coal reserves in the lease modification area are mined, they

would no longer be available for future use. The Proposed Action is the only past, present, and RFFA that would impact the coal reserves within the lease modification; therefore, there is no cumulative impact to coal reserves within the cumulative impact assessment area.

The mining operation would remove the coal and return non-coal material back into the lease modification area which would permanently alter the geology within the lease modification area. The Proposed Action is the only past, present, and RFFA that would impact geology; therefore, there is no cumulative impact to geology within the cumulative impact assessment area.

Oil and gas permittees would have access to oil and gas reserves after mining and could access oil and gas reserves using directional drilling technology. Resolution of impacts to existing oil and gas operations would be negotiated between BBCC and the oil and gas lease holders. The cumulative impact to oil and gas development within the cumulative impact assessment area would be minor and short term.

4.5 Hydrologic Conditions

The impact assessment area for direct, indirect, and cumulative impact analyses for hydrologic conditions is the lease modification area and the anticipated area of groundwater drawdown and the adjoining portion of the surface watershed. The issues identified for impact analysis for hydrologic conditions are the potential for loss of use of groundwater for other users, potential for pollution introduction into groundwater and surface water, loss of seeps/springs/wetland/riparian, and potential to increase surface water erosion/head cutting.

4.5.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to hydrologic conditions other than those already authorized would occur.

Alternative II – Proposed Action

Due to the limited availability and poor quality of groundwater present in the Fort Union Formation, and the absence of other Fort Union Formation water users in the groundwater drawdown zone, the groundwater level declines would be a minor impact to the local groundwater resource. Elevated TDS concentrations are expected in groundwater following spoil re-saturation. However, with time TDS concentrations and the groundwater table are expected to recover to near pre-mine quality and elevations, respectively (WDEQ 2008). Rock types containing elevated mineral concentrations considered unsuitable for placement in close proximity to groundwater and surface water resources would be segregated for appropriate placement in the backfilled pits. This would lower the potential impact from geologic materials on water resources. Impacts to groundwater quality would be minor and long-term. Indirect impacts from the deposition of mercury from the burning of coal at the Jim Bridger Power Plant are currently not considered an issue of concern based on historical water quality monitoring of Bitter Creek. Mercury emission control measures installed at the plant in April 2015 (Pacificorp 2017) further reduce the potential for mercury to impact aquatic systems in Bitter Creek and surrounding water courses.

The five foot groundwater drawdown contour would extend an estimated mile and one half from the Pit 15 boundary, based on calculations extrapolated from Pit 10 (BBCC 2001). Impacts to groundwater table elevations would be moderate and long-term, extending beyond the termination of mining and surface reclamation.

No water rights would be impacted by the mining of Pit 15, other than potentially those owned by BBCC. One well owned by WYDOT is located approximately 1.25 miles from the Pit 15 pit boundary. However, the well is not expected to be impacted due to its total depth in the underlying Lance or Fox Hills Sandstone formations which is below the Pit 15 pit bottom and geologic faulting between the well and Pit 15.

Streamflow losses to Bitter Creek would be attributable to disturbed-land runoff captured by the BBCM's drainage control structures. Relative to the runoff volume over the entire Bitter Creek drainage basin area, this loss of runoff from the disturbed land area would be negligible and short term. Given the available data, streamflow is constant throughout the BBCM area during baseflow conditions. There does not appear, based upon all usable historic data, to be any significant increasing or decreasing trends in the water quality (particularly total suspended solids and TDS concentrations) occurring between monitoring sites SBC1-75 and SBC2-75. Natural processes occurring within the channel can generally explain any notable differences in streamflow and water quality. Impacts to water quality would be negligible and short term.

Drainage channel impacts would be minimized to the period when mining is occurring. Reconstruction of the drainage channels to their approximate pre-mining profile and location, and monitoring of the sustainability of the constructed channels would minimize the potential for head cutting and excessive erosion. Impacts to stream channel form and function would be moderate and short term.

4.5.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area and the anticipated area of groundwater drawdown and the adjoining portion of the surface watershed) for hydrologic conditions are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); vehicle transportation and electrical transmission corridors; and BBCM coal mining activities (i.e., existing access roads, a surface water retention basin, topsoil stripping to accommodate mining of the existing leased and fee coal, and topsoil and overburden stockpiles) under an existing BLM right-of-way agreement.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Cumulative impacts to groundwater resources would be limited to coalescing cones of depression in groundwater surrounding Pits 11, 10, and 15. The 2008 Cumulative Hydrologic Impact Assessment that was prepared for the Green River Coal Area and that includes Bridger Coal Mine, Leucite Hills Coal Mine and BBCM, indicated based on modeling, that no cumulative potentiometric surface drawdowns would occur in the Fort Union Formation due to mining (WDEQ 2008). Groundwater quality impacts would be similar to that described for direct and indirect impacts. Cumulative groundwater impacts would be minor in intensity and long-term in duration.

Decreases in surface water flow to Bitter Creek would occur during mining. Following reclamation activities, surface water flows would be re-established in drainages that are designed to be similar in plan and profile morphology to the original drainages. Re-vegetation of disturbed surfaces would reduce the potential for erosion. However, livestock grazing, oil and gas development, and other surface uses in the watershed have the potential to increase erosion and sedimentation if not properly monitored and best management practices implemented. Monitoring following reclamation would be performed and areas developing increased erosion and/or heading cutting in channels would undergo corrective action. Impacts during the BBCM bond release period from other land uses in the area may become evident and would likely be brought to the attention of the BLM if they impact BBCC's bond release schedule. Cumulative impacts to surface water resources would be negligible to minor in intensity, and short term in duration.

4.6 Lands/Access

The impact assessment area for direct, indirect, and cumulative impact analyses for lands/access is the lease modification area. The issues identified for impact analysis for lands/access are loss of use of infrastructure or leases due to mining activities.

4.6.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to lands/access other than those already authorized would occur. Land status and prior rights to the lease modification 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 BBCM area.

Alternative II – Proposed Action

In the short term, surface coal mining would restrict public access and disrupt oil and gas development in portions of the lease modification area. Once the surface and vegetation in the lease modification area is reclaimed and BBCM has received bond release, the land would be returned to BLM management for multiple use and the land would be available again for public access and for oil and gas development. No impacts to existing infrastructure (pipelines or telecommunication lines) are expected based on those features being located outside of proposed the surface disturbance area.

4.6.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area) for geology/mineral resources/energy production are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); and BBCM coal mining activities under an existing BLM right-of-way agreement.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Incremental impacts from the Proposed Action in combination with other actions would slightly increase the amount of land area restricted from traditional land uses, but these impacts are expected to be short-term and moderate in nature. The majority of the impacts would result during the mining of the coal.

4.7 Livestock Grazing

The impact assessment area for direct and indirect impact analyses for livestock grazing is the lease modification area. The impact assessment area for cumulative impact analysis for livestock grazing is the portion of the Rock Springs Allotment south of Interstate 80 and east of Flaming Gorge National Recreation area within the BLM RSFO area, approximately 1,030,219 acres. The issues identified for impact analysis for livestock grazing are loss of AUMs, spread of noxious weeds, livestock and vehicle collisions, and forage modification.

4.7.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to livestock grazing other than those already authorized would occur. Forage production and diversity would remain the same and permittee access to the lease modification area would continue.

Alternative II – Proposed Action

It is assumed that the entire lease modification area would be restricted from livestock grazing when the BBCM starts operating in the area. Approximately 68 acres of the lease modification have been previously disturbed by BBCM mining activities under a BLM right-of-way agreement which directly impacted forage land available for livestock grazing and resulted in the loss of 7 AUMs in the short term. Implementation of the Proposed Action would directly impact approximately 257 additional acres of forage land available for livestock grazing and would result in the loss of 26 AUMs in the short term. The remaining forage lands and 12 AUMs

would be indirectly impacted due to the lease modification area being restricted via fence. Allocations of the Rocks Springs Grazing Allotment use would have to be restructured by the BLM to accommodate the loss of forage and access available to grazing permittees. The effects of mining in the lease modification area would be most notable to those permittees who use forage production within the lease modification area on an annual basis. As portions of the BBCM are reclaimed and made available to grazing, the loss of grazing in the lease modification area would be reduced. In addition, provided that appropriate reclamation is completed in the lease modification area after mining, the allotted AUMs would remain unchanged. See **Section 4.11** for the analysis of invasive species and noxious weeds. The entire lease modification area would be restricted from livestock grazing, therefore, no livestock and vehicle collisions are anticipated. The impact to livestock grazing in the impact assessment area would be adverse and substantial in the short term. Long-term impacts would be negligible to minor.

4.7.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (the portion of the Rock Springs Allotment south of Interstate 80 and east of Flaming Gorge National Recreation area within the BLM RSFO area, approximately 1,030,219 acres) for livestock grazing are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); BBCM coal mining activities under an existing BLM right-of-way agreement; adjacent BBCM mining activities; vehicle and railroad transport corridors; and electrical transmission corridors.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Impacts from the past, present, and RFFAs to livestock foraging areas include short- to long-term for oil and gas activities, long-term for transportation corridors, and short- to long-term for mining. For mining and oil and gas activities, impacts are minor to moderate and with reclamation and re-vegetation of the impacted areas, forage will return and livestock grazing use in the future will continue. Temporary loss of grazing in the lease modification area would incrementally increase the cumulative loss of forage acreage for livestock grazing by 0.04 percent (approximately 45 AUMs) of the cumulative impact assessment area (approximately 103,022 AUMs). Due to the large size of the portion of the Rock Springs Allotment (south of Interstate 80 and east of Flaming Gorge National Recreation area within the BLM RSFO area, approximately 1,030,219 acres) and the short-term nature of many of the other land uses, impacts to the cumulative impact assessment area would be minor. See **Section 4.11** for the analysis of invasive species and noxious weeds.

4.8 Native American Religious Concerns

The impact assessment area for direct, indirect, and cumulative impact analyses for Native American Religious Concerns is the lease modification area and an associated quarter-mile buffer. The issues identified for impact analysis for Native American Religious Concerns are potential impacts to three sites that occur within a quarter-mile of the lease modification area.

4.8.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to Native American Religious Concerns other than those already authorized would occur.

Alternative II – Proposed Action

Three sites sacred to Native Americans are located within a quarter-mile buffer of the lease modification area. The Proposed Action would not directly disturb any of the three sites; therefore, there would be no direct effect on any sacred Native American sites. The sites would be indirectly impacted due to the surface disturbance and other mining activities being visible from each site, degrading the viewshed. However, Native American consultation has determined that the tribes do not oppose the Proposed Action as long as the sites are not directly disturbed and do not see viewshed impacts as degrading the identified sites. Direct and indirect impacts to Native American religious concerns would be negligible.

4.8.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area and an associated quarter-mile buffer) for Native American Religious Concerns are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); BBCM coal mining activities under an existing BLM right-of-way agreement; and adjacent BBCM mining.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

The three Native American sensitive sites would not be directly impacted by the Proposed Action and other past, present, and RFFAs since these sites are protected by the BLM and tribal restrictions. The Proposed Action and other past, present, and RFFAs in the cumulative impact assessment area have indirectly impacted the viewshed of the three Native American sites. However, Native American consultation has determined that the tribes do not oppose the Proposed Action or other RFFAs as long as the sites are not directly disturbed and do not see viewshed impacts as degrading the identified sites. The Proposed Action will not increase

cumulative impacts to Native American sensitive sites and the overall cumulative impacts would be minor.

4.9 Social and Economic Resources

The impact assessment area for direct, indirect, and cumulative impact analyses for social and economic resources is Sweetwater County, Wyoming. The issues identified for impact analysis for social and economic resources are potential impacts to the population, housing, community services, local economy (primarily employment and earnings in the mining industry and other sectors of the economy), and local, state, and federal tax revenues in Sweetwater County due to the Proposed Action and BBCM operation.

4.9.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional beneficial impacts to social and economic resources other than those already authorized at the BBCM would occur. Operational costs at the BBCM would increase as the strip ratio of coal to overburden would increase without opening new pits; therefore, BBCM would not be competitive enough and would no longer be able to provide coal to their current customers without leasing additional reserves on public lands. The BBCM employees would drop by more than 100 people in the upcoming years as the focus at the BBCM would shift from production to reclamation in order to satisfy the State of Wyoming's bonding liability currently held by the BBCM. Future mining of other coal resources in the area could occur, but none have been identified at this time. The shortening of the BBCM life would eliminate an income source for mine employees and support service employees in the short term. A reduction in the demand for housing and community services would occur. Coal sales revenue to the State of Wyoming and the federal government in the form of royalty payments would not occur. Property taxes and net proceeds of the mining taxes, as well as sales taxes would not be paid to Sweetwater County.

The Jim Bridger Power Plant would seek other, potentially non-local, sources of coal to maintain production. The additional costs would be passed onto the utility consumers in the form of higher energy prices.

Alternative II – Proposed Action

Approval of the Proposed Action would allow BBCM to extend present production and employment levels for an additional approximately two to three years, resulting in continued economic benefits to Sweetwater County. In addition to the 185 BBCM employees that would have an additional two to three years of employment, according to the 3.0 multiplier used in the Pit 14 FEIS, an estimated additional 555 jobs would benefit from the additional two to three years of production. 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.

Since the workforce needed to support the Proposed Action is already employed at the BBCM, the existing housing and community services in Rock Springs, Green River, and Sweetwater County would be sufficient to accommodate the continued workforce.

The Proposed Action would continue to provide revenue to the State of Wyoming and the federal government in the form of royalty payments. Property taxes and net proceeds of the mining taxes, as well as sales taxes would be paid to Sweetwater County. Approximately 9.2 million tons of in-place mineable coal would be removed with the approval of the Proposed Action. The total estimated revenue at current market prices for the approximately 9.2 million tons of in-place mineable coal would be an additional $106,260,000 to $350,796,000. Approximately 28 percent of the revenue from the sale of coal would go to pay royalty, severance, and ad valorem taxes.

The Proposed Action would provide the lowest transportation cost of coal to supply the Jim Bridger Power Plant, leading to less expensive generation of electricity for customers of the Jim Bridger Power Plant.

4.9.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (Sweetwater County, Wyoming) for social and economic resources are the BBCM, trona and other coal mines, Jim Bridger Power Plant, mining exploration, oil and gas exploration, production, and transport, electrical transmission and vehicle/railroad transportation corridors, livestock grazing, and recreation.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area. The cessation of mining at the end of the BBCM permitted reserves would create negative and moderate impacts that would decrease the rate of growth in population and personal income levels. This may also slow growth impacts associated with known and RFFAs in Sweetwater County.

Alternative II – Proposed Action

Implementation of the Proposed Action, RFFAs, and continuation of existing projects would provide an increase in the tax base to Sweetwater County, state, and federal governments. This increase would be realized through severance and ad valorem taxes, and royalty payments from existing and proposed mining, energy, and oil and gas 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 BBCM, continue to increase property values and the need for more community services.

4.10 Soils

The impact assessment area for direct, indirect, and cumulative impact analyses for soils is the lease modification area. The issues identified for impact analysis for soils are modification of soil structure and type due to mining related surface disturbance.

4.10.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, no additional development beyond currently approved levels would occur; therefore, no additional impacts to soils would result.

Alternative II – Proposed Action

Activities occurring under the Proposed Action would result in approximately 257 additional acres of soil disturbance to the lease modification area. Approximately 68 acres of the lease modification area has been previously disturbed due to mining activities. **Table 4.1** identifies the approximate total number of undisturbed soil map unit acres within the lease modification area that would be directly impacted by the Proposed Action.

Table 4.1. Acres of Mine Development on Undisturbed Soil Map Units Found within the Lease Modification Area

Soil Map Unit	Approximate Acres of Direct Impact
Pit 10 Area[1]	
Winton Channery Loam, 0-45 percent slopes	2.6
Winton Horsley Rock Outcrop Association, Very Steep	11.5
Huguston Horsley Haterton Complex, 6-30 percent slopes	6.8
Monte Loam, 0-6 percent slopes	0.2
Pit 15 Area[2]	
Rock Outcrop & Typic Torriorthents	98.3
Ustic Haplocambids & Ustic Torrirorthents	137.1

Source: [1]Nyenhuis 2002 and [2]Munn and Arneson 1998.

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 to soils from the Proposed Action would increase the potential for wind and water erosion and sedimentation until re-establishment 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 lease modification 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 salvaged 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.

As part of the resource protection measures discussed in **Section 2.2.3**, BBCC is proposing 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

4.10.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area) for soils are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); and BBCM coal mining under an existing BLM right-of-way agreement.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Cumulative impacts in the cumulative impact assessment area would be dominated by mining activities. However, oil and gas exploration and production, pipelines, mining exploration, and livestock grazing have impacted soils in the cumulative impact assessment area. These impacts range from negligible to substantial in intensity. Many of these impacts will be temporary after reclamation of the impacted area. The cumulative impacts to soils are similar to direct and indirect impacts, but occupy a larger area of the cumulative impact assessment area. The majority of soils within the cumulative impact assessment area would eventually be able to support pre-mining uses.

4.11 Vegetation (Including Forestry and Rangeland) and Invasive Species/Noxious Weeds

The impact assessment area for direct, indirect, and cumulative impact analyses for vegetation (including forestry and rangeland) and invasive species/noxious weeds is the lease modification area. The issues identified for impact analysis for vegetation and invasive/noxious weeds are loss of native vegetation communities and the spread of invasive plant species and noxious weeds due to mining related surface disturbance.

4.11.1 Vegetation Range Sites

4.11.1.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and no additional impacts to vegetation (including forestry and rangeland) other than those already authorized would occur.

Alternative II – Proposed Action

The Proposed Action would result in the direct impact and short-term removal of approximately 257 additional acres within the lease modification area. Approximately 68 acres of the lease modification area have been previously disturbed. The total surface disturbance would be approximately 325 acres or 72 percent of the lease modification area. **Table 4.2** identifies the approximate total number of undisturbed range site acres that would be directly impacted by the Proposed Action.

Table 4.2. Acres of Mine Development on Undisturbed Range Sites Found within the Lease Modification Area

Range Site	Approximate Acres of Direct Impact
Shallow Sandy 50 percent-Shale 50 percent Complex	152.1
Saline Upland	86.0
Sandy 64 percent-Shallow Sandy 36 percent	18.06

Direct impacts from surface disturbance would leave approximately 325 acres of vegetation communities unavailable for use as wildlife habitat and livestock forage during the life-of-operations (i.e., five to 10 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.

In addition to the direct disturbance of a total of approximately 325 acres (approximately 68 acres previously disturbed) of vegetation, direct or indirect impacts could occur anywhere within the remaining 125 acres of the lease modification 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 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 re-establishment within the reclaimed range sites.

BBCC would develop a site specific post-mining detailed reclamation plan in coordination with the WDEQ, BLM RSFO, and the 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 re-vegetation would include a certified weed-free diverse mix of native grasses, forbs, and shrubs (as defined by existing range sites).

Prior to release of the reclamation bond (a minimum of 10 years following closure of the pits), 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 lease modification 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, reclaimed lands could eventually support vegetation cover and production rates similar to pre-mine conditions. Species diversity would be emphasized with a certified weed-free diverse seed mix, and special planning practices for shrubs, particularly sagebrush, would encourage re-growth of this important ecosystem component.

4.11.1.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area) for vegetation (including forestry and rangeland) are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); and BBCM coal mining activities under an existing BLM right-of-way agreement.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Cumulative impacts in the cumulative impact assessment area would be dominated by mining activities. However, oil and gas exploration and production, pipelines, mining exploration, and livestock grazing have impacted vegetation in the cumulative impact assessment area. These impacts range from negligible to substantial in intensity. Many of these impacts would be temporary after reclamation of the impacted area. The cumulative impacts to vegetation are similar to direct and indirect impacts, but occupy a larger area of the cumulative impact assessment area. The majority of the cumulative impact assessment area would be revegetated following reclamation, however, the types of vegetation present may differ from pre-disturbance conditions. However, range conditions within the cumulative impact assessment area are expected to support pre-mining uses following reclamation of short-term land uses.

4.11.2 Invasive Species/Noxious Weeds

4.11.2.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Impacts caused by the threat of invasive species and 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 species and noxious weeds from a contaminated area to a non-contaminated area.

Alternative II – Proposed Action

Surface disturbance would increase the potential for the spread of invasive and noxious weeds that are currently found within the lease modification area (e.g., black henbane, halogeton, thistles, cheatgrass, and foxtail barley). Disturbance would also have the potential to introduce new invasive and noxious weed species from outside the lease modification 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.

Per the GRRMP and ROD (BLM 1997a), 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. BBCC would develop a site specific post-mining detailed reclamation plan in coordination with the WDEQ, BLM RSFO, and the 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 re-vegetation would include a certified weed-free diverse mix of native grasses, forbs, and shrubs (as defined by existing range sites). The re-establishment of a self-perpetuating native plant community would limit opportunities for the establishment of invasive species and noxious weeds.

Since there are only some scattered weeds in the area and the 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.

4.11.2.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area) for invasive species/noxious weeds are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); and BBCM coal mining activities under an existing BLM right-of-way agreement.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

Surface disturbance in the cumulative impact assessment area would total approximately 325 acres (approximately 68 acres previously disturbed) or 72 percent of the lease modification area. Because the cumulative impact assessment area for invasive species and noxious weeds is limited to the lease modification area, any cumulative impacts from invasive species and noxious weeds associated with the Proposed Action would be the same as the direct and indirect impacts described above, except greater in area due to the presence of oil and gas operations and pipelines outside of areas identified for ground disturbing activities associated with the Proposed Action.

4.12 Paleontological Resources

The impact assessment area for direct, indirect, and cumulative impact analyses for paleontological resources is the lease modification area. The issues identified for impact analysis for paleontological resources are loss of paleontological resources due to mining related surface disturbance.

4.12.1 Direct and Indirect Impacts

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. Fossils would not be destroyed as a result of mining. Potentially scientifically significant fossils would not be discovered.

Alternative II – Proposed Action

No significant fossil remains were discovered during the reconnaissance paleontological field survey conducted for the proposed lease modification area. Mining of the coal could create the potential for scientifically significant fossils to be found. However, targeted coal seams are above the stratigraphic units containing the initial dinosaur discoveries at Black Butte (personal communication, Gene Smith, September 2015). Resource protection measures discussed in **Section 2.2.3**, which will be implemented for the Proposed Action, require that any unanticipated discoveries be reported to the appropriate regulatory authorities and no land disturbing activities take place within 100 feet of such remains until they have been evaluated by the regulatory authorities and salvaged, if warranted. If such fossils are found, the information gained would be a beneficial impact to the science of paleontology. Scientifically significant fossils that may be inadvertently destroyed would be an adverse impact due to the loss of paleontological information.

4.12.2 Cumulative Impacts

The past, present, and RFFAs within the cumulative impact assessment area (lease modification area) for paleontological resources are scattered oil and gas exploration, production, and transport (i.e., pipelines); exploratory drilling for coal in support of BBCM; livestock grazing (i.e., cattle and sheep); and BBCM coal mining activities under an existing BLM right-of-way agreement.

Alternative I – No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented and there would be no incremental increase in the cumulative effects in the cumulative impact assessment area other than those that have resulted from previously authorized actions at the BBCM and other past, present, and RFFAs in the cumulative impact assessment area.

Alternative II – Proposed Action

The Proposed Action in addition to other past, present, and RFFAs in the cumulative impact assessment area could uncover scientifically significant fossils and add to the existing information of the area. Scientifically significant fossils could be destroyed inadvertently. Potential cumulative impacts would be greater than the Proposed Action due to the cumulatively larger area being impacted by the Proposed Action, oil and gas operations, pipeline excavations, and other earth disturbing activities.

4.13 Residual Effects

Alternative I – No Action Alternative

If the proposed lease modification is not approved, it is likely that the federal coal reserves within the lease modification area would be bypassed, resulting in a loss of federal and state royalties.

Alternative II – Proposed Action

If the Proposed Action is approved, up to approximately 9.2 million tons of in-place mineable coal would be removed, resulting in approximately 257 additional acres of surface disturbance. Modification of the geology of the mined out pit would remain forever. Topographic reconstruction of the mined area would approximate the previous topography, but would tend to moderate topographic features. Vegetation, wildlife, and water resources are expected to with time resemble pre-mining conditions and meet post mining land use requirements.

4.14 Mitigation Measures

Resource protection measures (**Section 2.2.3**) and BLM special lease stipulations (**Appendix A**) have been incorporated into the Proposed Action to reduce impacts from the mining of coal within the lease modification area. Future mitigation is proposed for prehistoric Site 48SW6304 and the mitigation measures will be determined in consultation with SHPO and completed by OSMRE. The mitigation measures may include recordation of site features to preserve knowledge of the impacted site. It is possible that additional resource protection measures may be identified by the WDEQ during the post coal leasing SMCRA mine permitting process, for implementation during the mining of the coal and subsequent reclamation.

5.0 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

BLM consultation with potentially affected Native American tribes concerning the identification and management of specific traditional cultural properties and other sensitive sites is a mandated part of Section 106 and Section 110 of the NHPA, intended to determine cultural resource sites that might not be archaeological sites or historical structures. Non-archaeological/non-structural site types, such as springs, rivers, undeveloped trails, migration routes, procurement areas, hunting grounds, and vision quest locales, may also be considered sacred to Native American tribes.

On February 8, 2012, letters were mailed to the following Native American tribes: Northern Arapaho, Eastern Shoshone, Shoshone Bannock, Ute Tribe of the Uintah, and Ouray Reservation. Two of these tribes, the Northern Arapaho and the Eastern Shoshone, requested a field visit. On April 16, 2012, the Northern Arapaho and Eastern Shoshone tribes visited four sites, three of which were within a quarter-mile of the lease modification area. Both of these tribes did not oppose the proposed leasing and pit projects, as long as the sites are not disturbed (Stadler 2015). Therefore, there would be no effect on any sacred Native American sites. The BLM RSFO concurs that none of these sites would be disturbed by the Proposed Action (Stadler 2015).

The BLM consulted with the Wyoming SHPO and the SHPO concurred with the BLM determinations regarding the eligibility of the cultural sites near the lease modification area. In addition to tribal and cultural consultations, the BLM RSFO sent the notice of scoping for the lease modification to a variety of local, state, and federal government agencies including WGFD, USFWS, Wyoming Department of Agriculture, State Geological Survey, WDEQ, and State Planning Office; Sweetwater County Conservation District; and Sweetwater County Commission.

6.0 PREPARERS AND REVIEWERS

The list of preparers and reviewers for this EA, including BLM ID Team members and the third-party contractor, are presented in **Table 6.1**.

Table 6.1. List of Preparers and Reviewers

Name	Title	Area of Responsibility
BLM		
Bob Price	Supervisory Rangeland Management Specialist	Livestock Grazing, Rangeland Health Standards
Brenda Neuman	Solid Minerals Branch Chief	Document legality, overall document quality
Carol Montgomery	Renewable Energy Coordinator	Environmental Justice, Farmlands (Prime and Unique), Interm Project Lead
Charis Tuers	Physical Scientist (Air Quality)	Air Quality/Global Climate Change/Greenhouse Gases
Crystal Hoyt	Realty Specialist	Lands/Access
Dennis Doncastor	Hydrologist	Floodplains, Hydrologic Conditions (Including Water Resources/Quality (municipal supply watersheds, impaired waters) and wetlands/riparian zones)
Gene Smith	Archaeologist	Cultural/Historical Resources, Native American Religious Concerns, Paleontological Resources
James Evans	Petroleum Engineer	Oil and Gas Resources
James Glennon	Botanist	Invasive Species/Noxious Weeds (Executive Order 13112), Special Status Plant Species (Including ESA-listed and BLM Sensitive species), Woodland/Forestry, Vegetation (Including Forested and Rangeland)
Jay D'Ewart	Wild Horse and Burro Specialist	Wild Horses and Burros
Jeff Clawson	Mining Engineer	Engineering and Mining
Jessica Montag	Socioeconomic Specialist	Socio-economics

Name	Title	Area of Responsibility
Joanna Nara-Kloepper	Assistant Field Manager, Minerals and Land	Overall document quality, Interim Project Lead
Jo Foster	Outdoor Recreation Planner	ACECs, Areas of Wilderness Character, Recreation, Roadless, Wild and Scenic Rivers, Wilderness/WSA, Visual Resources
Kirk Rentmeister	Geologist	Wastes (hazardous or solid)
Mike Barajas	Range Technician (Fire)	Fuels/Fire Management (Presuppression)
Patrick Lionberger	Wildlife Biologist	Fish and Wildlife, Special Status Animal Species (Including ESA-listed and BLM Sensitive species), Migratory Birds
Phillip Blundell	Planning and Environmental Coordinator	NEPA analysis, overall document quality
Steve Wiig	Geologist	Geology/Mineral Resources/Energy Production, Public Safety, Soils
Theodore (Ted) Inman	Project Lead-Natural Resource Specialist	Project Lead, Environmental Justice, Farmlands (Prime and Unique)
OSMRE		
Eugene Hay	Mining Engineer, Western Region	Cooperating Agency and EA Review
Lauren Mitchell	Environmental Specialist, Western Region	Cooperating Agency and EA Review
Marcello Calle	Hydrologist	Cooperating Agency and EA Review
WDEQ		
Bryan Wood	Land Quality Division, District 2 Assistant Supervisor	Permit Coordinator
Tetra Tech, Inc. (Third-party Contractor)		
Mike Egan	Project Manager and NEPA Specialist	Project Management, NEPA Lead, and Document Preparation
Jill Reid	Wildlife Biologist/NEPA Specialist	Document Preparation and Project Record Compilation

Name	Title	Area of Responsibility
Wendy Rieth	Wildlife Biologist/NEPA Specialist and GIS Analyst	Fish and Wildlife, EA Calculations and Figures

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APPENDIX A
FORM 3400-12 (COAL LEASE)
BLM SPECIAL STIPULATIONS

Sec. 15. **SPECIAL 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 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 Regional Director of the Western Region of the Office of Surface Mining (the Western Regional Director), the Authorized Officer 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 Western Regional 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 Western Regional Director or Authorized Officer.

(2) Any existing Class III inventory report covering the lease area that has not received federal agency review must be reviewed and accepted by the agency, site National Registry of Historic Places (NRHP) eligibility determinations made, and consultation with the State Historic Preservation Officer completed before any surface disturbing activities take place.

(3) The lessee shall protect all cultural resource properties that have been determined eligible or unevaluated to the NRHP within the lease area from lease-related activities until the cultural resource mitigation measures or site evaluations 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.

(4) The cost of conducting the inventory, preparing reports, and carrying out mitigation measures shall be borne by the lessee.

(5) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Western Regional Director or Authorized Officer, or the Authorized Officer of the surface managing agency, if the Western Regional Director is not available. The lessee shall not disturb such resources except as may be subsequently authorized by the Western Regional Director or Authorized Officer.

Within two (2) working days of notification, the Western Regional 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.

(6) 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 of significant scientific interest discovered during the operations.

(c) ***THREATENED, ENDANGERED, CANDIDATE, OR OTHER SPECIAL STATUS PLANT AND ANIMAL SPECIES*** – (1) 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.

(2) 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.

(3) Any potential habitat that has not already been surveyed for Ute ladies'-tresses within the project area shall be identified and surveyed prior to surface mining activities.

(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 unmineable 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 a 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 unmineable 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 Office of Natural Resources Revenue (ONRR) 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.